Big data and industrial innovation progress in Jiangxi Province incremental effect highlights enabling digital economy cultivation

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Abstract. With the advent of the Internet information age, most social and economic activities rely on data. As a new resource, big data technology plays an important role in the social digital economy. Therefore, it is not only the objective requirement of economic development, but also the value of big data resources to promote the close integration of big data and industry, and help the upgrading and development of industry with big data. In order to emphasize the strength of digital economy, this paper studies the gradual effect of big data and industrial innovation in Jiangxi Province, and carries out a series of studies. With the development of the times, the most popular Internet also changes with the development of the times. The Internet has changed from the IT era at the beginning to the new digital technology era. The creation of big data technology and the establishment of database have become the storage and source direction of new resources for all industries. At present, the digital economy is facing the opportunities and challenges of the "Internet plus" new market. Digital economy related enterprises should strengthen mutual cooperation among resources supply network organizations such as information and information, dissolve and reorganize production factors, strengthen the competitiveness among industrial economies, promote the optimization and upgrading of industrial economic structure, and expand the market space for which the industry can develop. However, the development of the Internet plus industry depends on the innovative investment and innovation power of the industry. In the era of big data, one of the ways to improve the overall level of the industry is innovation. This paper discusses how much influence big data shows in the cultivation of digital economy.

Key words: Big data, Industrial innovation, Digital economy of Jiangxi Province, Energy increasing effect
1. Introduction

In the era of digital economy, big data has become the core production factor, enriching the supply of elements. In the process of production and circulation, people can not only produce goods and complete transactions, but also produce data, process and analyze data at the same time, so as to create new value and wealth [2]. Through the digital economy of big data, once the traditional single value system collapses, it generates an unprecedented huge value chain through integration [3].

Big data resources, a new element of social production, have a great impact on changes in technology, economy and other fields, but the industry has not enough motivation to use big data resources for innovation [4]. Firstly, after analyzing big data resources from two aspects of big data evolution and big data value, big data and innovation mode are established to analyze production income. The results have a positive relationship with big data resources and innovation investment, and their input and output conform to the scale of income reduction [5]. On this basis, the relationship between big data platform and innovation center is sorted out, and diversified innovation and industrial innovation strategy between traditional industries are discussed [6]. In the enabling digital economy of Jiangxi Province, big data occupies a central position [7]. Focus on the free field of digital economy and technology, increase the investment in the research and development of digital economy technology, strengthen the introduction and training of digital economy personnel, build a talent team of their own to solve the problems faced by enterprises in the development of digital economy, and then encourage enterprises and research and development institutions to carry out research and development of digital economy technology, so as to enable Jiangxi Province to occupy The highest point of digital economy development is to strengthen China's competitiveness in the digital economy industry. While speeding up high-end communication and big data development, it also drives the reform of relevant scientific research and technological innovation, promotes the digital economy and provides better services for the physical economy [8].

The construction of digital infrastructure is an important guarantee to realize the development of digital economy and "beyond the curve". Although data technology is closely related to the real economy, it has effectively transformed the traditional economy into a digital economy, adding new vitality [9]. But it also caused chaos in the digital economy market of Jiangxi. For example, the off-line misconduct has been rapidly replicated and expanded on the Internet, unfair competition has intensified, disputes and dissatisfaction on online trading platforms are still high, false advertising and vulgar content are repeatedly banned, and data disputes between platforms are still waiting. This kind of confusion seriously affects the healthy development of digital economy. In March 2019, "opinions on the implementation of digital economy development strategy in Jiangxi Province" was published. It is clear that big data and Internet, blockchain, virtual reality technology, cloud computing, artificial intelligence, software and information technology services will be the main development direction of digital industry in Jiangxi [10]. The scale of China (Nanchang) VR industrial base has been very large, with more than 60 VR enterprises gathered. The VR industry in Ganzhou, Shangrao, Ji'an and Yingtan cities has also accelerated, and the VR industry in Jiangxi Province has stepped into a fast track.

2. Method

2.1 Cobb Douglas function algorithm

The products developed through big data innovation have unique creativity. At present, there are no similar related similar products and competitive competitors in the national market. Moreover, if the product life cycle is not considered, the supply-demand relationship of the product market will be affected by the cost of data resources and innovation investment. Taking the current known digital economic development of Jiangxi Province as the calculation target, the number of According to resource cost and innovation investment cost, it can be used as input-output factors. Based on Cobb Douglas production function theory, the production function of big data innovation can be deduced as follows:
The producer’s cost function is as follows:
\[ C(x, y) = x + y \]  \hspace{1cm} (2)

As a rational producer, producers always pursue the maximization of enterprise profits. Therefore, the profit function of producers is as follows:
\[ \pi(x, y) = R(x, y) - C(x, y) \]
Namely:
\[ \pi(x, y) = bx^\alpha y^\beta - x - y \]  \hspace{1cm} (3)

