

Big Data and the Development of Regional Economy

Aoyun Chen

School of Economics and Management, Beijing Jiaotong University, P.R China, 100044

15120564@bjtu.edu.cn

Keywords: big data; industrial structure optimization; regional economy

Abstract: Big data has promoted the integration of Internet and industrial innovation, and further promotes traditional industrial upgrading and the emergence of emerging industry, has resulting in a huge social and economic impact. This paper demonstrate the mechanism of industrial structure optimization promoted by big data based on big data's industry and economic characteristics to verify the effectiveness of big data to enhance the regional economy. And give suggestions to promoting the big data industry in China by four aspects: Promoting the universal service of big data, accelerating the development of big data industry for science and technology innovation, enhancing information security system, promoting resources sharing of big data.

1. Introduction

Until today, big data are still not be exactly defined. From the view of technology, big data refers to the collection of data that cannot be managed and processed by conventional software tools in a certain period of time. Big data industry refers to all production and gathering, collection of organization and management, analysis and discovery, application and service of the economic activities of the big data. It centered on data mining analysis services, including data center, network infrastructure services, application of geographic information, data resources and intelligent transportation service network, financial and other smart city big data solutions and service etc.

The arrival of big data era, making data becomes one of the important factors of production. Left behind in big data field means missed the commanding heights of industry, digital sovereignty and even national security will be missed even endanger. Therefore, big data will have a direct impact on national social stability. At the background of vigorous development in the global data, China also facing rare opportunities for development to seize the opportunity, translating China data resources into economic development is the urgent task that government and industry faced.

2. Mechanism analysis of big data promotes industrial restructuring

The application of big data for the development of information industry and information technology has brought great opportunities. It's a new focus of application integration of the new generation of information technology, new engine for the rapid growth of information industry and new power to promote the competition ability of the industry users.

2.1 Big data promotes the utilization rate of production factors in various sectors. Big data has a huge socio-economic impact. In primary industry, big data promotes agricultural productivity, enhance industrial added value. In secondary industry, big data accelerate China manufacturing to China creating. The use of big data in the field of new product development, research and development of new materials, bio pharmaceuticals, equipment maintenance will makes the new product development, design, production and testing process improvement process of revolutionary change, can greatly improve the production efficiency of enterprises. It can greatly improve the production efficiency of enterprises. In third industry, big data promotes the prosperity of the third industry. Through big data, cloud computing technologies and business models, modern service industry, producer services, cultural, creative industries and economies can be will developed, building a new application scenarios and service models, innovating profit model, enhancing the ability of independent innovation in many industries. The composition of big data industry ecology

is shown in Fig. 1.

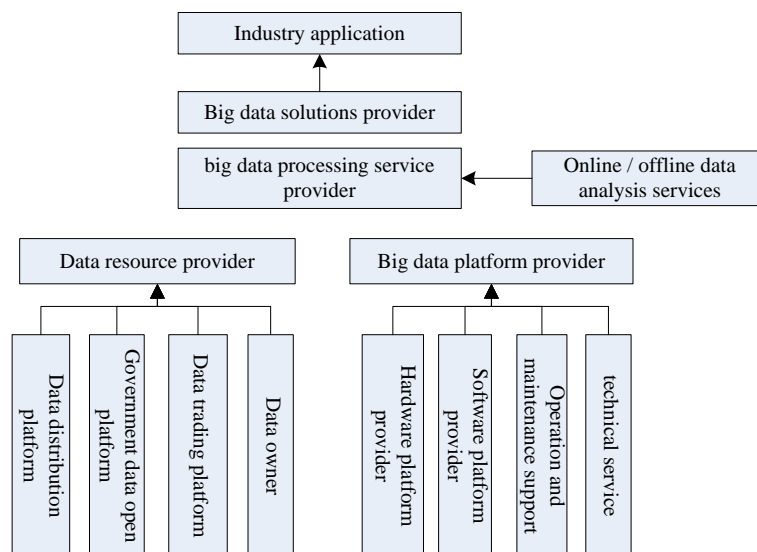


Fig.1. Big data industry ecology sketch map.

