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Original Paper

Embedding in Global Value Chains, Innovative Human Capital and China's Manufacturing Upgrades

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Abstract

Since the reform and opening up, China has actively participated in the Global Value Chain (GVC) division of labor system and achieved rapid economic growth and moderate industrial upgrading. However, with the rapid development of GVC, more and more countries are participating in the global competition, and China's manufacturing industry is facing the serious challenge of "two-way squeeze" from the return of high-end and low-end transfer. This paper constructs a theoretical framework of GVC embedding and innovative human capital accumulation affecting manufacturing upgrading, and empirically examines the impact of GVC embedding location enhancement and innovative human capital accumulation on manufacturing upgrading from the perspective of product upgrading and efficiency upgrading. The findings show that innovative human capital accumulation enhances the positive effect of GVC embedding on product upgrading and efficiency upgrading. The extent of this effect varies across types of industries; for product upgrading, the positive regulating effect of innovative human capital on the positive relationship between embedded location and China's manufacturing upgrading is most pronounced in labor-intensive industries; for efficiency upgrading, innovative human capital plays a more significant positive regulating effect in capital-intensive and technology-intensive industries. Based on the above conclusions, the Chinese government should strengthen diversified investment in high-level talents and invest in the expansion of cooperative learning platforms in the upper, middle and lower reaches of the global value chain manufacturing industry, establish and improve relevant laws and regulations on intellectual property protection and transformation of innovation results, and solve the problem of deviation of talents from optimal allocation, so as to better exert the regulating effect of innovative human capital and promote the upgrading of China's manufacturing industry.

Keywords

global value chains, product upgrading, efficiency upgrading, innovative human capital

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1. Introduction

Manufacturing is the foundation of building and strengthening country. Since the middle of the last century, international transportation and communication costs have been decreasing, technology has been improving, more and more countries, including China, have been participating in the international division of labor system. However, in recent years, with the rapid development of global value chains, countries are becoming more and more competitive, some developed countries are implementing the "re-industrialization" strategy, and some developing countries are accelerating the industrialization process, which leads to China facing new challenges in the process of embedding in Global Value Chains (GVCs), such as "high-end reflux", "low-end lock" and "low-end transfer". Therefore, how to jump out of the trap of the low-end link and promote the upgrading of the manufacturing industry has become a key issue that China needs to solve. At the same time, China's demographic dividend is gradually disappearing, and the ranks of innovative talents are growing under the background of the strategy of reinvigorating the country through science and education and strengthening the country with talents, and actively participating in the process of GVC. Finding the appropriate direction and path of manufacturing upgrading is of great practical significance to promote the high-quality development of China's economy, which also provides some help for China to formulate industrial policies and provides theoretical and empirical research support for China to accelerate the implementation of the innovation-driven development strategy.

The upgrading of manufacturing industry is important to promote the high quality development of economy, and what factors affect the upgrading of manufacturing industry has become a hot topic recently. Su Hang, Zheng Lei (2017) suggest that if we want to realize the upgrading of China's manufacturing industry, we must optimize the factor structure, especially pay more attention to the accumulation of human capital. Zhong Xie et al. (2019) empirically investigated the relationship between innovation activities and manufacturing upgrading in emerging countries, and the results showed that technological innovation, product innovation and institutional innovation had a significant positive effect on manufacturing upgrading. Porter hypothesis holds that appropriate and moderate environmental regulations can promote enterprises to learn more advanced technologies or improve productivity, the enterprises will gradually realize industrial upgrading in the long run. In addition, more and more scholars have begun to study the impact of participating in GVCs on the upgrading of manufacturing industry, but various views have emerged. Scholars represented by Huang Ning and Zhang Guosheng (2015) believe that developed countries will continue to give full play to their advantages in capital and technology to consolidate their position in the global value chain, which will cause the industries of developing countries to fall into a miserable situation for a long time, which is not conducive to the development of the manufacturing industry in developing countries. However, there are still a large number of scholars who believe that participation in GVCs is beneficial to the upgrading of manufacturing industry. For example, Chen Yi (2019) used factor analysis method to construct a comprehensive index for the transformation and upgrading of manufacturing industry, and then empirically tested the positive impact of participation in GVCs on the upgrading of manufacturing industry.

