Impact of Human Capital Accumulation on China's Industrial Structure Upgrading

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Abstract. Human capital is an important factor in transforming the mode of economic development and promoting the transformation and upgrading of industrial structure. This paper combs the existing literature on human capital accumulation and industrial structure upgrading, and analyzes the current situation of China's human capital and industrial structure. Research indicates that human capital as a factor of production will have an impact on the upgrading of industrial structure, and can promote the upgrading of industrial structure by promoting labor transfer and changing consumer demand.

Keywords: Human capital; Industrial structural upgrade; Influence Mechanism

1. Introduction and literature review

The rationalization and upgrading of industrial structure is an important indicator to measure the economic development of a country or region, and is also a necessary condition for promoting further economic development. Since the reform and opening up, China's economy has developed rapidly and the industrial structure has gradually become more reasonable. At present, China is in the midst of transforming the economic development mode, optimizing the industrial structure, and transforming economic growth momentum. To achieve the upgrading of industrial structure is to realize the transformation of production mode from factor-driven to efficiency-driven and innovation-driven, while the key to efficiency-driven and innovation-driven lies in human capital(Cheng rui et al.,2019)[1]. China is a populous country, and its abundant human resources have made great contributions to economic development.However, with the arrival of the "Lewis Turning Point", it is difficult to maintain economic growth by relying solely on the abundant human resources. Therefore, we must transform the quantitative advantage of China's human resources into a quality advantage and focus on improving the stock of human capital.Clark(1940)pointed out that the the essence of industrial restructuring is the new configuration process of various production factors such as capital and labor[2]. The role of human capital in this is to influence the upgrading of industrial structure by promoting technological progress and increasing income levels(Richard,1966)[3]. Laborers enhance their comprehensive quality through human capital investment and provide intellectual support for the the optimization of industrial structure. Romalis(2004) study pointed out that the higher the stock of human resources, the higher the industrial structure, and the better the development of knowledge-intensive and technology-intensive industries. In this regard, domestic scholars have also launched a series of studies[4]. Xu Youmin et al. (2010) believe that abundant human capital stock is an important reason for China to create an "economic miracle" and also the fundamental driving force to promote the transformation and upgrading of industrial structure[5]. The difference of human capital level between different regions is also one of the important reasons leading to regional industrial structure differences and uneven economic development.(Zhang guoqiang et al.,2017)[6]. Yang Ligao (2018) also showed through empirical research that the impact of China's current human capital accumulation on the rationalization and upgrading of industrial structure is positive[7]. Above all, scholars generally agree that human capital accumulation will have an impact on industrial upgrading, but what is the mechanism of action? What is the current status of human capital accumulation in China? What are the problems? Answering these questions has important practical urgency for optimizing the industrial structure and realizing economic transformation and

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upgrading.

2.Situation Analysis

2.1 China's human capital accumulation status quo

2.1.1 Human capital stock status quo. The stock of human capital is an important indicator reflecting the accumulation of human capital in a country, and the per capita education time is the most commonly used indicator for measuring human capital stock in the existing literature. According to the Chinese Education Years Law, this paper divides the education level of labor into six categories: illiterate, primary school, junior high school, high school, technical secondary school, junior college and above, and assigned to it: 0 years, 6 years, 9 years, 12 years, 12 years, 16 years. The results of the calculation of the per capita education time of the Chinese labor force in 2000-2017 are shown in Table 1.

From the table we can see that China's human capital stock has shown a steady growth trend in recent years.In 2000, the per capita education time in China was only 7.11 years, that means, most people only completed primary education. In 2006, China began to popularize “Nine-Year Compulsory Education”. By 2017, the per capita education time has risen to 9.21 years, and the per capita education has reached junior high school and above.But the growth rate of human capital showed a trend of first rising and then falling. From 2000 to 2008, the growth rate of the number of years of education per capita in China was 16%, but from 2009 to 2017, the growth rate was only 10%, this indicates that the growth rate of those who receiving higher education in the existing population is lower than that who receiving lower education.According to statistics, in 2015, the per capita education time in Canada, Australia and the UK was 14 years, that in Finland, the us and France was 13 years, while China has only 9 years.As a country with a large population, China ranks first in the world in terms of the total population, but its human capital level is far lower than that of developed countries, which indicates that a large part of human resources have not been properly developed and utilized.