2.2 Big data promotes traditional industrial upgrading and the emergence of emerging industry. Big data are deeply integration with traditional industries. In business intelligence area, people can pinpoint the real needs and potential needs of enterprise user groups by study consumer behavior online. It means traditional manufacturing enterprises have acquired the ability to predict the future. Under the era of big data, data is becoming the core assets of the enterprise, and a profound impact on its business model. For example, the variety of vehicle information can be continuously transferred to the company headquarters by installing sensors and embedded CPU in automotive products in automotive industry. Based on the data, Enterprise research and development department can quickly improve product design, improve research and development efficiency. So that enterprise sales department can accurately locate the user's habits, improve product user adhesion.

2.3 Big data is necessary to enhance the height of industrial structure. The high degree of Industrial structure presents as the most appropriate industrial structure of a country's economic development in different periods. The height of industrial structure includes two connotations: evolution of proportional relation and improvement of labor productivity. The former is the connotation of the height of industrial structure, while the latter is the connotation of the high degree of industrial structure. The height of industrial structure is not only a measure of the proportion of different industries, but a measure of labor productivity. A country or a region's industry with high labor productivity accounted for a large share means the country or region's has a high industrial structure level.

3. Verification of regional industrial structure optimization based on the version of big data

With the integration of cloud computing, big data, networking, mobile communication and other new technologies, new models of development, the information industry has step into a new stage of integration, transformation and adjustment. The regional economy active docking industrial transfer, the industrial division of labor and competition is accelerating the formation of new industrial space. Big data industry space expansion began to accelerate and reconstruct focus on regional economic development features, brings big data industry's regional development a rare opportunity.

Big data industry is a capital intensive technology intensive and energy intensive industries. Subject to professional technical personnel, strong capital market, perfect infrastructure, limited by resource rationing, talent, network infrastructure and user size, the energy intensive industrial chain in the current big data industry began to shift to energy intensive, sub economic developed areas. Meanwhile, the supporting industry chain which closely related to data platform also showed

gradient transfer trend. In the development of large data industry in regional economies, it is necessary to combine the resource endowments and factor comparative advantages, grasp the market capacity and prospects, industry related effects, industrial clusters, comparative advantage principle factors. Unbalanced promote the development of regional large data industry and balanced push big data technology application in the development of various industries, to further enhance the quality of industrial development of regional economies, find the best path of development.

3.1 Big data promotes the integration of Internet and industrial innovation. Information technology, especially Internet technology, has a revolutionary impact on the development of traditional industries. The United States, Germany and other industrial powers have taken the lead in strategic layout. For China, promoting the integration of the internet and industrial innovation has become a key way to make breakthrough in the bottleneck of industrial development, enhance international competitiveness and response to the economic downturn. Multi source data fusion is a necessary condition for the integration of Internet and industry. However, big data is necessary in both analyzing and processing a variety of sources and massive data and mining the relations of the complex data. As the representative of the new generation of information technology, big data has begun to be applied in industrial design, research and development, manufacturing, sales and service. Meanwhile, it will become the driving force of the traditional industrial transformation and upgrading of quality and efficiency.

3.2 Verification of big data on regional industrial upgrading. This paper measure the effect of big data on the regional economy by input-output method. The method analyzes the relationship between the production and consumption of products in different sectors of the national economy. The input-output table describes the source and the flow direction of the products used in the production of the various sectors of the social economy in a period of time by matrix. The direct consumption coefficient, denoted by A_{ij} ($i, j=1,2,\dots, n$), means the value of goods or service that j products department directly consumed in production and management, which the goods or service is from i products department. The method of calculation is that the value of goods or service belongs i products department and consumed by j products department in production and management divided by the total input of the department X_j .

$$a_{ij} = x_{ij} / X_j, (i, j = 1, 2, \dots, n) \quad (3-1)$$

Adding the direct consumption coefficient into a table, that is direct consumption coefficient matrix. The integration of industry and big data can improve the marginal revenue of the unit product, so it will improve the overall performance of the industry. This paper based on the typical production function decomposition method, and then quantitative analysis to measure whether the big data on the performance of the industry has a positive effect.