The above research results show that there are many factors affecting the upgrading of manufacturing industry, and which need to be analyzed in combination with different national conditions. In addition, existing studies mainly discuss the impact of a single factor on industrial upgrading, which may lead to biased conclusions. Unfortunately, while the pool of innovative talents in China is growing, there is little literature that integrates innovative human capital with GVC embedding and manufacturing upgrading into a unified framework and explores their direct and indirect impacts on manufacturing upgrading from both theoretical and empirical perspectives.

The marginal contributions of this study are as follows. Firstly, the test of manufacturing industry segment heterogeneity is conducive to formulating more targeted upgrading paths for China’s manufacturing industry. Secondly, the manufacturing upgrading is divided into product upgrading and efficiency upgrading, and the entropy value method and DEA-Malmquist index method are used to measure product upgrading and efficiency upgrading respectively, which enriches the research perspective of manufacturing upgrading. Thirdly, it incorporates global value chain embedding, innovative human capital and manufacturing upgrading into a unified new framework for research, focusing on the close connection between the three, which makes a certain degree of contribution in making up for the previous research focusing only on local relationships.

2. Theoretical Analysis and Research Hypothesis

First of all, the scale effect generated by embedding in GVCs can promote the upgrading of manufacturing industry. Enterprises' participation in GVCs will expand their market scale and increase market demand. Schmookle (1966) proposed the "demand-induced Innovation" theory that the increase of market demand will naturally lead to innovation activities, which is an inevitable activity for enterprises to pursue interests. Therefore, enterprises will continue to carry out research and innovation after participating in the global market, which will promote industrial upgrading.

Secondly, the competitive effect of GVCs can promote the upgrading of manufacturing industry. When enterprises with similar technology levels are integrated into the GVC at the same time, they will invest more in R&D with the aim of maintaining their existing market share, occupying more market share or even striving for monopoly status. According to Peretto (2003), the competition effect can promote R&D innovation, reduce production costs, enhance core competitiveness, and thus promote industrial upgrading. When enterprises with large gaps in technology levels are integrated into the global value chain at the same time, developing countries can play a comparative advantage through labor and natural resource endowment, thus occupying the low-end manufacturing links downstream of the GVC, while enterprises in developed countries with leading technology levels have more energy and funds to enhance their core competitive capabilities, and this situation will have a positive effect on the industrial upgrading of both technologically advanced and lagging companies.

Finally, human capital has a positive impact on industrial upgrading. Under the background of the contemporary knowledge economy, especially advanced and innovative human capital, will have a more important impact than ever before. Innovative human capital has extremely rich professional knowledge reserve , strong professional problems solving skills, a high level of education and qualifications, or has strong business management skills, personnel selection and matching skills, the former is called technology-based senior human capital, the latter is called entrepreneurial senior human capital. With the development of GVCs, trade barriers between countries are gradually weakened, and innovative human capital flows more freely in the global market. When technology-based senior human capital participates in GVCs, on the one hand, it can improve the production efficiency, on the other hand, improve the technical level, and increase the possibility of breaking through the original technical bottleneck and creating greater profits for enterprises, thus promoting industrial upgrading. When the entrepreneurial senior human capital is involved in the production activities of the GVCs, it can allocate different production activities to different skilled human capital with its rich and reliable management experience, so that the matching situation is optimal and the capabilities of the specialized skilled human capital can be used most efficiently to promote the industrial upgrading. Senior human capital can provide better intellectual support for industrial upgrading, and this human capital has obvious downward compatibility (Yuan Dongmei & Li Heng, 2021), this view is consistent with the mechanistic analysis in this paper. So this paper proposes the following hypothesis: innovative human capital accumulation can enhance the positive effect of embedding in GVCs on China's manufacturing upgrading.

