

Research on the Development of China's Industrial Intelligence

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ABSTRACT. In view of the fact that China's industrialization has not yet been fully realized and the meaning of industrial intelligence is rich, the construction of an industrial intelligence evaluation system and analysis of the development of China's industrial intelligence have shown through research that China's industrial intelligence is continuing to develop, but the regional development is not balanced. There are significant differences in the level of industrial intelligence between the eastern region and the central and western regions.

KEYWORDS: Industrial intelligence, Unbalanced regional development

1. Introduction

With the deep integration of intelligent technology and industry, the level of industrial intelligence has also increased significantly. However, industrialization in China is not yet fully realized. Therefore, while China is developing industrial intelligence, the catch-up development path of "Industry 2.0" supplementary lessons, "Industry 3.0" popularization, and "Industry 4.0" demonstrations is required. This leads to a deeper meaning of industrial intelligence in China. And China's regional economic development is not balanced, so the level of industrial intelligence in various regions is not the same. Therefore, this paper constructs an evaluation system for industrial intelligence to measure the level of industrial intelligence in 30 provinces in mainland China except Tibet, and through comparative analysis, and it hopes to provide effective suggestions for the long-term balanced development of industrial intelligence in China through the comparative analysis.

2. Literature Review

The most direct manifestation after the development of industrial intelligence is the substitution of robots for labor. Therefore, Chinese scholars regard the sales of industrial robots as a measure of industrial intelligence^[1]. However, industrial intelligence is definitely not only reflected in the large number of applications of industrial robots. Some scholars have a glimpse of the importance of the advancement of informatization and intelligent technology in industrial intelligence. When they measure the level of industrial intelligence, they use artificial intelligence-related patent applications as the measurement standard^[2], or take the investment in informatization and intelligent technology as the measurement basis. For example, Rongjie Lv et al. (2018) measured the level of development of artificial intelligence by using fixed asset investment in the information transmission, computer services, and software industries^[3]. Some scholars also believe that relying on a single input or output indicator to measure industrial intelligence is too one-sided, so various indicators of high-tech industry input and output are used to measure the level of intelligence. However, the development level of industrial intelligence is not only reflected in the development of intelligence, but also in the advancement of industrialization. Therefore, Zao Sun and Yulin Hou (2019) draw on the indicator system of the Ministry of Industry and Information Technology on the integration of industrialization and informatization, A measurement index for the level of industrial intelligence is constructed, which explains the industrial intelligence more comprehensively^[4].

3. Construction of Industrial Intelligent Index System

Existing literature mostly uses the sales of industrial robots to characterize industrial intelligence, which is too simple to show the full picture of industrial intelligence. Zao Sun and Yulin Hou ^[4]pioneered the construction of a

multi-index system for industrial intelligence, which comprehensively explains the connotation and extension of industrial intelligence. This article draws on its indicator system and considers the availability of data. The connotations and measurement methods of each secondary indicator are as follows: ① Software popularization and application. The income from products using basic software, supporting software, and embedded application software accounted for the percentage of the main business income of all industrial enterprises. ② Input of intelligent equipment. The import value of selected computers, electronic components and equipment, etc. accounted for the proportion of the main business income of all industrial enterprises. ③ The ability to collect information resources. The level of Internet development in each province is used to measure the proportion of the number of Internet users in the population aged 15-64. ④ Data processing and storage capacity. It is measured by the proportion of information technology consulting service income and data processing and operation service income in the main business income of all industrial enterprises. ⑤ Intelligent manufacturing enterprises. The main business income of intelligent manufacturing enterprises in each province is used to represent the proportion of the main business income of national intelligent manufacturing enterprises. Among them, intelligent manufacturing-related enterprises refer to the ten major areas mentioned in “Made in China 2025” and obtain relevant data through Wonder database. ⑥ New product production. The measurement of the proportion of the sales income of new products in the main business income of industrial enterprises. ⑦ Platform operation and maintenance. Including the operation and maintenance of online information platforms, e-commerce platforms, and logistics management platforms, measured by the proportion of the income from platform operation and maintenance services in each province and region to the main business income of all industrial enterprises. This data is included in the information system integration business income. ⑧ Innovative ability. The ratio of the number of national patent applications granted to the full-time equivalent of R&D personnel is used. ⑨ Economic benefits. Use the total asset contribution rate and cost utilization rate of each province to express. ⑩ Social benefits. Measured by the energy consumption per unit GDP of each province, including electricity and coal. Industrial intelligence is synthesized by the above 10 secondary indicators using the coefficient of variation method.

4. Result Analysis

Calculation based on the 2004-2016 “China Statistical Yearbook”, “China Science and Technology Statistical Yearbook”, “China Labor Statistics Yearbook”, “China Electronic Information Industry Statistical Yearbook”, “China Energy Statistics Yearbook” and Wanda database industrial intelligence related enterprise financial statement data calculation. The level of industrial intelligence is shown in Figure 1 and Figure 2.

