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Research on Industrial Structure and Talent Management of Advanced Manufacturing Industry in Jiangsu Province

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ABSTRACT
This paper first uses the data of listed companies in the advanced manufacturing cluster industry in Jiangsu Province, China in 2018, and constructs the Chenery-Selquin talent structure model to conduct an empirical analysis of the matching effect of the advanced manufacturing cluster industry and the corresponding talent structure. The empirical results show that there is an imbalance between the supply and demand of talents in all industries. From the perspective of all talents, the two industries of cutting-edge new materials and core information technology have the highest deviation coefficients, which are 1.73 and 1.21. From the perspective of various types of talents, the resource allocation of non-technical talents in most industries is relatively reasonable, while the oversupply of technical talents in various industries has occurred.
Keywords: *Industrial structure, talent structure, advanced manufacturing clusters*

1. INTRODUCTION

Jiangsu is a strong manufacturing province in China and is undergoing industrial transformation and upgrading by cultivating 13 advanced manufacturing clusters. The upgrading of the industrial structure is inseparable from the upgrading of the industrial talent structure. If the talent structure cannot be adjusted according to the actual needs of the economic industrial structure transformation and upgrading, then the development of Jiangsu's economy will be restricted by the unreasonable talent structure. Therefore, this article uses the data of Jiangsu's manufacturing industry and talents to conduct empirical research by constructing models to provide countermeasures and suggestions for Jiangsu Province to cultivate high-quality industrial talents and cultivate high-quality innovative development of advanced manufacturing industries.

2. THEORETICAL RESEARCH AND MODEL BUILDING

2.1. Literature Review

Advanced manufacturing cluster refers to an industrial network based on advanced technology and industrial fields[1,2], which is formed by a few geographically adjacent companies and institutions through mutual cooperation and exchange[3]. Based on satisfying the various elements of the industrial cluster, it is at the leading level in terms of technology, process, manufacturing mode, product quality, elements and organizational form[4,5].

Industrial talents refer to talents related to the industrial development process, including industry instructors who focus on the overall development of the industry[6], as well as industry practitioners who are committed to the industry's micro-main body and third-party talents who provide production factors for specific industrial projects[7].

Regarding the relationship between industrial structure and talent structure, industry is the external manifestation of the development of productivity, and talent is the internal factor that promotes the development of productivity[8]. The industrial economy can realize the concentration and combination of all kinds of talents and realize economies of scale[9]. The gathering of industries in a certain area attracts talents to gather in this area, providing sufficient human resources for different industries, thus accelerating the speed of industrial transformation and upgrading[10]. In addition, many scholars have studied the relationship between emerging industries and talent structure from the perspective of structural deviation, and made policy recommendations based on the results[11,12].

2.2. Model Building

Chenery-Selquin proposed the lagging theory of employment structure conversion and believed that the demand for labour in emerging industries is relatively low. Talents in traditional industries cannot be absorbed into emerging industries at the beginning, thus industrial and

talents structure cannot be balanced. High asymmetry in a state of asynchrony and asymmetric change. This article is based on the Chenery-selquin model to measure the symmetry of talent and industrial structure:

$$\text{Deviation}X_i = \left(\frac{\text{Industrial output value composition ratio}}{\text{Talent structure composition ratio}}\right) - 1;$$

$$\text{Total deviation} = \sum |X_i|, i = 1,2,3,\cdots$$

Industrial output value refers to the total market value of listed companies in each industry, talent structure refers to the number of various types of talents in the industry, and the total deviation is equal to the sum of the deviation degrees of each industry, i refer to different industry. According to the formula, if Jiangsu's advanced manufacturing cluster industry and talents are fully matched, the calculated deviation degree should be 0, which is an ideal state. In terms of size, the smaller the absolute value of the deviation degree, the higher the matching degree between industry and talent; the larger the absolute value of deviation degree, the lower the matching degree between industry and talent. In terms of positive and negative values, if the deviation degree is positive, it means that the composition ratio of the industrial output value is greater than the talent, and the industry is lack of talents; if the deviation degree is negative, it means the industry is over-talented and there is a waste of talent.

2.3. Data Sources and Notes

Data of the market value and talents structure of listed companies in 2018 come from the Eastern Fortune Choice Database. It should be noted that advanced manufacturing cluster refers to new power (new energy) equipment, construction machinery, Internet of Things, high-end textiles, cutting-edge new materials, biomedicine and new medical equipment, integrated circuits, offshore equipment and high-tech ships, high-end equipment, energy conservation environmental protection, core information technology, automobiles and parts, new displays. Besides, the talent structure includes R&D talents, senior management, general administrative personnel, and technical personnel.

3. MODEL RESULT ANALYSIS

The model calculates the deviation coefficient, the total deviation coefficient of Jiangsu advanced manufacturing cluster industry, the result is shown in Table 1. The calculation results show that there is an incoordination between the talent structure and the development of the deviation shows that the industrial and talents structure is industry, the demand and supply of talents in various industries are not balanced.