3. Model Construction, Variable Measurement and Data Description

(1) Model setting

In this paper, manufacturing upgrading is divided into two dimensions: product upgrading and efficiency upgrading. In order to examine the influence mechanism of the embedded location of GVC on product upgrading and efficiency upgrading, this paper sets the model as follows.

$$IND_{it} = \beta_0 + \beta_1 GVC_{it} + \beta_2 IHC_{it} \times GVC_{it} + \beta_3 IHC_{it} + \beta_4 Controls_{it} + \varepsilon_{it} \quad (1)$$

i denotes industry, *t* denotes time, *IND* denotes product upgrading *(PRO)* or efficiency upgrading *(TFP)*, *GVC* denotes global value chain embedding location, *IHC* denotes innovative human capital, and *Controls* denotes control variables, specifically including physical capital stock *(PCS)*, labor stock *(LS)*, technological progress *(TP)*, enterprise scale *(ES)*, enterprise performance *(EP)*, and technology intensity *(TI)*. α_0、β_0 denotes the constant, $\alpha_j(j=1,2,3...)$、$\beta_j(j=1,2,3...)$ is the coefficient to be estimated, and ε_{it} is the random error term. In this paper, we use a fixed effects model after a Hausman test, and control for year and industry.

(2) Variable measurements

Explained variables: product upgrading *(PRO)* and efficiency upgrading *(TFP)*. PRO is measured by the entropy method, TFP is measured by DEA-Malmquist method using DEAP2.1 software, and the specific evaluation index system is shown in Table 1. It should be noted we firstly measures the dynamic change process of total factor productivity *(TFP)* during the period under examination, and then refers to the method of Li Lianshui and Bao Yifa (2020), taking 2000 as the base period, assuming that the TFP value of 2000 is 1, the Malmquist Index of 2001 is multiplied with the TFP value of 2000, thus obtaining the TFP value of 2001, and so on, using the cumulative multiplication method to calculate the TFP value of each industry from 2002 to 2014.

Explanatory variable: GVC embedding location *(GVC)*. This paper uses the total export value added decomposition method proposed by Koopman (2010) to measure the GVC location index, which is a popular method used by domestic and international scholars. The formula is as follows.

$$GVC\_Position_{ir} = Ln(1+\frac{IV_{ir}}{E_{ir}}) - Ln(1+\frac{FV_{ir}}{E_{ir}}) \quad (2)$$

In Equation 2, $GVC\_Position$ denotes the GVC embedding location, *i* denotes the country, *r* denotes the industry, *E* denotes total exports, *IV* denotes the value of intermediate goods exported abroad, including intermediate exports consumed directly by the importing country and domestic value added re-exported by the importing country to third countries, and *FV* denotes foreign added value.

Adjustment variables: innovative human capital *(IHC)*. We choose the logarithm of the converted full-time equivalent of R&D personnel of industrial enterprises above the scale to measure IHC, which is a relatively popular measurement method in the world, and the results are accurate.

Control variables: control variables include factor endowments and industry characteristics (Liu Dongdong, 2019). Factor endowments specifically include physical capital stock *(PCS)*, labor stock *(LS)*, and technological progress *(TP)*; industry characteristics specifically include enterprise size *(ES)*, enterprise performance *(EP)* and technology intensity *(TI)*. The descriptions of the variables are shown in Table 1.

