

# An Empirical Analysis of the Relationship between Employment Structure and Industrial Structure — From the Perspective of Artificial Intelligence

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**Abstract:** The emergence and development of artificial intelligence is like a "double-edged sword" on labor employment. The rapid development of industrial intelligence makes "intelligent manufacturing" and "machine replacement" more and more common in China's traditional manufacturing industry, which undoubtedly has a great impact on labor employment in traditional industries. Based on the research of a large number of scholars, it is known that there is a close relationship between employment structure and industrial structure. Therefore, this paper wants to study the relationship between the output value of the three major industries and employment over the years, so as to promote the improvement of employment structure and the transformation and upgrading of industrial structure in the era of machine replacement. Firstly, taking the employment and GDP of the three major industries in China from 1978 to 2018 as the research object, this paper investigates the development trend of the employment and industrial production value of the three industries respectively. Secondly, the empirical regression shows that the increase of employment in the primary industry has a negative effect on the production value of the three industries; The increase of employment in the secondary industry has a positive effect on the production value of the three industries; The increase of employment in the tertiary industry has a negative effect on the secondary industry. Therefore, it is necessary to reasonably introduce artificial intelligence technology into the three industries to promote the improvement and upgrading of employment structure and industrial structure.

**Keywords:** employment structure; industrial structure; artificial intelligence; OLS model

## 1. Introduction

Innovation is the main driving force to promote regional sustainable development. At present, a new round of technological revolution is developing rapidly. As an important driving force of the new technological revolution, artificial intelligence has a profound impact on the

technical level of labor force. Industrial structure and employment structure are "one body and two wings" in the process of economic structure adjustment [1], however, the problem of China's industrial structure is becoming increasingly prominent. The unreasonable employment structure, the disappearance of demographic dividend, the increase of labor cost and the low technical level of employees all affect the transformation and upgrading of the industry. The employment situation of the labor force has a profound impact on the transformation and upgrading of the industry and ultimately on the development of the economy. The rapid development of artificial intelligence will bring great adjustment and change to China's future labor market structure, and more and more labor forces will continue to change from traditional industries to emerging industries. However, the current economic situation is not optimistic, and China's economic development is also facing many difficulties. In the coming period, China's employment situation will be more complex and arduous. The contradictions such as "recruitment difficulty" of enterprises, "employment difficulty" of college students and machine replacement are very prominent. Employment is related to the income of residents and the output of enterprises. Over the years, it has been identified as a major livelihood project in China and the first of the "six stabilities". In order to maintain the stable state of employment in China, the state has always adhered to the employment priority strategy and implemented an active employment policy.

With the development of economy and artificial intelligence technology, the economic structure is adjusted towards rationalization, and many employment and industrial problems are gradually solved. In the face of the form of machine replacement and high-quality economic development, the three industries, as the core driving force of economic development, need to be continuously transformed and upgraded, and the employment structure also needs to be continuously adjusted to alleviate the problems of people's livelihood. Only the coordinated development of the two can achieve high-quality development. Over the years, many scholars have studied the relationship between industrial structure and

employment structure. Based on various studies, this paper uses the production value and employment of the three major industries from 1978 to 2018 to explore the development trend of employment and industry in China. At the same time, it makes an empirical analysis of the impact of employment structure on industrial structure, draws relevant conclusions and solves the development problems of the two.

## 2. Journals Reviewed

Foreign scholars have studied and analyzed the relationship between employment structure and industrial structure from various angles. Based on William Petty's research, the British scientist Clark (1940) put forward the "petty Clark law", which reveals the relationship between labor force and industry, that is, the labor force structure of the three industries will change with the increase of per capita national income [2]. Minerva E. et al (2021) based on the employment data of Mexico from 2013 to 2018, the study found that its labor force is gradually transitioning from inefficient production sector to efficient production sector [3], which confirmed the "petty Clark law". Ding, Y. Y., et al (2020) thinks that there is a very close relationship between industrial structure and employment structure, in which the tertiary industry has the strongest absorption capacity and the highest degree of synergy [4]. Jesus Felipe et al (2021) based on the data of 40-68 countries for 16-50 years, it is found that with the development of industrial globalization, the labor market of various countries is also rapidly globalized, and the industrial structure affects the change and upgrading of employment structure [5]. At the same time, artificial intelligence technology has profoundly changed the traditional production mode. The computer-aided design management system developed by many scholars can help simplify the design of industrial robots, Achieve the goal of replacing people with machines [6]. The development of computer network will lead to the substitution of industrial bias of labor or capital [7-8], which makes social capital accumulate continuously and labor-intensive industries turn to technology intensive industries. It can be seen that foreign scholars are also actively studying the relationship between the two, and find that the interaction mechanism between employment structure and industrial structure has an impact on economic development, and the change of industrial structure affects the employment of labor force. At the same time, the employment situation also has a certain impact on the industrial output value.