It can be seen from Figure 1 and Figure 2 that the level of industrial intelligence in China varies significantly from place to place. Beijing, Guangdong and Shanghai have very high levels of industrial intelligence. The overall industrial intelligence level in the eastern region is also in an absolute leading position, not only much higher than China's average level, and it is developing rapidly. The reason is that industrial intelligence is integrated and developed on the basis of industrialization. Therefore, the industrialization process and economic development level of various regions cannot be ignored for the development of industrial intelligence. In the eastern region, Beijing, Tianjin, and Shandong closely focus on the Bohai Economic Zone with the Beijing-Tianjin-Hebei as the core and vigorously promote the construction of smart cities; Jiangsu, Zhejiang and Shanghai rely on the Yangtze River Delta Economic Zone to vigorously develop smart manufacturing technologies and accelerate the integrated development of industrial intelligence; Guangdong and Fujian are based on the Internet industry in the Pearl River Delta Economic Circle to promote the integration of the Internet industry and the real economy. The industrial and service industries in the eastern region, which have a high level of economic development, have already developed relatively complete, providing a good basic condition for the integrated development of industry and intelligence. Therefore, the eastern region's industrial intelligence has not only developed rapidly, but also the degree of industrial intelligence. At a high level. However, the original economic development of the central and western regions did not have too many first-mover advantages. The level of industrial intelligence was relatively low, and the development speed was relatively slow. Therefore, the level of industrial intelligence development in most provinces and cities was relatively low. In the central region, only Hunan, Hubei, Anhui, and Henan have relatively advanced industrial intelligence levels, while the western regions have higher industrial intelligence levels in Shaanxi, Chongqing, and Sichuan.

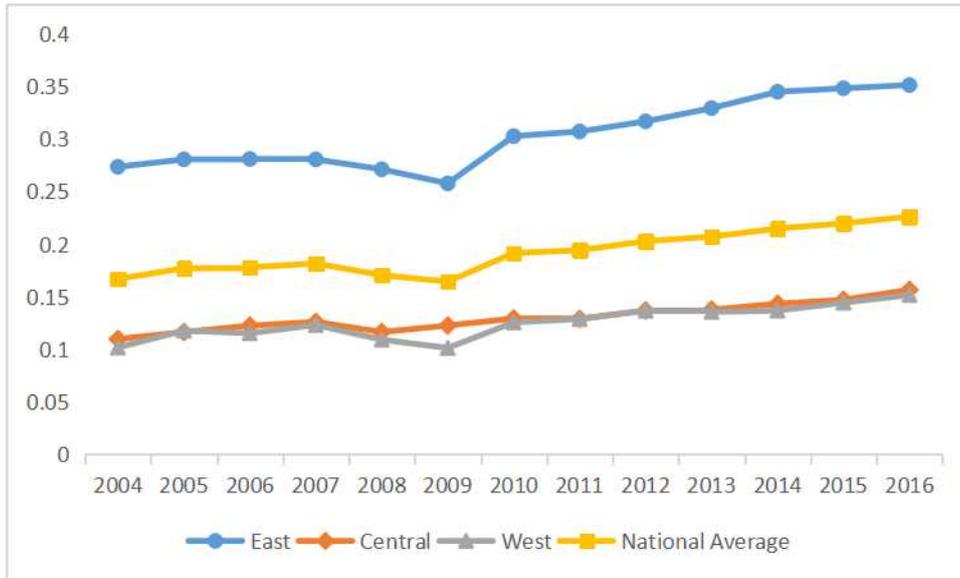


Fig.1 The Dynamic Level Distribution of China's Eastern, Central and Western Industrial Intelligence from 2004 to 2016

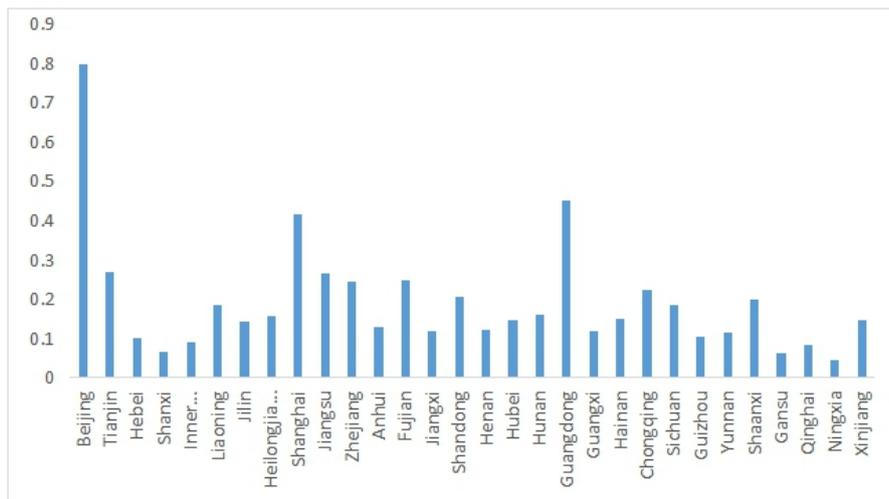


Fig.2 13-Year Average Value of Industrial Intelligence in Various Provinces from 2004 to 2016

5. Conclusion

The level of intelligent development in my country is still improving, but the regional development is significantly unbalanced. The eastern region is developing strongly, while the central and western regions are developing slowly. Therefore, in order to promote the balanced development of industrial intelligence in various provinces, measures should be taken to make the coordinated development of industrial intelligence in various provinces and reduce the gap in the development level of industrial intelligence in various regions. At the national level, while actively promoting the development of industrial intelligence, the country should formulate relevant policies for regional coordinated development, so that regions with high industrial intelligence can help regions with low industrial intelligence, and coordinate to improve the industrial intelligence level of different provinces. . At the provincial level, while the provinces with relatively advanced industrial intelligence are actively developing themselves, they should share their industrial intelligence development experience with relatively backward areas and provide corresponding assistance. For the central and western provinces with relatively backward intelligence , Don't blindly pursue intelligence. First, we should consolidate the basic conditions for the integration and development of industry and intelligence. Then, we should absorb the development experience of other provinces, combine our own regional advantages, develop characteristic industries according to local conditions, and embark on a path of industrial intelligence that suits

ourselves.

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