According to formula (3), the partial derivatives of \( x \) and \( y \) are obtained respectively, order \( \frac{\partial \pi(x, y)}{\partial x} = 0 \),
The results are as follows:
\[ bax^{\alpha - 1}y^\beta - 1 = 0 \]  \hspace{1cm} (4)
Order \( \frac{\partial \pi(x, y)}{\partial x} = 0 \), The results are as follows:
\[ b\beta x^\alpha y^{\beta - 1} - 1 \]  \hspace{1cm} (5)

The results of simultaneous equations (4) and (5) are as follows:
\[ x = \frac{\alpha}{\beta - 1}y \]  \hspace{1cm} (6)

By introducing equation (6) into equation (4) and (5), we get the following results:
\[ x = \left( b^{-1}\alpha^{-1}\beta^{-1} \right) x^{\alpha - 1}y^{\beta - 1} \]
\[ y = \left( b^{-1}\beta^{-1}\alpha^{-1} \right) x^{\beta - 1}y^{\alpha - 1} \]

From the analysis, we can get the following conclusions

Inference 1: from formula (6), we can see that \( B, \alpha, \beta \) have proportional linear relationship. In other words, there is a positive interaction between big data resources and innovation investment. The richer the information of big data resources is, the higher the intensity of innovation investment is. On the contrary, with the increase of innovation investment cost, the better the innovation achievements are, and the resources of innovative products are gradually accumulating.

Corollary 2: when there is a positive linear relationship between big data resources and innovation investment, the production profit will reach the maximum. But the amount of benefit depends on the price of \( B, \alpha, \beta \). The second derivative of \( X \) and \( Y \) is calculated according to formula (3)
\[ \frac{d^2\pi(x, y)}{dx^2} = b\alpha(\alpha - 1)x^{\alpha - 2}y^\beta < 0 \]  \hspace{1cm} (7)
\[ \frac{d^2\pi(x, y)}{dy^2} = b\beta(\beta - 1)x^{\alpha}y^{\beta - 2} < 0 \]  \hspace{1cm} (8)

Corollary 3: in equations (7) and (8), the quadratic function is less than 0, the limit profit is less than the limit cost, and the input and output show the phenomenon of non economic scale. In other words, the sales of data innovation products follow the market supply and demand theory, and the over development of data products will lead to the regression of the scale of big data resources and the reduction of innovation investment.

2.2 promoting the construction of digital economy infrastructure
Accelerate the construction and layout of 5g, plan the demand construction of 5g base station, accelerate the commercial deployment of 5g and the R & D, promotion and application of 5g products, focus on promoting the application of 5g in industrial Internet, intelligent transportation, intelligent manufacturing and other fields, strengthen the deep integration of 5g products and the real economy, accelerate the construction of digital industry cluster area and Internet digital platform, Form a multi-level, scientific and sustainable development, systematic digital platform development system to provide platform support for the development of digital industry.

2.3 promote the deep integration of digital economy and real economy
We should formulate development plans for the integration of digital economy and physical economy, establish an index system for the integration of digital economy and physical economy, correctly
analyze and evaluate the value contribution of digital economy, accelerate the construction of digital economy ecosystem, encourage the deep integration of digital technology and various industries, increase the contribution to traditional industries, and make great efforts to reform the Internet, artificial intelligence and big data. It is connected with all elements of the real economy, the whole industry chain and the whole value chain. We will implement the pilot demonstration of digital economy, accelerate the transformation of key industries, improve the level of industrial supply, and gradually form the industrial cluster of Jiangxi integrated economy.

2.4 strengthen cooperation and exchanges with the outside world
We should strive to create a strong atmosphere for the development of digital economy, introduce policies to encourage innovation, establish a flexible regulatory system, trading rules and target assessment system for the digital economy, optimize the business environment, attract leading digital enterprises to participate in the construction of digital economy in Jiangxi, strengthen original research and development, and promote the innovation of management and business models. We will establish a digital economy development advisory committee, provide support for enterprises to carry out digital technology innovation and personal innovation.

3. Experiment

3.1 subjects
The development of digital economy involves different spatial scales, such as municipal, provincial and national scales. However, most of the existing studies focus on the national scale, and lack of research on the development of digital economy from the local perspective. In view of the lack of research on digital economy at the local level, this paper selects the development of digital economy in Jiangxi Province as the research object, which has certain significance for breaking through the national level of digital economy generalization research and making up for the lack of regional research on digital economy.

3.2 research methods

(1) Literature research method
Literature research is the primary method of this paper. Based on a comprehensive review of academic journals and relevant research reports of research institutions, this paper has a basic understanding of the hot spots and research gaps of digital economy, and on this basis, determines the research direction and basic ideas of this paper, strengthens the theoretical basis of this paper, expands the scope of research, and extends the practical connotation.

(2) Case study method
This paper takes Jiangxi Province, the representative of digital economic development in inland provinces as the research object, and puts forward the development countermeasures with applicability and popularization significance through the current situation evaluation, characteristic analysis and problem summary.