Table 1. Description of Variables

Variable Type		Variable Name	Specific Indicators and Measurement Methods
Explained Variables		PRO	Entropy method. Four indicators were selected: new product development expenditure, new product sales revenue, number of invention patent applications, and number of new product development projects
		TFP	DEA-Malmquist index method. The average value of the fixed capital stock and the total number of employees in all industries is used as the input variable, the average value of the total industrial output value is used as the output variable.
Explanatory Variable		GVC	Value-added accounting method. Three indicators of each industry are selected: total export, value of intermediate goods exported abroad, and foreign added value contained in exported products.
Adjustment Variables		IHC	The logarithm of the equivalent full-time equivalent of R&D personnel in industrial enterprises above the scale.
Control Variables	Elemental Endowment	PCS	Logarithm of net fixed assets after deflating treatment
		LS	Logarithm of the annual average number of all employees
		TP	Logarithm of internal expenditure of R&D funds
	Industry Characteristics	ES	Ratio of industrial sales output to the number of business units
		EP	Ratio of total profit to industrial sales value
		TI	Ratio of net fixed assets to industrial sales value

(3) Data description

This paper selects the 17 China's manufacturing industry segment data for empirical research, the GVC embedded location was calculated the original data from the World Input-Output Database, the raw data for each index of product upgrade and efficiency upgrade and raw data for control variables were obtained from China Industrial Statistical Yearbook, China Statistical Yearbook, Yearbook of Scientific and Technological Activities of Industrial Enterprises. The sample study period was from 2000-2014. This is because the latest version of data released by the World Input-Output Database is updated to 2014. In order to keep the data statistical time consistent, this paper then sets the statistical time period for all indicators to 2000-2014.

It should also be noted that in this paper, the R&D expenditure deflator is used to deflate the new product development expenditure and the industrial producer ex-factory price index is used to deflate the new product sales revenue when measuring the product efficiency upgrade. Among them, the R&D expenditure deflator is weighted by the consumer price index and the fixed asset investment price index, with the weight of the two indices being 55% and 45% in turn (Zhu Pingfang, 2003). The original data sources for all the indices involved here are the China Statistical Yearbook.

Finally, since the mean of the total number of employees has been used as an input variable to measure the explanatory variables when measuring TFP values using the DEA-Malmquist method, it is no longer used as a control variable when testing the impact of the manufacturing industry's embedded position in the global value chain on manufacturing productivity and the regulating effect of innovative human capital.

4. Empirical Results and Analysis

(1) Baseline regression result

In this paper, the dependent variables are set to PRO and TFP in turn, yielding no strong correlation between the independent variables. Furthermore, through variance inflation factor analysis, the VIF values were 3.78 and 3.80 respectively, both less than the critical value 10, so there is no serious multicollinearity problem between variables. According to Aiken and West (1991), both GVC and IHC were centralized before interaction terms were made, then GVC_C and IHC_C were obtained, and substituted them into the regression equation. This method avoids the covariance that "the interaction effect may mask or distort the main effect of either of the two factors". Table 2 presents the regression results of model 3.1.

From the perspective of product upgrading, manufacturing's position in the GVC positively affects product upgrading and is significant at the 1% level, and innovative human capital plays a significant positive regulating role in the relationship between manufacturing's GVC position and product upgrading. From the perspective of efficiency upgrading, there is a significant positive correlation between manufacturing embedded status and total factor productivity improvement, and innovative human capital can also play a positive moderating role between manufacturing GVC position and efficiency upgrading. This proves that hypothesis H1 holds, indicating that fostering innovative human capital is a favorable way to enhance the embedded position in the global value chain, which can simultaneously promote product innovation and production efficiency. From the control variables, the increase of labor factor is significantly and negatively correlated with industrial upgrading, indicating that China's labor force does not exert good learning effect and knowledge spillover effect, and most of them are engaged in low value-added and simple production jobs. Both physical capital stock and enterprise size contribute significantly and positively to product upgrading and efficiency upgrading. There is also a significant negative relationship between firm performance improvement and manufacturing upgrading, which may be due to the fact that firms neglect the importance of allocating more funds to product R&D and development after performance improvement. The unsatisfactory transformation of technological progress also reflects that the current allocation of resources may be irrational.