On the one hand, domestic scholars have conducted relevant research on the relationship between the two structures, Xu Bo et al. (2019) conducted corresponding research and dynamic prediction based on the evolution process of China's two major structures, and found that the evolution process of industrial structure and employment structure does not match. The evolution fluctuation range of the two structures continues to weaken over time, and the adjustment difficulty between the two will increase, which is not conducive to the long-term economic development [9]. Hua Deya, Tang long (2019) through the research on the industrial structure and employment

structure of the Yangtze River economic belt, it is found that the higher the coordination of the two structures, the more conducive it is to promote the rationalization and upgrading of their respective structures, and help stabilize the regional economy [10]. On the other hand, scholars study the coupling relationship between industrial structure and employment structure from a spatial perspective, Xia Siyou et al (2020) using estda framework and standard deviation ellipse and other methods, it is found that the local space of the coordination degree between employment structure and industrial structure has strong stability and shows certain path dependence or spatial locking characteristics [11]. For the relationship between employment structure and industrial structure, Guo Junhua et al (2018) from the perspective of the new normal, China's industrial development is subject to the quality and supply structure of its internal labor force. Labor force with low quality and technical level is difficult to meet the requirements of industrial transformation and upgrading, and labor employment may hinder industrial transformation [12]. Wu Zhenhua (2021) used provincial panel data to test the impact of Internet and computer technology on employment skill structure "U" type influence [13]. Yu Binbin and Wu Yinzong (2020) used the differential GMM estimation method to test the direct effect of the coordinated development of employment industrial structure on industrial overcapacity. They believe that promoting the coordinated development of employment industrial structure and accelerating the upgrading of human capital at this stage can become a new idea to resolve industrial overcapacity [14].

Through reviewing and combing the existing literature, it is found that many scholars use different angles and analysis methods to study the employment structure and industrial structure, and unanimously agree that there is a close relationship between the industrial structure and employment structure. The intervention of artificial intelligence technology and employment situation have an impact on the industrial production value. It can be seen that the coordinated development of the employment structure and industrial structure of the three industries is conducive to the high-quality development of China's economy, but the specific impact relationship and impact degree still need to be further explored. In view of this, this paper attempts to empirically analyze the linear relationship between the employment of the three industries and the production value of the three industries in China by using the OLS regression model through the data of the employment of the three industries and the GDP of the three industries in China from 1978 to 2018, and conduct the corresponding intermediary effect and heterogeneity test to explore the impact of employment structure and artificial intelligence technology on industrial structure, In order to obtain valuable research conclusions and make suggestions for the rational layout of China's three major industrial structures and employment structures.