Table 1. The per capita education time in China from 2000to 2017

Year	y2000	y2001	y2002	y2003	y2004	y2005	y2006	y2007	y2008
Per capita years of education	7.11	7.62	7.73	7.91	8.01	7.83	8.04	8.16	8.27
Year	y2009	y2010	y2011	y2012	y2013	y2014	y2015	y2016	y2017
Per capita years of education	8.38	8.21	8.85	8.94	9.05	9.04	9.08	9.08	9.21

Note: The data is compiled by the author according to the China Statistical Yearbook. The same below.

2.1.2 Human capital structure status quo. The accumulation of human capital must not only be concerned with the level of stocks, but also its internal structure.According to the education level of labor force, this paper divides Chinese human capital into three categories: primary human capital (including illiterate and primary school), medium human capital (including junior high school, high school and secondary school), and higher human capital (including junior college and above). From Figure 1, we can see that China's primary human capital accounted for 77.2% in 2010, the level of human capital is low. With the continuous development of education, the proportion of primary human capital has gradually declined, reaching only 30.5% in 2017. It shows that China's basic education has achieved great accomplishments. Medium human capital increased from 19.2% in 2000 to 55.6% in 2017, with a stable growth rate and a high proportion. The proportion of higher human capital is relatively low, only 3.6% in 2000. In 2017, the proportion of higher human capital in China increased to 13.87 percent,the proportion increased,

but the growth rate was very slow, indicating that China's higher education still needs to be developed.In general, China has abundant labor resources, but higher human capital is still scarce. The proportion of primary and medium human capital is relatively high, and the human capital structure needs to be improved.