Table 2. Baseline Regression Results

Explanatory variables	Explained variables: PRO （1）	Explained variables:TFP （2）
GVC	0.086***	0.36***
	(0.014)	(0.135)
GVC_C×IHC_C	0.092***	0.064***
	(0.035)	(0.023)
IHC	0.403***	-0.334**
	(0.075)	(0.144)
LS	-0.435***	
	(0.103)	
PCS	0.263**	0.702***
	(0.105)	(0.203)
TP	0.068	0.28*
	(0.077)	(0.147)
ES	0.044***	0.099***
	(0.008)	(0.015)
EP	-2.374**	-0.791*
	(1.009)	(0.437)
TI	0.556	-6.349***
	(0.518)	(0.997)
_cons	-2.765***	1.4*
	(0.431)	(0.83)
Time effect	Yes	Yes
Industry effect	Yes	Yes
N	255	255
R^2	0.789	0.837

Note. Robust standard errors are reported in parentheses.

(2) Robustness tests

① Variable substitution

This paper adopts the method of replacing the adjustment variable, selects the number of personnel with bachelor's degree or above in the R&D institutions run by enterprises as the new adjustment variable, selects the same manufacturing industry segment data for the same 15 years, takes product upgrading and efficiency upgrading as the dependent variables respectively and regressed again. The results of the robustness regressions are shown in Table 3, and this result is generally consistent with the above, indicating that the article conclusions are reliable.

Table 3. Robustness Test Results

Explanatory variables	Explained variables: PRO	Explained variables: TFP
	-1	-2
GVC	0.078***	0.293***
	-0.013	-0.105
GVC_C×IHC_C	0.091***	0.105***
	-0.026	-0.027
IHC	0.485***	-0.209*
	-0.066	-0.116
LS	-0.331***	
	-0.097	
PCS	0.168**	0.716***
	-0.085	-0.21
TP	-0.118*	0.178
	-0.067	-0.143
ES	0.046***	0.109***
	-0.007	-0.014
EP	-2.217**	-0.719*
	-0.928	-0.414
TI	-0.484	-6.621***
	-0.53	-1.126
_cons	-2.705***	1.666**
	-0.392	-0.832
Time effect	Yes	Yes
Industry effect	Yes	Yes
N	255	255
R^2	0.707	0.835

Note. Robust standard errors are reported in parentheses.

② Endogeneity test

There may be a two-way causal relationship between embedding in GVCs and manufacturing upgrading: on the one hand, participation in GVCs will have a positive impact on manufacturing upgrading. On the other hand, the degree of upgrading of the manufacturing industry will determine the location of the industry's GVC embedding. With the continuous upgrading of the manufacturing industry, the output efficiency and scientific and technological innovation ability of enterprises will be improved, and the industrial structures will be continuously optimized, which will promote the manufacturing industry to develop to a higher level of the value chain and reach a higher embedded position in the GVCs and then. There was significant between-group heteroskedasticity in the samples in this paper, and the DWH test was used to test for endogeneity. Referring to Liu Xiangru (2021), who uses the lagged term of the endogenous variables as the instrumental variable, this paper uses the lagged term of the GVC embedding location as the instrumental variable and further employs the two-stage least squares (2SLS) method for endogeneity estimation to overcome the effect of endogeneity problem. Table 4 shows the regression results of the second stage.

Table 4. Endogeneity Test Results

Explanatory variables	Explained variables: PRO	Explained variables: TFP
	-1	-2
GVC	0.463**	1.132***
	-0.214	-0.275
GVC_C×IHC_C	0.089**	0.550***
	-0.042	-0.182
IHC	-0.032	-0.704**
	-0.478	-0.296
LS	0.066***	
	-0.015	
PCS	0.127	0.503***
	-1.63	-0.097
TP	0.108	0.588***
	-1.293	-0.217
ES	0.022**	0.074
	-0.01	-0.339
EP	-1.442*	7.241***
	-0.858	-1.951
TI	-0.245	-0.746**
	(-0.619)	-0.329
_cons	-0.369***	-1.381**
	-0.106	-0.541
Time effect	Yes	Yes
Industry effect	Yes	Yes
N	255	255

Note. Robust standard errors are reported in parentheses.