## 3. Analysis on the Change Trend and Influence Mechanism of Industrial Structure and Employment Structure

### 3.1. Change Trend of Output Value of Three Major Industries in China

Since the reform and opening up, the government has actively guided the development of industry, promoted the continuous improvement of China's market mechanism, the evolution of industrial structure according to the general law, and constantly optimized and moved towards high-end. According to the statistical data, China's GDP was about 367.87 billion yuan in 1978 and increased to 90030.95 billion yuan after 40 years, an increase of 244.7 times. As can be seen from the change trend chart of the respective output value proportion of the three major industries in Figure 1, we can see that from 1978 to 1984, the industrial structure showed the situation of "two one three", in which the tertiary industry developed rapidly during this period, and its output value exceeded the primary industry in 1985. From then on to 2012, the industrial structure showed the situation of "two three one". With the continuous growth of the production value of the tertiary industry, its output value exceeded that of the secondary industry in 2013 and became the leading force among the three industries. In 2015, the output value of the tertiary industry accounted for more than 50%, and the industrial structure also showed the pattern of "three, two and one". This shows that the economic system reform proposed at the Third Plenary Session of the Eleventh Central Committee has promoted the shift of the focus of economic development from agriculture to heavy industry, fully stimulated the vitality of the secondary industry, and changed the unbalanced development of the three major industries before China's reform and opening up. At the same time, the secondary industry has made a great and stable contribution to the growth of the national economy, It marks the transformation of China from an agricultural power to an industrial power. In the 21st century, China's entry into WTO and the promotion of economic globalization have led to the rapid development of the tertiary industry. Tertiary industries such as service industry have made great contributions to the national economy. China has changed from an industrial power to a service power again. In the whole evolution process, we can see that the proportion of primary industry decreases rapidly and accounts for a relatively high proportion; the proportion of the secondary industry decreased slowly, but accounted for a large proportion; The tertiary industry is growing rapidly, accounting for the largest proportion. From a long-term perspective, the proportion of the primary industry will continue to decline, and the secondary and tertiary industries will also occupy a leading position in economic development. The tertiary industry contains great development potential and will become the main force for the development of the national economy and play a great role in driving the growth of the national economy.

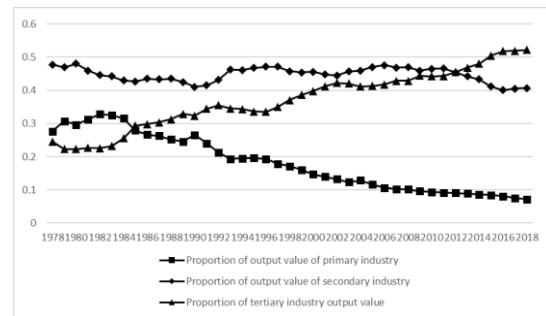
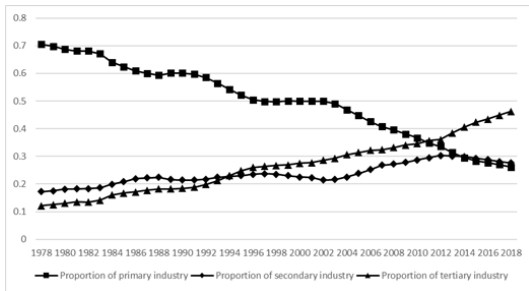


Figure 1. Change trend of the proportion of output value of three major industries from 1978 to 2018

### 3.2. Change Trend of Employment in China

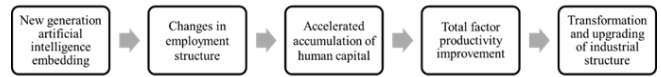
As a country with a large population, employment is related to people's happiness index and national economic development, residents' income and enterprise output. Over the years, it has been regarded as a major livelihood project in China. On the one hand, with the increase of total population and GDP, the change of industrial structure also promotes the change of employment structure. On the other hand, the rapid popularization of new computer technology affects labor relations and employment structure through various channels [15]. As shown in Figure 2, from 1978 to 2010, although the proportion of employment in the secondary industry and the tertiary industry showed an increasing trend, and the proportion of employment in the primary industry showed a downward trend, the proportion of employment in the primary industry was still larger than that in the other two industries. Before 1994, the employment structure showed the pattern of "one, two and three". After that, the proportion of employment in the secondary industry was exceeded by the tertiary industry, and the employment structure was "one, three and two" from 1995 to 2010. In 2010, the total number of employees in the tertiary industry exceeded that in the primary industry, and the employment structure showed a "three one two" pattern by 2014. From 2014 to 2018, the proportion of employment in the primary and secondary industries decreased slightly. At the same time, the number of employment in the tertiary industry increased rapidly, and the employment structure showed a "three two one" pattern. During the whole change period, the proportion of employment in the primary industry continued to decline, reaching 44%. During this period, China's agriculture gradually developed in the direction of agricultural modernization and science and technology by relying on various reforms and scientific and technological investment, the demand for labor force decreased, and a large number of rural surplus labor force poured into the secondary and tertiary industries from the primary industry. With the continuous adjustment of China's industrial structure and economic development, the secondary and tertiary industries contain many industries, with large scale and many jobs, attracting more employees. The overall employment structure also changes and tends to be rationalized, which also affirms the good results of industrial structure adjustment since the reform and opening.