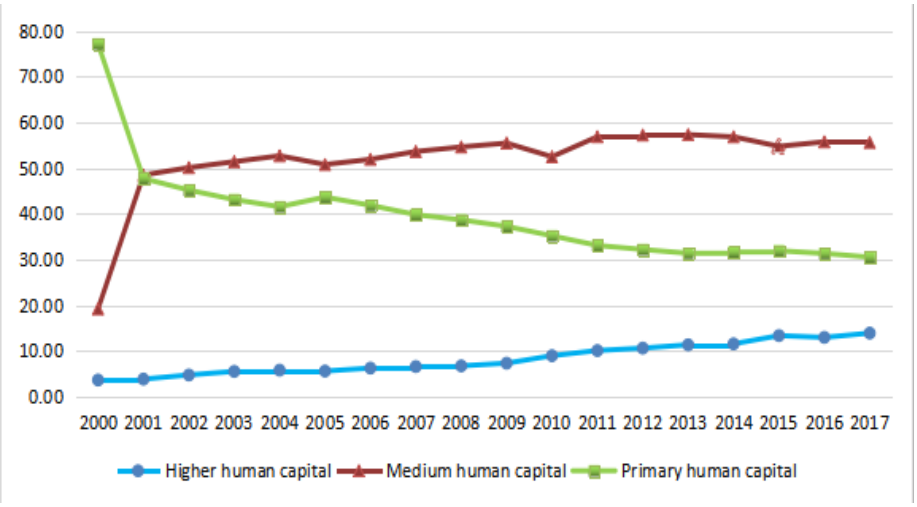

Figure 1. Current situation of China's human capital structure from 2000 to 2017

2.2 China's industrial structure development status quo

Since the reform and opening up, China's economy has developed rapidly and its industrial structure has been gradually upgraded and optimized. Figure 2 reflects the changes in the proportion of the output of the three major industries and the changes in the composition of employed persons between 2000 and 2017. It can be seen from the figure, since 2000, the proportion of the output value of the primary industry has gradually declined, the proportion of the output value of the secondary industry has first risen and then decreased, and the proportion of the output value of the tertiary industry has gradually increased. The industrial structure has gradually become reasonable, from the "two three one" structure to the "three two one" structure. The leading industry has changed from industry to service industry, and the direction of change is in line with China's economic development. However, the proportion of the tertiary industry is still relatively low compared to the developed countries, only 51.9%. In terms of employment structure, in 2000, the proportion of employment in China's three major industries was 50:22.5:27.5, and the primary industry absorbed half of China's labor force. With the economic development and industrial structure upgrading, the labor force has shifted to the secondary and tertiary industries. The proportion of employees in the primary industry has gradually declined, reaching 27% in 2017; the proportion of employees in the secondary industry has experienced a trend of rising first and then decreasing, and in 2017 it was 28.1%; the labor force eventually flowed into the tertiary industry, accounting for 44.9%. This law is consistent with the "Petty-Clark Theorem". However, the proportion of the employed population is not very reasonable.The output value of the primary industry is only 7.6%, which is 33% less than that of the secondary industry, but its proportion of employees is only 1.1% less than that of the secondary industry.This shows that there is still a large amount of human capital concentrated in the primary industry without reasonable transfer and utilization, thus resulting in a situation in which the primary industry has excess human resources but the secondary and tertiary industries are seriously lacking.

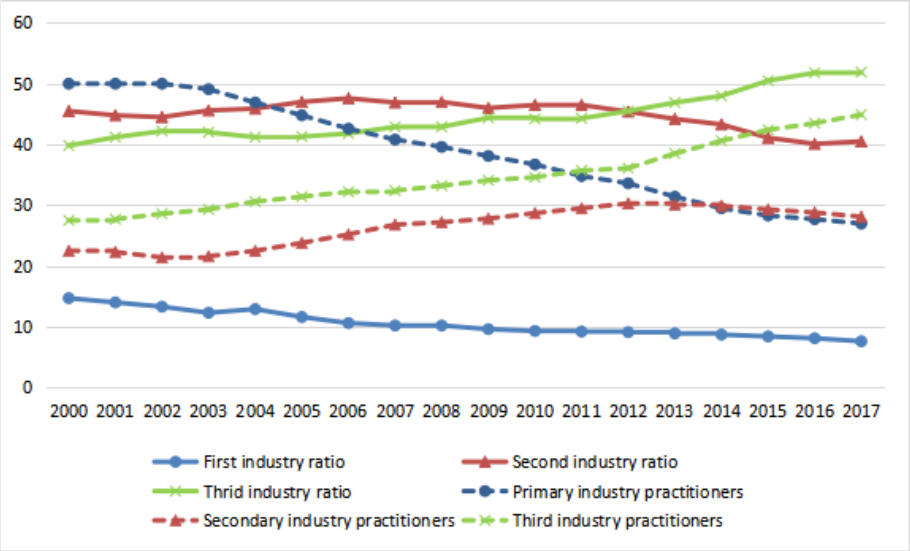

Figure 2. The proportion of China's three industrial structures and employees from 2000 to 2017

3.Analysis of the Influence Mechanism of Human Capital Accumulation on Industrial Structure

3.1 Supply angle

3.1.1 Human capital as an input factor affects the upgrading of industrial structure. In the Cobb-Douglas $Y=K\alpha(AL)1-\alpha$, where the K, A, L refers to physical capital, technical progress and human capital. It can be seen that human capital as a production factor, the quantity and quality of its input are related to product output, and increasing human capital investment has facilitation in industrial development. Technological progress is a core element affecting the development of human society and also a key factor in promoting the upgrading of industrial structure. Different levels of technological development and technological progress between different industrial sectors have led to a gradual increase in productivity and profitability among different industrial sectors. The unbalanced development between industries has driven the production factors from low-profit sectors to high-profit sectors, and finally achieved the upgrading of industrial structure through the survival of the fittest in market competition. However, technological progress is the endogenous result of knowledge accumulation, and the key to knowledge accumulation lies in the accumulation of human capital. Human capital is a special production factor. Through learning and accumulation, laborers can continuously improve their knowledge level and production skills, and create a constant power for technological progress. Therefore, as China's per capita education time increase year by year, the level of human capital continues to rise, and the industrial structure is also optimized.