(3) Heterogeneity analysis

In this paper, the 17 manufacturing industries are divided into 7 labor-intensive industries (Note 1), 6 capital-intensive industries (Note 2) and 4 technology-intensive industries (Note 3) according to the different proportions of investment in technology, capital and labor. Table 5 shows the regression results of the heterogeneity analysis, where columns (1)(4) are selected for labor-intensive industries data, columns (2)(5) correspond to technology-intensive industries, and columns (3)(6) correspond to capital-intensive industries. Firstly, in terms of product upgrading, innovative human capital plays a positive moderating role in both labor-intensive and technology-intensive industries, and the moderating role is significant in labor-intensive industries. This result suggests that innovative human capital is an important moderator of product upgrading in these two industries. It is worth noting that the moderating effect of innovative human capital in capital-intensive industries is negative but not significant, indicating that capital-intensive industries still need to promote product upgrading more by giving full play to their capital advantages. From the current situation, the ability of innovative human capital in capital-intensive industries is very limited.

Secondly, in terms of efficiency upgrading, innovative human capital can play a positive moderating effect in all three types of industries, and the positive moderating effect in technology-intensive industries is significant at the 1% level, the effect in capital-intensive industries is significant at the 5% level, and there is no significant positive moderating effect in labor-intensive industries, which may be due to the fact that innovative human capital in labor-intensive industries are not optimally matched with jobs to bring out their innovation ability, but because they also have elementary labor skills, to a certain extent, they take advantage of the learning effect to improve the productivity of enterprises.

Table 5. Heterogeneity Analysis Results

Explanatory variables	Explained variables: PRO			Explained variables: TFP		
	(1)	(2)	(3)	(4)	(5)	(6)
GVC	0.469**	0.312**	0.193	0.599**	0.380	1.318**
	(0.195)	(0.155)	(0.342)	(0.263)	(0.708)	(0.129)
GVC_C×IHC_C	1.199***	0.032	-0.322	2.462	0.092***	1.268**
	(0.403)	(0.122)	(0.28)	(1.622)	(0.026)	(0.263)
IHC	0.083	0.232***	0.406**	0.035	-0.441	-0.221*
	(0.106)	(0.079)	(0.184)	(0.185)	(0.278)	(0.124)
LS	-0.626***	-0.951***	0.171			
	(0.139)	(0.220)	(0.314)			
PCS	0.131***	0.233***	-0.752**	0.072**	1.453***	0.455
	(0.033)	(0.051)	(0.293)	(0.034)	(0.474)	(0.337)
TP	0.321***	0.182	0.512**	-0.014	0.133	0.365*
	(0.099)	(0.108)	(0.219)	(0.172)	(0.33)	(0.206)
ES	0.181*	0.024***	0.057*	0.218	0.079***	-0.087***
	(0.096)	(0.008)	(0.033)	(0.16)	(0.024)	(0.031)
EP	-6.029**	-2.838***	-1.38	-10.333**	-3.945	0.276
	(2.428)	(0.981)	(2.026)	(4.221)	(3.007)	(1.907)
TI	1.875*	0.898	3.441**	-10.017***	-3.883**	-3.586**
	(0.985)	(0.557)	(1.530)	(1.712)	(1.707)	(1.440)
_cons	-1.234*	-1.283***	-7.404***	-3.856***	-3.035**	-6.685***
	(0.725)	(0.413)	(1.658)	(1.26)	(1.455)	(1.561)
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes	Yes	Yes
N	105	90	60	105	90	60
R^2	0.778	0.757	0.715	0.855	0.831	0.851

Note. Robust standard errors are reported in parentheses.