**Figure 2.** Change trend of employment proportion of three major industries in China from 1978 to 2018

3.3. Influence Mechanism

According to the statistics of IFR, as an important carrier of artificial intelligence, the ownership of industrial robots per 10000 manufacturing workers in China is growing rapidly, which has significantly exceeded the global average. The expansion of business intelligence market will lead to the replacement of labor force by artificial intelligence, and the positive impact of disruptive technology will promote industrial metabolism [16]. The mechanism of employment structure affecting industrial structure through artificial intelligence is shown in Figure 3. The development of the new generation of artificial intelligence has brought about huge structural adjustment of the employment market, and then affected the adjustment of industrial structure. The promotion of economic growth by the new generation of artificial intelligence refers to the goal of achieving high-quality economic growth, the main direction of improving the scientific and technological innovation ability of the new generation of artificial intelligence, and the starting point of in-depth learning, cross-border integration, man-machine cooperation, group intelligence openness and independent control. The ultimate goal is to promote high-quality economic development. The embedding of artificial intelligence technology first produces the effect of machine replacement, which has a profound impact on the employment structure of the three industries; Secondly, it will intensify the accumulation of human capital, so that enterprises can save more human costs and increase the investment of other production factors; Thirdly, it will promote the improvement of total factor productivity and make all factors play the greatest role; Finally, it will promote the deep integration among the three industries, improve the intelligence and automation of production, and realize the transformation and upgrading of industrial structure. Under the background of machine replacement, new requirements will be put forward for the coordinated development of employment structure and industrial structure, that is, the domestic need to achieve national economic growth, the improvement of total factor productivity and the external need to achieve the overall prominence of economic competitive advantage. Only by constantly introducing and cultivating new business forms to adapt to the rapid adjustment of labor employment structure can we cope with the development trend of the new generation of artificial intelligence technology and achieve high-quality development.



**Figure 3.** Transmission path of employment structure affecting industrial structure under the background of machine replacement

4. An Econometric Test of the Impact of Employment Structure on Industrial Structure

According to the change trend chart of the two structures, the change of the proportion of output value of the three industries is basically consistent with the change of the proportion of employment in the three industries. However, it can also be found that the development of employment structure and industrial structure is uncoordinated, and the evolution of employment structure lags behind the and evolution of industrial structure. In order to understand the impact of the number of employees in China's three major industries on their respective industrial output value, this paper studies the linear relationship between employment structure and industrial structure through OLS regression model, and analyzes the impact of employment structure on industrial structure.

4.1. Data Description

This paper selects the time series data of the employment and output value of the three major industries from 1978 to 2018 in the China Statistical Yearbook, uses p1, p2 and p3 variables to represent the total employment of the primary, secondary and tertiary industries nationwide, and uses q1, q2 and q3 variables to represent the GDP of the primary, secondary and tertiary industries nationwide. In order to prevent the autocorrelation and heteroscedasticity of time series data from affecting the model, this paper carries out natural logarithm conversion on the original data to obtain variables ln p1, ln p2, ln p3, ln q1, ln q2 and ln q3, and uses Eviews software to process relevant data.

4.2. OLS Regression Estimation

The least square method (OLS) is used for model estimation, and the following results are obtained:

4.2.1. Model construction of the impact of employment in the three major industries on the output value of the primary industry

$$\ln q_1 = b_0 + b_1 \ln p_1 + b_2 \ln p_2 + b_3 \ln p_3 + u_1 \quad (1)$$

In order to eliminate the autocorrelation of the model, select the second-order autoregressive lag order to obtain the long-term equilibrium relationship expression between ln q1 and ln p1, ln p2 and ln p3:

$$\ln q_1 = -5.861 - 0.709 \ln p_1 + 0.632 \ln p_2 + 1.695 \ln p_3 \quad (2)$$

$$t=(-2.492) (-4.131) (1.818) (8.087)$$

$$\bar{R}^2=0.998 \quad DW=1.848 \quad F=3007.439$$

It can be seen from the regression results that the goodness of fit of the model is high and the sample determination coefficient  $\bar{R}^2 = 0.998$ . It shows that the employment of the three industries (ln p1, ln p2 and ln p3) has a significant impact on the output value of the primary

industry. The explanatory power of (lnq1) is 99.8%, which indicates that the model fits the sample data well, and the regression coefficient passes the t-test and DW test, that is, there is no autocorrelation in the model. The regression results show that for every 1% increase in employment in the primary industry in this period, the GDP of the primary industry will decrease by 0.709% on average; for every 1% increase in employment in the secondary industry in this period, the GDP of the primary industry will increase on average 0.632%; for every 1% increase in employment in the tertiary industry in this period, the GDP of the primary industry will increase by an average of 1.695%.

4.2.2. Model construction of the impact of employment in the three major industries on the output value of the secondary industry

$$\ln q_2 = b_0 + b_1 \ln p_1 + b_2 \ln p_2 + b_3 \ln p_3 + u_1 \quad (3)$$

In order to eliminate the autocorrelation of the model, select the second-order autoregressive lag order to obtain the long-term equilibrium relationship expression between lnq1 and ln p1, ln p2 and ln p3:

$$\ln q_2 = 19.979 - 1.242 \ln p_1 + 0.738 \ln p_2 - 0.038 \ln p_3$$

$$t=(5.689) (-3.574) (2.067) (-0.122)$$

$$\bar{R}^2=0.999 \quad DW=2.075 \quad F=8427.468$$

It can be seen from the regression results that the goodness of fit of the model is high and the sample determination coefficient  $\bar{R}^2=0.999$ . It shows that the employment of the three industries (lnp1, ln p2 and ln p3) has a significant impact on the output value of the secondary industry. The explanatory power of (lnq2) is 99.9%, which indicates that the model fits the sample data well, and the regression coefficient passes the t-test and DW test, that is, there is no autocorrelation in the model. The regression results show that for every 1% increase in employment in the primary industry, the GDP of the secondary industry will decrease by 1.242% on average; for every 1% increase in employment in the secondary industry, the GDP of the secondary industry will increase on average 0.738%; for every 1% increase in employment in the tertiary industry in this period, the GDP of the secondary industry will decrease by an average of 0.038%.

Table 1. Regional regression results

variable	lnq1	lnq2	lnq3	lnq1	lnq2	lnq3
c	-5.861*** (-2.492)	19.979** (5.689)	22.362*** (6.751)	-2.457* (-1.531)	18.436** (4.977)	21.437** (6.411)
lnp1	-0.709** (-4.131)	-1.24*** (-3.574)	-1.117** (-3.444)	-0.241** (-2.673)	-1.104** (-3.017)	-1.65*** (-3.846)
lnp2	0.632*** (1.88)	0.738** (2.067)	0.292*** (0.866)	0.598*** (1.486)	0.641** (1.975)	0.314** (0.945)
lnp3	1.695** (8.087)	-0.038* (-0.122)	0.139*** (0.448)	1.866** (9.475)	0.014* (0.037)	0.268** (0.652)
M				0.546** (2.456)	0.428*** (1.964)	0.476* (2.047)
soble				0.035***	0.057**	0.061**
$\bar{R}^2$	0.998	0.999	0.999	0.998	0.999	0.998

Note: \*\*\*, \*\*, \* means significant at the level of 1%, 5% and 10%, and the standard error in brackets.

