

Analysis of Rural E-commerce Evaluation in Heilongjiang Province Based on Entropy Weight Method

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Keywords: Rural e-commerce; entropy weight method; e-commerce evaluation;

Abstract: In order to promote the healthy development of rural e-commerce in Heilongjiang Province, on the basis of summarizing the domestic and international research results, and integrating the regional characteristics of logistics development, residents' living standards and economic benefits in Heilongjiang Province, this paper proposes a rural e-commerce evaluation model based on entropy weight method in Heilongjiang Province. The empirical analysis was carried out with relevant data from 2010 to 2017. The study found that rural e-commerce has a good overall implementation effect in Heilongjiang Province, which can effectively promote the steady growth of the rural economy and promote the smooth progress of rural economic supply reform.

1. Introduction

In recent years, China's e-commerce economy has developed rapidly, and urban e-commerce has gradually taken shape. E-commerce giants such as Ali and JD.com have begun to deploy rural e-commerce [1]. The government proposed measures such as "E-commerce Demonstration County" and "Rural Revitalization Strategy" to promote the transformation and upgrading of the rural economy and rural economic growth. According to a survey conducted by the Ministry of Commerce [2], in 2017, the rural network sales reached 1,244.88 billion yuan, the number of e-commerce employment exceeded 28 million, and the growth rate of rural retail sales in the Northeast was the highest, up to 60.9%. Rural e-commerce plays an important role in revitalizing the rural economy, expanding consumption, solving employment, and tackling poverty. The Heilongjiang provincial government has issued a number of relevant documents such as "Guiding Opinions on Promoting the Healthy and Rapid Development of E-Commerce" and formulated "Accelerating the Development of Rural E-Commerce Program" to promote the development of rural e-commerce .

With the combination of production, education and research, and the coordinated development, the government provides good policy support for the development of rural e-commerce, and attracts a lot of researchers. Carmen [3] conducted a comparative analysis of two typical Taobao villages, and believed that ICT, natural resources and geographical advantages have a greater impact on economic performance; Cao [4] proposed the rural e-commerce innovation development model and implementation measures based on the Internet+; Quan[5] proposed to cultivate a rural e-commerce ecosystem, solve the problem of agricultural product circulation, open up the sales market, and promote rural economic development. Rural e-commerce has different degrees of influence on the development of economy, policy, science and technology, etc. [6]. However, most of the research on rural e-commerce development in Heilongjiang Province is limited to theoretical and superficial analysis. Therefore, based on the previous research results and the relevant data from 2010 to 2017, the entropy method is used to empirically analyze the current situation of rural e-commerce development in Heilongjiang Province, and explore its internal dynamic mechanism and its economic impact on Heilongjiang Province.

2. Models and evaluation methodology

2.1 Models

In the mid-to-late 1990s, countries and organizations with better economic development began to conduct research on the development of e-commerce, and proposed the OECD, APEC, CII China e-commerce indicator system, as well as the US, the UK, and the European Union to propose their own e-commerce evaluation system [7-10], in which the evaluation standards proposed by the OECD organization have the best effect. The OECD organization believes that e-commerce development is a dynamic process of development that can be described by studying new things development and diffusion process theory. The rural e-commerce with the two-way coupling circulation function of “agricultural products into the city, crafts going to the countryside” belongs to the emerging industries such as network and knowledge economy. Its development is in line with the development of Rogers's innovation diffusion theory S curve. The evaluation should be based on the development characteristics of S curve [9]. This paper draws on the OECD and CII models as reference [8, 10], and constructs the evaluation model of rural e-commerce development in Heilongjiang Province from three levels: readiness, application and impact degree. The readiness degree reflects the development level of Informatization, networking and mechanization of rural e-commerce development, mainly reflecting the evaluation results of rural e-commerce development infrastructure; The application degree reflects the intensity of use, residents' life application and industrial application, which is the most direct represent of rural e-commerce on residents' life and economic development; The impact degree reflects the degree of influence of rural e-commerce development on the economy, residents' living and social benefits, which is a macroscopic display of the development of rural e-commerce to the society and residents. The specific model is shown in Fig. 1.