5. Conclusions and Suggestions for Countermeasures

(1) Research conclusions

This paper analyzes the impact of embedding position of GVC and innovative human capital on China's manufacturing upgrading from both theoretical and empirical perspectives. The findings of the study are as follows.

Firstly, upgrading the embedding position of GVC can promote product upgrading and efficiency upgrading of manufacturing industries.

Secondly, innovative human capital can positively regulate the relationship between embedded location and product and efficiency upgrading. Thus, it can be seen that cultivating innovative human capital is a favorable way to promote the status of the global division of labor and the upgrading of manufacturing industry.

Thirdly, this paper divides the manufacturing industry into labor-intensive, capital-intensive and technology-intensive industries based on the factors of production. The regression results show that for product upgrading, the regulating effect of innovative human capital is most significant in labor-intensive industries; for efficiency upgrading, the positive regulating effect played by innovative human capital is significantly positive in capital-intensive and technology-intensive industries.

(2) Suggestions for countermeasures

① Enhancing diversified investment in innovative talent

As the labor force decreases and the economy grows, China's "demographic dividend" effect has gradually faded, and the effective way to cope with the severe test of upgrading the manufacturing industry is to comprehensively improve the quality of the labor force and cultivate the innovation ability.

The government can strengthen diversified investment in innovative human capital. The first is to increase investment in education and support the teaching of innovative thinking and ability development in colleges and universities, and strive to export more innovative talents from colleges and universities to society. The second is to invest more in health care and social security, and improve the existing supporting policies to provide innovative human capital with the right level of logistical support in terms of taxation, housing, and even spouse placement and children's schooling. Thirdly, for talents with particularly significant scientific and technological achievements and outstanding contributions to the R&D of core manufacturing technologies, the government and the enterprises in which they work should increase the remuneration and benefits and expand the publicity platform to give social encouragement as incentives.

② Investing in the expansion of a collaborative learning platform for upstream, midstream and downstream GVC manufacturing

This measure can enhance the internal drive, facilitate more frequent, extensive and in-depth exchanges between talents from different countries, stimulate the learning motivation and innovative thinking of China's innovative human capital, and at the same time cultivate more senior talents with innovative ability and sense of innovation.

③ Establishing and improving the relevant laws and regulations on the protection of intellectual property and the transformation of innovative achievements

Increasing the investment and protection of innovative human capital is an effective way to mobilize the enthusiasm of innovative human capital, increase the stock of Human capital in China and bring into play the "technology dividend". The establishment and improvement of relevant laws and regulations, while raising the cost of violating relevant laws and regulations, will provide a stronger protection mechanism for innovative human capital and encourage them to participate more actively in the division of GVCs.

④ Solving the problem of talent deviation from optimal allocation

Innovative human capital in the GVCs on the relationship between the product upgrading has played a negative effect, this shows that the allocation of resources in the present stage of China's capital-intensive industries may not be reasonable enough, there is an innovative human capital in the circumstances of the mismatch in the department of the enterprise, therefore, the government and enterprises should pay more attention to and solve the problem of mismatch of innovative talents, optimize the distribution of internal resources, The higher the matching degree is, the more conducive to improving the innovative power and effectiveness of innovative human capital, and providing stronger impetus for industrial development.

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Notes

Note 1. Labor-intensive industries include: food, beverage and tobacco industry; textile, garment and leather industry; wood processing (except furniture) and wood, bamboo, rattan, palm, grass products industry; printing and publishing industry; paper and paper products industry; metal products industry; furniture products other manufacturing industry.

Note 2. Capital-intensive industries include: coking and petroleum industry; chemical product industry; pharmaceutical products industry; rubber and plastic products industry; other non-metallic mineral products industry; basic metal products industry.

Note 3. Technology-intensive industries include: computer, electronic and optical equipment industry; electrical equipment industry; machinery and equipment industry; transportation equipment industry.