4.2.3. Model construction of the impact of employment in the three major industries on the output value of the tertiary industry

$$\ln q_3 = b_0 + b_1 \ln p_1 + b_2 \ln p_2 + b_3 \ln p_3 + u_1 \quad (5)$$

In order to eliminate the autocorrelation of the model, select the second-order autoregressive lag order to obtain the long-term equilibrium relationship expression between lnq1 and ln p1, ln p2 and ln p3:

$$\ln q_3 = 22.362 - 1.117 \ln p_1 + 0.292 \ln p_2 + 0.139 \ln p_3$$

$$t=(6.751) (-3.444) (0.866) (0.448)$$

$$\bar{R}^2=0.999 \quad DW=2.119 \quad F=11801.82$$

It can be seen from the regression results that the goodness of fit of the model is high and the sample determination coefficient  $\bar{R}^2=0.999$ . It shows that the employment of the three industries (lnp1, ln p2 and ln p3) has a great impact on the output value of the tertiary industry. The explanatory power of (lnq3) is 99.9%, which indicates that the model fits the sample data well, and the regression coefficient passes the t-test and DW test, that is, there is no autocorrelation in the model. The regression results show that for every 1% increase in employment in the primary industry, the GDP of the tertiary industry will decrease by 1.117% on average; for every 1% increase in employment in the secondary industry, the GDP of the tertiary industry will increase on average 0.292%; for every 1% increase in employment in the tertiary industry in this period, the GDP of the tertiary industry will increase by an average of 0.139%.

4.3. Test of Intermediary Effect by Industry

In order to test whether the intervention of artificial intelligence technology affects the variable relationship between the employment of the three industries and the output value, this paper introduces the intermediary variable m to test the intermediary effect of different industries. In this paper, the per capita patent applications nationwide are selected to measure the development of artificial intelligence technology, and the logarithm is taken for regression analysis. The test results are shown in Table 1.

As can be seen from table 1, the first three columns report the estimation results of the benchmark regression model excluding intermediary variables; The last three columns report the regression results with the intermediary variable - artificial intelligence as the explained variable. It is concluded that the employment and the introduction of artificial intelligence technology play an obvious role in promoting the improvement of industrial output value. In the primary industry, the intermediary effect of artificial intelligence is 0.546, that is, the employment of the three industries will increase by 1%, and the output value of the primary industry will increase by 0.546% through machine replacement. In the secondary industry, the intermediary effect of artificial intelligence is 0.428, that is, the employment of the three industries will increase by 1%, and the output value of the secondary industry will increase by

0.428% through machine replacement. In the tertiary industry, the intermediary effect of artificial intelligence is 0.476, that is, the employment of the three industries will increase by 1%, and the output value of the primary industry will increase by 0.476% through machine replacement. Through the above analysis, it is concluded that the development of artificial intelligence is the intermediary path of employment structure affecting industrial output structure, which confirms the mechanism proposed above.

#### 4.4. Heterogeneity Test

In order to verify the robustness of the results of the article, regional heterogeneity analysis is carried out in this paper, and the test results are shown in Table 2.

**Table 2.** Regional regression results

variable	Eastern Region			Central region			Western Region		
	lnq1	lnq2	lnq3	lnq1	lnq2	lnq3	lnq1	lnq2	lnq3
c	-27.7 (-3.1)	21.6 (3.0)	-46.1 (-6.2)	-19.3 (-1.9)	-0.29 (-0.2)	2.61 (0.5)	-2.8 (-0.6)	19.3 (1.9)	-5.45 (-1.1)
lnp1	1.364 (1.9)	-0.958 (-2.3)	1.708 (3.14)	0.517 (0.66)	0.107 (0.12)	-2.681 (-5.1)	-0.963 (-2.5)	-0.756 (-0.8)	-1.692 (-3.9)
lnp2	0.57 (0.71)	0.941 (2.21)	1.159 (2.13)	0.576 (2.15)	0.338 (2.00)	0.249 (0.72)	0.718 (2.19)	0.215 (0.86)	0.775 (2.04)
lnp3	2.197 (4.82)	-0.72 (-2.8)	3.514 (11.7)	2.171 (7.89)	0.764 (1.64)	3.423 (17.8)	1.737 (10.2)	-0.022 (-0.1)	2.905 (14.8)
R <sup>2</sup>	0.952	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
F	101.392	8568.77	2752.37	1418.44	6277.87	1290.57	1631.97	3944.57	3034.84
DW	2.093	1.818	2.208	1.886	1.728	1.659	2.019	1.976	2.069

