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Research On the Path of High Quality Development Enabled by Big Data Technology in the Curved Area of The Yellow River

Abstract: - Big data is a key factor of production to promote the current social development, and the good use of big data technology is a must to achieve high-quality development. Jiziwan of the Yellow River is a strategic overlapping area of the western development and the overland Silk Road, which has very important strategic value both in terms of geographical space and historical development. Therefore, it is particularly important to enable the high-quality development of the Yellow River Jiziwan region with big data technology. By analyzing the relevant data of the high-quality development of the main provinces of the Yellow River Bend in recent years, this paper makes a comparison of the gross product of the region in recent years, the added value of the three major industries, and the R&D investment of the industrial enterprises, so as to get the results of the high-quality development of the Yellow River Bend area and the existing problems. Through these analysis results, this paper puts forward some solutions: using big data technology to optimize regional industrial structure, promote high-quality ecological development and promote innovative development. These optimization paths help promote the importance of the digital economy and promote high-quality, sustainable and coordinated development in the region.

Keywords: Big Data, Digital Technology, Yellow River Curved Area, High Quality Development, Optimize the Path.

I. INTRODUCTION

On July 6, 2022, Green Development - Big Data Empowering the Yellow River Basin Ecological protection and high-quality Development Seminar was held online, which also showed that big data is an important development factor of the current digital society, and it is necessary to make good use of big data technology in order to better promote the high-quality development of the Yellow River Jiziwan region. Researches on big data technology enabling high-quality development of Jiziwan area of the Yellow River mainly focus on the following two aspects: First, at the macro level, it focuses on digital technology to enable high-quality development of the Yellow River Basin. Zhou Qingqing and He Aiping (2020) believe that to achieve high-quality development of the Yellow River Basin, it is necessary to comprehensively promote the use of information technology means such as big data, Internet and artificial intelligence to enable production, life and ecology[1]. At the micro level, it focuses on the high-quality development of a certain aspect enabled by big data. Zhou Jiaxin and Tan Fuqiang (2022) mentioned the use of big data technology to enable the high-quality development of cultural industry[2],Dong Yaqi, Wu Jingtao, Wang Chunshun, Wu Yizhao (2022) mentioned the use of big data technology to enable the high-quality development of sports tourism[3]. There are many studies on digital technology enabling high-quality development, but few studies on big data enabling high-quality development in Jiziwan Area of the Yellow River, which are more focused on a certain industry, ecology and other aspects, and few studies on the macro aspects of high-quality development in Jiziwan area of the Yellow River.

II. METHODS

The Yellow River Zigzagged area is a zigzagged area formed by the Yellow River flowing through Gansu, Ningxia, Inner Mongolia, Shaanxi and Shanxi provinces. This stage mainly analyzes the relevant data of the high-quality development of the main provinces in the Yellow River Zigzhuan region in recent years, reflects the achievements of the high-quality development of the Yellow River Zigzhuan region, and analyzes the causes of the problems.

A. Achievements of High-quality Development in the Curved Area of the Yellow River

In 2023, Gansu Province identified five state-level specialized and special "little giant" enterprises, with a year-on-year increase of 57.7% in the turnover of technology contracts and 9.6% in the added value of strategic emerging industries[4]. In 2023, with the acceleration of the development of "six new" industries, the rapid growth of new materials and clean energy industries will drive the added value of high-tech manufacturing above designated size

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in Ningxia to increase by 44.5% over the previous year. The GDP of the Inner Mongolia Autonomous Region in 2023 is 2,462.7 billion yuan. From 2021 to 2022, the grassland vegetation coverage and forest coverage rate in the region have increased from 40.3% and 20.8% to 45% and 23%, respectively[5]. Qin Chuangyuan, a platform highland of innovation in Shaanxi Province, has developed steadily, and 16,500 high-tech enterprises within the validity period were identified in the province by the end of 2023. By the end of 2023, Shanxi Province has built the first "intelligent operation management platform" in the coal industry and the first 5G+ intelligent pilot demonstration coal mine in the country, with the installed capacity of new energy and clean energy accounting for more than 40% and the power generation accounting for nearly 30%[6]. As can be seen from Figure. 1, the five provinces have been growing steadily in the past five years and have made certain achievements.

Figure 1 Gross Domestic Product Index of five provinces from 2018 to 2022
Data source: National Bureau of Statistics data query

B. The Problem of High-quality Development in the Curved Area of the Yellow River

Five provinces formed the curved area of the Yellow River, the main cities include Yan'an, Yulin, Qingyang, Baiyin, Zhongwei, Wuzhong, Yinchuan, Shizuishan, Datong, Shuozhou, Xinzhou, Luliang, Linfen, Wuhai, Bayannur, Baotou, Hohhot, Ordos, Erenhot, Alashan Left Qi and other 20 cities and counties and Ningdong Energy and chemical industry base. Although the five provinces in the Yellow River region have made some achievements in high-quality development, there are still some problems.