3.1. Analysis of Total Deviation Coefficient

As shown in Table 1, from the perspective of the deviation of the talent structure, the total deviation of total employee is 7.21, which shows that the supply and demand of talents in the advanced manufacturing cluster industries in Jiangsu Province is seriously imbalanced. Some industries need to introduce a large number of talents, and some industries need to reduce the number of personnel. From the perspective of various types of talents, the highest is the total deviation coefficient of general administrative staff, 9.49, which shows that the current industry lacks general administrative staff the most. According to the order of the total deviation coefficient of various types of talents, they are senior management (8.73), R&D personnel (8.59), and technical personnel (8.28).

3.2. Analysis of the Coefficient of Deviation of Talents in Various Industries

As shown in Table 1, from the perspective of the deviation of various industries, there is an oversupply of talents, such as cutting-edge new materials(1.37), engineering equipment(0.8), new power equipment(0.5), core information technology(1.21), and the Internet of Things(0.13). These five industries are the original advantageous industries with sufficient talent reserves in Jiangsu Province. There are also industries in which talents are in short supply, such as new displays(-0.62), high-end textiles(-0.31), offshore equipment and high-tech ships(-0.53), biomedicine and new medical equipment(-0.43), integrated circuits(-0.37), high-end equipment(-0.28), energy conservation and environmental protection(--0.32), automobiles and parts(-0.34). These eight industries need to bring in more talents.

From the perspective of the absolute value of the degree of deviation, the industry with the most serious oversupply of talents is cutting-edge new materials, and the deviation coefficient of R&D personnel is 3.14, which is much higher than other industries. The industry that needs the most talents is the new display, the total deviation is -0.62, and the industry is short of R&D talents. The industry with the most balanced talent structure is the high-end textile industry, with an average deviation of only 0.1.

From the perspective of the deviation of various types of talents, the deviation of R&D personnel fluctuates between -0.68 and 3.14, with the largest range; the more balanced is the senior management talent, and the fluctuation range is between -0.62 and 1.68.

Table 1 The deviation degree of the talent structure of Jiangsu's advanced manufacturing cluster industry in 2018

Industry name	Total number of employees	R & D personnel	Senior management	Administrative staff	Technical staff	Bachelor degree and above	Industry average Deviation
Cutting-edge new materials	1.37	3.14	0.46	1.32	2.83	1.96	1.85
Construction machinery	0.80	0.80	2.47	1.08	1.17	0.52	1.14
New displays	-0.62	-0.68	-0.39	-0.53	-0.76	-0.67	-0.61
High-end textiles	-0.31	0.68	-0.04	-0.26	0.13	0.39	0.10
New power (new energy) equipment	0.50	0.51	-0.06	0.02	0.21	0.66	0.31
Offshore equipment and high-tech ships	-0.53	-0.51	-0.83	-0.73	-0.23	-0.16	-0.50
Biomedicine and new medical equipment	-0.43	-0.47	-0.15	-0.47	-0.48	-0.60	-0.43
Integrated circuits	-0.37	-0.42	-0.22	-0.07	-0.44	0.05	-0.25
Core information technology	1.21	0.39	1.68	2.80	0.69	0.22	1.16
High-end equipment	-0.28	-0.37	-0.52	-0.46	-0.33	-0.28	-0.37
Internet of Things	0.13	0.26	0.82	0.74	0.66	0.20	0.47
Energy conservation environmental protection	-0.32	-0.20	-0.62	-0.56	-0.25	-0.30	-0.38
Automobiles and parts	-0.34	-0.15	-0.47	-0.45	-0.10	0.00	-0.25
Total deviation coefficient	7.21	8.59	8.73	9.49	8.28	6.02	-

4. CONCLUSION

From the analysis of the model results, it can be seen that in 2018, all kinds of talents in Jiangsu's advanced manufacturing cluster industries were in oversupply or in short supply.

(1) From the perspective of the matching of all talents with the industrial structure, among the 13 manufacturing cluster industries in Jiangsu Province, the most balanced talent structure is the Internet of Things and high-end equipment, indicating that the allocation of human resources in these two industries in Jiangsu Province is relatively well. The most unbalanced are the frontier new materials and core information technology industries. In the talent structure of the cutting-edge new materials industry, the supply of R&D personnel and technical personnel is excessive, indicating that although there are many R&D personnel, there is no actual technical output., Or it may be that the technology has not been transformed into actual economic benefits. In the core information technology industry, the degree of deviation between senior managers and general administrative personnel is the largest, indicating that the management system in the

industry may be more complicated, with too many non-technical personnel and too many low-end managers.
(2) From the perspective of the matching of single-type talents and single industries, the most reasonable allocation of human resources in Jiangsu's advanced manufacturing cluster industry in 2018 are senior managers in the high-end textile industry, senior managers and Ordinary administrative staffs in the new power equipment industry, and the integrated circuit industry. It can be found that the management personnel in various industries are often reasonably allocated, but the R&D technicians have the problem of unbalanced supply and demand. This may be because the Jiangsu Provincial Government wants to develop these thirteen advanced industries and introduces a large number of talents, and these industries cannot fully absorb these technical talents in a short time. The data on the degree of deviation of R&D personnel and technical personnel in the cutting-edge new materials industry also confirms this point.

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