(3) Comparative study method
Comparative study is a method of comparative study on a group of similar objects. This paper mainly carries out a comparative study in two aspects: first, it makes a comparative analysis on the weight of the four types of digital economy, namely "basic type, technical type, integration type and service type", so as to evaluate the contribution of the four types of digital economy to the overall economic development; second, based on the relevant statistical data of each sub evaluation index, this paper makes a longitudinal comparison of the development status of various indicators of digital economy in
Jiangxi Province from 2011 to 2016 in order to analyze the development trend of each specific index.

4. Results

Based on the evaluation index system of digital economy development constructed from the perspective of technological economy paradigm, this paper inquires into the database of China Statistical Yearbook and Jiangxi provincial government information disclosure work report. Considering the availability and comparability of each index data, this paper selects the six-year statistical data of digital economic development in Jiangxi Province from 2011 to 2016. Specifically, the evaluation indicators and original data of digital economy development in Jiangxi Province from 2011 to 2016 are shown in Table 1

| Table 1. evaluation indicators and original data of digital economy development in Jiangxi Province from 2011 to 2016 |
|----------|---------|---------|---------|---------|---------|---------|
| Index    | 2011    | 2012    | 2013    | 2014    | 2015    | 2016    |
| X1       | 2.41    | 2.90    | 3.48    | 4.09    | 5.00    | 6.60    |
| X2       | 69.02   | 79.12   | 76.09   | 79.35   | 77.50   | 79.61   |
| X3       | 37.33   | 40.36   | 43.26   | 45.32   | 46.77   | 51.36   |
| X4       | 8.99    | 10.50   | 11.12   | 11.77   | 14.91   | 17.22   |
| X5       | 24.71   | 27.10   | 36.22   | 61.10   | 226.02  | 173.22  |

According to the longitudinal statistical data from 2011 to 2016, the fixed asset investment of information industry in Jiangxi Province presents two characteristics: one is the scale of fixed asset investment in information industry in Jiangxi province continues to expand. In addition to the short-term decline in 2014, the fixed assets investment scale of information industry in Jiangxi Province shows an overall growth trend (see Figure 1). Second, the attention of fixed asset investment of information industry in Jiangxi Province is decreasing.

**Figure 1.** fixed investment in information industry of digital economy in Jiangxi Province from 2011 to 2016

Since 2011, the fixed asset investment of digital economy and information industry in Jiangxi Province has shown a certain growth trend, which shows that the fixed asset investment in the information industry of data economy has developed steadily in the overall development direction of the total social investment in Jiangxi Province.

On the one hand, from the perspective of the carrier of government information disclosure, the network publicity represented by government websites has become the mainstream form. Taking 2016 as an example, the province made a total of 2341768 pieces of public information through various carriers. The order of publicity proportion of each carrier from high to low is: government website > TV broadcast newspapers > government microblog > government wechat > government bulletin (see...
Figure 2). The proportion of online publicity forms (Government website, government microblog and government wechat) is as high as 82%, It has become the mainstream way of information disclosure beyond the traditional media such as television, radio, newspapers and magazines.

![Figure 2. Information map of Jiangxi Provincial Government](image)

Figure 2. information map of Jiangxi Provincial Government

It can be seen from Figure 2 that in the digital economy of Jiangxi Province, big data network has an unusual development space, and digital infrastructure is the necessary support condition to ensure the healthy and sustainable development of digital economy. In view of the shortcomings of the basic digital economy in Jiangxi Province, such as the low Internet penetration rate and insufficient information level, the construction of basic digital economy in Jiangxi Province should be committed to improving the network infrastructure construction and improving the informatization level of the whole province. The cultivation of digital economy in Jiangxi should be carried out on the basis of big data and entrepreneurship and innovation.

5. Conclusion

Industrial innovation in the era of big data is facing a series of problems, such as talent shortage, resource shortage and investment risk. From this point of view, this paper proposes to improve the innovation mechanism of the connection between the government, industry and scientific research institutions, so as to maximize the advantages of all parties. First, establish an innovation ecosystem based on big data. Second, speed up the cultivation of big data and innovative talents, introduce innovative technology, compensation policies and talent flow guarantee mechanism, so as to ensure the efficiency of enabling digital economy cultivation in Jiangxi Province. Third, speed up the opening of shared data resources and the construction of digital ecological environment based on big data technology, so as to make the digital economy active and shared. Fourth, strengthen the big data decision-making function of industrial innovation, optimize the reform plan of digital economy by relevant industrial structure, so as to reduce the risks brought by industrial adjustment of economic model. In the future, Jiangxi Province's energy increasing effect will be highlighted. The cultivation of enabling digital economy cannot be separated from the innovative development of many talents. Therefore, we should strengthen the training of talents and establish the investment strategy of digital talents. In depth analysis and grasp of the status quo and demand of digital talents, formulate talent training policies according to the needs; increase the investment of talents, improve the talent incentive mechanism, and strive to attract digital talents; actively develop talent education in the digital economy, Based on the theoretical knowledge of digital economy and the theory of operation results of ten levels in enterprises, this paper constructs a digital economy talent resources and skills training system suitable for the characteristics of Jiangxi Province, so as to meet the needs of high-level application-oriented and technical skilled talents for the development of digital economy.
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