First, the coordinated development of industries is insufficient. The five provinces in the Yellow River area and their main cities have high homogeneity of related industries, taking Ningxia and Shaanxi as examples. Ningxia region Yinchuan, Wuzhong as an example: Yinchuan's main industries are high-end equipment manufacturing; Wuzhong's main industries are equipment manufacturing, energy and chemical industry. The main industries of Yan'an City in Shaanxi province are energy, chemical industry and red tourism industry. The main industry of Yulin city is high-end coal chemical industry. The main industries in the whole region are almost concentrated in energy, chemical industry, manufacturing and so on.From the above, it serves to show that the proportion of secondary industry is higher among the major cities in the Yellow River Bend area, and the industrial homogeneity of each city is high. As shown in Figure. 2, although the tertiary sector has grown significantly, it still has not completely replaced the secondary industry as the main development direction.
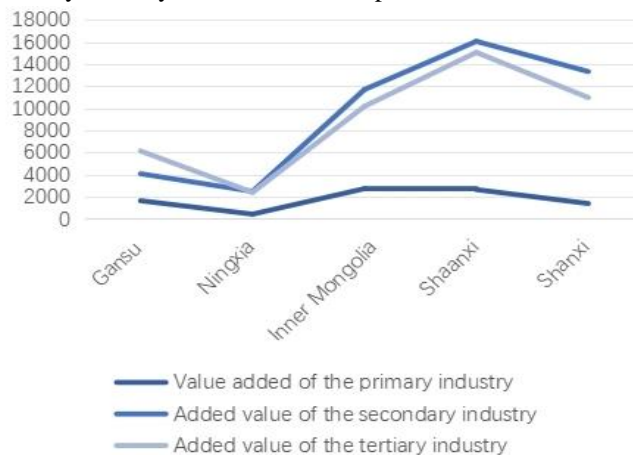

Figure 2 Comparison of added value of three major industries in five provinces in 2023(RMB 100 million)
Data source: Statistical Bulletin and Statistical Information of provincial Bureau of Statistics

Second, the ecological environment is under great pressure. The area of desertified land and soil erosion control in the province where the region is located exceeds 400,000 square kilometers and 300,000 square kilometers respectively, which is much higher than the two downstream Luyu and Henan, and is a typical ecologically fragile area. The annual precipitation in this region is 200-350mm, but the evaporation is as high as 2000mm, and water resources are extremely scarce[7].

Third, the leading role of scientific and technological innovation is not strong. On the one hand, the brain drain in Jiziwan area of the Yellow River is serious. There are many colleges and universities in the five provinces in the Yellow River region. Taking Xi'an Jiaotong University in Shaanxi as an example, about half of the undergraduates, master's students and doctoral students have left the western region to develop in other regions. It shows that the loss of middle and high level talents in Jiziwan area after local education is more serious than that in other areas, resulting in the shortage of scientific and technological innovative talents. On the other hand, the scientific and technological innovation investment is insufficient in various regions of the Yellow River. As can be seen from Figure. 3, the R&D expenditure of industrial enterprises above designated size in the five provinces from 2019 to 2022 is lower than that of Sichuan Province and Chongqing, and the gap is larger than that of other developed cities in the eastern region.

Figure 3 Comparison of R&D expenditure of industrial enterprises from 2019 to 2022 (ten thousand yuan)
Data source: Provincial data query of National Bureau of Statistics

C. Analysis of the Reasons for the Problems Existing in the High-quality Development of the Curved Area of the Yellow Rivers

Firstly, due to geographical location, natural factors, regional differences and competition, the industrial structure of the curved area of the Yellow River lacks coordinated development. Due to the geographical location of the regions, the natural conditions are also very similar, resulting in similar major industries between the regions. And in the process of competition, all regions ignore the coordinated development of different regions.

Secondly, the ecological environment in the curved area of the Yellow River is under great pressure due to factors such as geographical location and development mode. Jiziwan region is located in China's arid and semi-arid transition region, is also a transition zone of forest and grassland distribution, forest, grassland, desert, wetland and other ecosystems interwoven, the ecological region is unique[8]. Over a long period of time, due to the interaction of climate change and human factors, desertification and soil erosion have been increasing. Moreover, energy and resource industries are mainly developed in many areas of the Yellow River, and the excessive exploitation of minerals has caused serious damage to the regional ecological environment.

Thirdly, there is no large-scale mobilization of all social subjects to invest in scientific and technological innovation in the region, ignoring the important role of high quality and digital economy, resulting in a weak leading role of scientific and technological innovation in the whole curved area of the Yellow River region and no strengthening of digital construction. The leading role of the government is not enough, and there is a lack of policy guidance. Moreover, insufficient capital investment has limited the capital investment in scientific and technological innovation.

In short, the industrial coordination of the Yellow River is unbalanced, the ecological environment is under pressure, and the leading technology of scientific and technological innovation is not strong. The main reasons, in addition to objective factors, are due to the low quality of development and insufficient digital development.