$$Y = AK^\alpha L^\beta \quad (3-2)$$

Doing logarithm in both side, and assume $\lg A$ can be linear expansion.

$$\begin{aligned} \lg Y &= \lg A + \alpha \lg K + \beta \lg L + \varepsilon \\ &= F(w_1 + \dots + w_n) + \alpha \lg K + \beta \lg L + \varepsilon \\ &= \theta_1 w_1 + \dots + \theta_n w_n + \alpha \lg K + \beta \lg L + \varepsilon \end{aligned} \quad (3-3)$$

Commonly, the panel data were analyzed by mixed method, random effect model and fixed effect model. The industry samples are the 30 manufacturing industries that published by Statistical Yearbook. All the data are coming from *China Statistical Yearbook 2014* and *China Statistical Yearbook 2015*. The analysis of the panel model is carried out by mixing method. This paper defines the integration of big data and industry through the informatization of all the industries. In addition to human and capital inputs, it also should be distinguished that whether it is heavy industry or high-tech industry, for the property of the industry has different influence on big data and industrial performance development. The variables and the corresponding descriptions are shown in Table 1.

Table 1 Variable description of performance model

Variable properties	Variable description	Mathematical symbols	meaning	measurement
Dependent variable	profit	P	Outputs level of the industries	The industries value-added
Independent variable	Correlation coefficient between big data and industry	S	The dependence of the industries on big data	The complete consumption coefficient of big data in the industrial sector
control variable	capital	C	The capital investment of the industries	total assets of the industries
control variable	labor	L	The labor investment of the industries	Employment number of the industries
control variable	Heavy industry or not	I	Whether the industry is heavy industry	According to statistical caliber
control variable	High technology industry	T	Whether the industry is high technology industry	According to statistical caliber

According to table 1 and Formula 3-3, test model can be obtained as follows:

$$\lg P_{nt} = \alpha \lg C_{nt} + \beta \lg L_{nt} + \gamma S_{nt} + \theta T + \lambda I + \varepsilon \quad (3-4)$$

According to the results of Table 2, the integration of big data and industry has a positive correlation with the industry's profit growth. This confirms our theoretical expectations.

Table 2 result of the model

Result of the model		
lgP	Standardized coefficient	Significant level
lgC	1.3	0
lgL	-0.07	0.8
T	-0.18	0
I	0.13	0.02
S	0.17	0.003
Adjust	0.71	

4. Conclusion

Data has become one of the important factors of production with the arrival of the era of big data. All countries will start a new round of competition in this new field, because competition in the field of big data technology can affect the national security and the future. China should keep pace with the times, adapt to the era of big data, seizing the key point of the era of big data, promote the sharing of big data resources and other works by promote big data in universal service, develop big data industry towards technology innovation, enhance information security system construction and enhance the big data technology supportability.

References

- [1] Kita Haruka Motohashi, The impact of big data, *The Posts and Telecommunications Press*, pp. 3, 2013.
- [2] Xiaoxiang Meng, Xiang Ci, Big data management: concepts, technologies and challenges, *Computer Science and Development*, vol. 1, 2013.
- [3] Baoyao Zhou, Big data: strategy, technology and practice, *Publishing House of Electronics Industry*, pp.4, 2013.
- [4] Bingxin Yang, The sketch of 420th-424th academic seminar in Xiangshan Science Conference, *Chinese Basic Science*, vol. 4, 2012.

- [5] Yuanzhuo Wang, Network big data: present situation and prospect, *Journal of Computer Science*, vol. 6, 2013.
- [6] Weiling Wang, The strategic value of big data industry, *Research on Technology Economy and Management (Social Sciences Edition)*, vol. 1, 2013.
- [7] Yu Zeng, Path choice of China's industrial structure optimization from the perspective of cloud, *Journal of Capital Normal University (Social Sciences Edition)*, vol. 1, 2013.
- [8] Wei Liu and Hui Zhang, The study on regional differences between China's industrial structure and industrialization process, *Economics Information Econ Infor*, vol. 11, 2008.