From the regression results of the above sub regions, it can be seen that the regression coefficient symbol of the secondary industry in the eastern region is consistent with the regression coefficient symbol of the national data. This is because the economic level of the eastern region is high, and the heavy industry in the three northeastern provinces is relatively developed. Therefore, the secondary industry in the eastern region also develops faster than other regions and absorbs a large number of employed people, therefore, the return situation is consistent with that of the whole country. In the central region, only the regression coefficient symbol of the tertiary industry is consistent with the regression coefficient symbol of the national data. Although the economy of the central region is not as developed as the eastern region, it is superior to the western region, and its tertiary industry is also more developed. Therefore, it is more consistent with the national data in the three major industries. In the western region, only the regression coefficient symbol of the primary industry is consistent with the regression coefficient symbol of the national data. The development of the secondary and tertiary industries in the western region is relatively backward and has insufficient advantages compared with the eastern and central regions. Its primary industry is a basic industry with a long development history, so the data is more consistent with the national data.

#### 5. An Empirical Analysis of the Impact of Employment Structure on Industrial Structure

There is a close relationship between industrial structure and employment structure. The coordinated development of the two is also an objective requirement to promote a country's economic development. The change of the number of employees in the three industries restricts or promotes the industrial output value. At the same time, the introduction of artificial intelligence technology under the phenomenon of machine replacement will also have an impact on the industrial output value. After reviewing the evolution trend of China's industrial structure and employment structure since the reform and opening up, this paper estimates the linear relationship between the number of employees in the three industries and the output value of the three industries by using OLS regression model, and passes the corresponding intermediary effect test and heterogeneity test. Through the calculation of measurement tools, the following analysis is obtained:

1) Since 1978, the evolution and development of industrial structure has gone through three stages, from "two one three" to "two three one" and finally to "three two one". A reasonable industrial structure should develop into a small proportion of primary industry and a large proportion of secondary and tertiary industries, guide the development of the whole industry and promote the increase of total output value. The evolution and development of employment structure has gone through four stages, from "one, two, three" to "one, three, two" and finally to "three, two, one". Even though both of them

eventually evolved into a "three two one" pattern, the comparison of the two data shows that the difference between the proportion of employment in the primary industry and the proportion of output value of the primary industry is nearly 20%, indicating that there is a large number of surplus labor force in the primary industry, with too many employees and less increase in output value; Similarly, the proportion of employment in the secondary and tertiary industries does not match its output value, indicating that there is still a lot of employment space.

2) From each regression model, it can be found that the increase of employment in the primary industry has a negative effect on the output value of each industry, of which the negative effect on the primary industry is small and the negative effect on the secondary industry is large. As a country with a large population, China invested a lot of labor force to develop agriculture in the early stage, and the rural population is large, and the rural areas absorbed a lot of labor force, which is also consistent with the high employment ratio of the primary industry in the early stage of reform and opening up. With the reform and opening up, China's economy has developed rapidly, the investment in science and technology in the primary industry has increased, and the agricultural modernization has been gradually realized, which has released a large number of labor force, and the rural surplus labor force has transferred to the non-agricultural economy. If the primary industry absorbs a large number of rural surplus labor, it will not only be detrimental to the economic growth of its own industry, but also have a negative effect on the secondary and tertiary industries, seriously affecting the adjustment of industrial structure. Therefore, vigorously promoting the transfer of rural surplus labor force is conducive to the economic growth of the three industries.

3) The increase of employment in the secondary industry has a positive effect on the output value of each industry, of which the positive effect on the tertiary industry is small and the positive effect on the secondary industry is large. According to the classification of China's current industrial structure, the secondary industry is mainly divided into four categories: manufacturing, mining, construction and energy production and supply. The first two are labor-intensive industries and require a lot of labor force. Therefore, the employment of the secondary industry also accounts for a large proportion. Heavy industry has always been the focus of China's development. At the same time, industry is also the main driving force of national economic development and has made great contributions to other industries. For example, the farming machinery of the primary industry needs the production of the secondary industry, and the development of the tertiary industry also needs the infrastructure provided by the secondary industry. Therefore, the increase of employment in the secondary industry has a positive impact on the three industries and is conducive to the growth of GDP.