III. RESULTS

Based on the previous data analysis, it can be seen from Figure. 4 that the application of big data technology to boost the Yellow River Zigzhuan area mainly needs to promote the high-quality regional development from three aspects: optimizing the regional industrial structure, promoting high-quality ecological development, and giving play to the leading role of innovation.
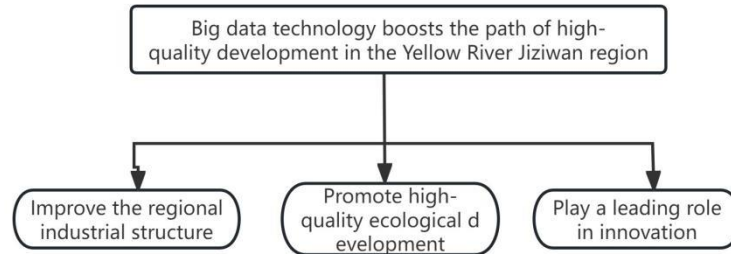

Figure 4 Framework of big data technology enabling high-quality development in the Yellow River Jiziwan region

A. *Big Data Technology Promotes the Upgrading of Industrial Structure*

First, big data technology is used to comprehensively collect economic activity data in the region, and the collected data is analyzed through data mining, forecasting model building and other methods, so as to reveal the law of industrial structure and economic development and find potential problems and opportunities. According to the results of data analysis, big data technology is used to make intelligent decisions on the direction, path, policy measures of industrial structure upgrading, and provide scientific basis for the government and enterprises.

Second, policies can be adjusted and optimized through big data platforms to optimize industrial development in various regions. For example, Yulin, Ordos, Datong and other cities need to optimize the traditional energy industry through information technology. To transform the traditional manufacturing industry into a technology-based industry, the traditional industries in various regions, such as agricultural products and manufacturing, are integrated with digital technology. Efforts should be made to develop new digital forms of business. In the face of new changes and new needs in the new era, it is necessary to accelerate the digital transformation of enterprises and develop information products and services[9].

B. *Big Data Technology Enables Ecological Protection*

On the one hand, it is necessary to use big data technology to conduct real-time monitoring and analysis of environmental quality data, and provide data support for the development of green, low-carbon and intelligent economy. Build an environmental monitoring network with the rational use of big data technology to collect data on water quality, air quality and soil conditions in real time and identify ecological problems in a timely manner. Through big data analysis, the ecological status of Jizi bend area of the Yellow River was evaluated to provide scientific basis for ecological protection.

On the other hand, based on the results of big data analysis, precise ecological restoration plans are formulated to improve the effect and efficiency of ecological restoration. It is necessary to pay attention to the use of digital technology, which can realize the upgrading of industrial structure, therefore, it will also reduce carbon emissions and contribute to the high-quality development of ecology[10]. Therefore, it is necessary to make use of big data technology to rationally plan and manage water resources and land resources, improve resource utilization efficiency, and reduce the damage to the ecological environment. Deepen collaborative governance through big data platforms. Break the boundaries of administrative divisions, with the goal of integration and symbiotic development, plan and build the Yellow River Jiziwan National Park with Jiziwan as one, and build the ecological barrier of the Yellow River basin with the construction of the three Northern shelterbelts[11].

C. *Big Data Technology Enables Innovation and Development*

First, we should attach importance to the application of big data technology. The formation of the innovation model of national social and economic development requires the formation of an effective institutional environment to promote the integration of research and the strengthening of innovative activities in the production sector[12]. Therefore, government departments should promote data disclosure, strengthen standardized production of digital technologies, improve big data information management capabilities, and achieve breakthroughs in core technologies of digital economy[13]. Thus providing a good policy environment for the high-quality development of big data technology.

Second, the use of big data technology to play the leading role of innovation in the Yellow River bend area and stimulate innovation ability needs to start from many aspects such as data collection, analysis and application. The rational use of big data technology can better promote innovation and development. Based on the results of data analysis, more targeted innovation strategies can be developed, future trends can be predicted, and scientific decisions can be made accordingly. And through the monitoring and analysis of the regional environment, we can find and solve the problems that hinder innovation in time, and create a good innovation environment. Big data technology helps to identify and mine innovation resources in the region, such as talent, technology, capital, etc., to provide support for innovation activities. In terms of application, big data technology will promote the transformation of innovation achievements into practical applications, improve innovation efficiency, and promote regional economic development.

IV. CONCLUSIONS

First of all, the use of big data technology to enable high-quality development of the Yellow River Jiziwan area has a certain theoretical significance. The rational use of big data technology to promote high-quality development in all aspects has promoted the importance of big data and innovative development in the provinces and cities of the Yellow River, and enriched the theoretical experience of high-quality development.

Secondly, it is of practical significance to use big data technology to promote the path selection of high-quality development in Jiziwan area of the Yellow River. The use of big data technology to drive industrial transformation, promote ecological construction, and promote the leading role of innovation has enriched the practical experience of high-quality development in the Yellow River Bend area.

Finally, as an important geographical and cultural area in China, the Yellow River Zigzag region has a unique ecosystem and rich natural resources. However, facing the rapidly changing market and economic environment, only relying on traditional management and decision-making methods can no longer meet the needs of regional development. Therefore, the use of big data technology to promote its high-quality development is particularly important.

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