3.1.2 Human capital affects industrial structure upgrading through labor transfer. One of the performances of industrial structure optimization and upgrading is the transfer and allocation of labor resources between industries. According to the general law, with the economic development, the labor force will flow from the primary industry to the secondary industry, and then gradually to the tertiary industry, from the traditional industry to the emerging industry and the growth industry, and finally realize the new allocation of human resources between industries and promote the industrial structure to a higher level. This phenomenon is consistent with the moving direction of China's labor force transfer and the upgrading of industrial structure. Secondly, the accumulation of human capital can not only improve the production efficiency of enterprises, reduce the production costs of enterprises, but also drive the accumulation of material capital. For the sunrise industry, the capital accumulation can promotes the expansion of the industrial scale and finally realizes economies of scale; for the sunset industry,

when the production scale remains unchanged, the surplus labor will be released to develop other industries, and the industrial structure will be optimized through market competition.

3.2 Demand angle

According to Keynesian theory of consumption, demand has a guiding effect on market supply. In terms of the quantity of consumer demand, the continuous increase in consumption will drive the vigorous development and scale expansion of related industries, and at the same time affect the development of upstream and downstream industries through the correlation effect of the industrial chain, thereby affecting the industrial structure. In terms of the structure of consumer demand, changes in the demand structure will lead to changes in the supply structure. According to Maslow's hierarchy of needs, the increase of human capital level will increase the income level of laborers, and their consumption structure will change accordingly, from survival consumer goods to gradual change into durable consumer goods, service consumer goods, and the industrial structure will be optimized and upgraded through changes in consumer demand structure. For example, in the early days of reform and opening up, people's income was low, mainly based on survival consumer goods, so the industrial development is mainly based on agriculture and light industry in industry. With the increase of income level, consumption has gradually turned to durable consumer goods. At this time, the proportion of agricultural output value in GDP has decreased, and the proportion of heavy industry and high-processing manufacturing industry has gradually increased. In the high-income level, the demand for service-oriented consumer goods increased, and the proportion of modern service industry output increased. And with the accumulation of human capital, consumers' consumption quality will also increase, and they will begin to pursue consumption grades and consumption quality. This will vigorously promote the development level of high value-added industries. Capital and labor have also begun to flow to high-tech industries, to achieve a shift from leading industries to technology-intensive industry and knowledge-intensive industry , and to promote industrial structure upgrading.

4.Conclusions and Recommendations

By analyzing the impact mechanism of human capital on industrial structure and the status quo of China's human capital and industrial structure, this paper draws the following conclusions: (1) Human capital mainly affects the upgrading of industrial structure through both supply and demand. First of all, human capital as a production factor, through the increase of factor input and the improvement of human capital level, affect product output and promote industrial upgrading. Second, human capital can guide the upgrading of industrial structure by promoting labor transfer and increasing labor income levels to change consumer demand. (2) China's human capital stock is increasing year by year, but the growth rate is gradually slowing down, and the level of human capital is still lower than that of developed countries. And the human capital structure is unreasonable. The proportion of low-level human capital such as primary, middle, and high schools is relatively high, and the high-level human capital such as colleges and above is still insufficient. This will have a certain hindrance to promoting China's economic development and realizing the transformation and upgrading of industrial structure. (3) At present, China's industrial structure is "three two one," but compared with developed countries, the proportion of the tertiary industry is still low. This is related to the distribution structure of human resources. There is a clear surplus of employees in China's primary industry, and there are insufficient employees in the secondary and tertiary industries. Human resources have not been rationally allocated and effectively utilized among industries.

Therefore, this paper proposes the following suggestions: (1) Increase human capital investment and improve the stock of human capital. First of all, the government still needs to increase investment in education, and gradually promote the implementation of twelve-year compulsory education on the basis of nine-year compulsory education.

And encourage private institutions such as enterprises to increase the proportion of investment in education and form a diversified investment structure. Second, improve the scientific research ability while ensuring the increase in the number of scientific and technological talents. Sound the talent evaluation indicators and perfect the talent incentive mechanism. (2) Breaking the household registration restriction system and Sounding the labor mobility mechanism. China's duality household registration system is the biggest factor hindering the free flow of labor, resulting in a lot of waste of human resources. To this end, the government should promote the reform of the household registration system and establish a unified management of household registration in the country. Eliminate the protection barriers of local governments, promote the implementation of the integrated social security system, realize the barrier-free flow of social security accounts between regions, and change the current imbalance of human capital distribution.

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