4) The increase of employment in the tertiary industry has a positive effect on both the primary and tertiary industries, of which the positive effect on the primary industry is greater than that on its own industry, but has a negative effect on the secondary industry. The tertiary

industry mainly includes transportation, social service and tourism, which provides a large number of jobs. Therefore, it can effectively absorb the surplus labor force of the primary industry, promote the development of the primary industry, and is also conducive to the development of the tertiary industry itself. Comparing China's industrial structure with that of developed countries, it is found that the excessive development of China's service industry is likely to inhibit the development of the secondary industry [17]. Therefore, the increasing number of employees in the tertiary industry may lead to the decline of the output value of the secondary industry.

5) At the same time, we can see that under the impact of artificial intelligence and automation technology, machine replacement will lead to significant adjustment in the employment structure. Previously, stylized jobs at the middle level are easier to be replaced. The employment structure may show a "polarization trend" in which the proportion of high-income and high skilled jobs increases synchronously with that of low-income and private service jobs. With the adjustment of employment structure, various production factors will also change accordingly, so as to promote the transformation and upgrading of industrial structure.

## 6. Suggestion

### 6.1. Release Rural Surplus Labor Force

It can be seen from the above that the employment of China's primary industry accounts for a relatively high proportion, and has a negative effect on the increase of the output value of the three major industries. It can be seen that the employment of rural surplus labor force restricts the development of industrial structure. Therefore, it is necessary for the government to coordinate the development of agriculture, promote the development of agricultural modernization and liberate the rural surplus labor force. In addition, relevant policies can be introduced, such as creating an effective vocational training mechanism for rural labor force, improving the cultural level of migrant farmers, making them meet the needs of the human market and improving the employment rate of rural labor force. The development of the three industries needs not only capital investment, but also labor investment. The reduction of the employment rate of the primary industry is conducive to the economic development of the three industries. While promoting the smooth and orderly transfer of surplus labor force in the primary industry, it is conducive to the rational allocation of social labor resources, increasing the income of the poor in rural areas, solving the "three rural" problems, promoting the optimization and upgrading of industrial structure and accelerating national economic growth.

### 6.2. Integrating Artificial Intelligence Technology

"Science and technology is the primary productive force". At present, the society is in the key period of a new round of technological revolution. No matter which industry is inseparable from the support of artificial intelligence technology. The primary industry can introduce high-end automatic machinery and equipment for planting and production to change the dilemma of "relying

on heaven"; The secondary industry can introduce high-end automatic robots, improve the workshop intelligent flow line, and transform and upgrade from labor-intensive to high value-added manufacturing; The tertiary industry also introduces artificial intelligence technology to enrich the diversity of services and promote the development of traditional services to new services. In foreign countries, knowledge intensive industry has become the main driving force for development, while the development situation of this industry in China is not optimistic. The lack of high-quality talents and the severe employment situation also lead to the uncoordinated technical level of various industries in China. In order to promote the growth of total industrial output value and the optimization of structure, we need to vigorously promote the development of education, cultivate high-quality talents, promote the development of knowledge intensive industries, and improve China's overall scientific and technological level.

### 6.3. Enhance Industrial Linkage

It can be seen from the current industrial structure that the output value of the secondary and tertiary industries accounts for more than 90%, and they jointly promote China's economic growth. From the perspective of employment structure, the employment proportion of the secondary and tertiary industries is only more than 70%, the employment proportion of the two industries is relatively low, and there is still a large employment space. The two major industries are the main driving forces of development and need to be linked with each other, rather than developing independently. There is a close relationship between the two. Therefore, through the intervention of artificial intelligence technology, we can build an upstream and downstream industrial chain between the two industries, promote the smooth transition from the manufacturing industry of the secondary industry to the producer service industry of the tertiary industry, and improve the respective shortcomings of the two industries. Strengthening the linkage between the secondary and tertiary industries is conducive to expanding the development scale of the industry, providing more jobs, absorbing the surplus labor force transferred from the primary industry, and promoting a more perfect employment structure; At the same time, it is also conducive to promoting the high-end development of industrial structure, relying on intelligent technology to enhance the main driving force of economic development, and promoting China's development towards a manufacturing power and a service power.

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