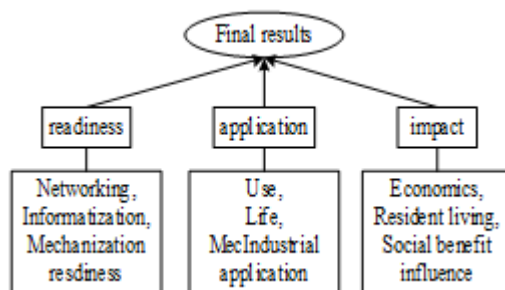


Fig. 1 evaluation model

2.2 Evaluation methodology

In this paper, the entropy weight method (EWM) is used for evaluation. The EWM method can be used as an evaluation method of objective weighting [11]. Compared with SWOT, AHP and other evaluation methods, the EWM's evaluation results on rural e-commerce development can reduce the influence of human subjective consciousness integration, and effectively avoid the uncertainty and subjective initiative brought by traditional main observation and evaluation methods [12]. The concept of entropy was first proposed by the German physicist Clausius in 1854. Shannon introduced entropy into information theory. The uncertainty of the information is measured by the entropy value, and the entropy is inversely proportional to the information uncertainty. Based on this characteristic, the characteristics of information entropy are combined, the degree of change of each index is quantified, the entropy weight value of each index is measured, and the weight product of the index value and the weight of the information entropy is combined with the weight of the index value to obtain a more objective evaluation result. [13], quantitatively compares the degree of change of each index, measures the entropy weight value of each index, and combines the weight of the index value with the weight of the information entropy to obtain a more objective evaluation result.

The specific evaluation process is shown in Fig. 2.

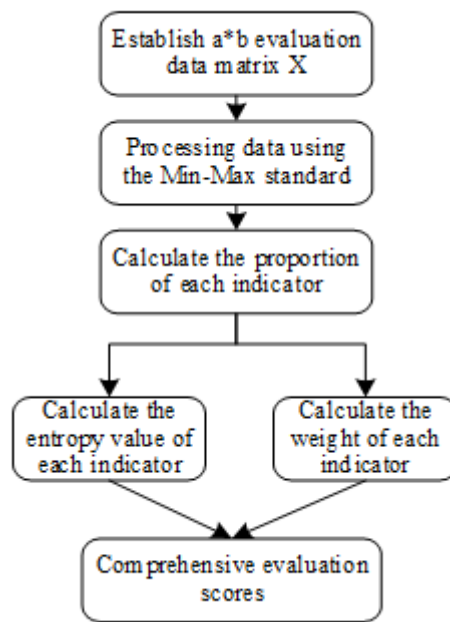


Fig. 2. The specific evaluation process

3. Empirical specification

3.1 Index system

China's rural e-commerce evaluation index system standards are not perfect, there is no standard evaluation index system, only some statistical reports related to e-commerce development, such as the "China E-commerce Development Report" issued by the Ministry of Commerce, CNNIC's "China Internet Development Status Statistics Reports", "China E-Commerce Development Index Report" jointly published Ali and other research institutes and other official reports. Based on the CII and OECD e-commerce evaluation standards, this paper combines the characteristics of regional rural e-commerce development in Heilongjiang Province, comprehensive logistics development, residents' living standards and economic benefits, and selects 27 indicators to build the evaluation system, dividing into three levels according to the model, 9 indicators per layer.

3.2 Data collection

To ensure statistical caliber and data validity, the research data mainly comes from China Statistical Yearbook, Heilongjiang Statistical Yearbook, China Internet Network Development Report, China E-Commerce Development Report, and national statistics released by Heilongjiang Province. Statistical bulletin on economic and social development, statistical bulletin on the development of the postal industry. In view of the late start of rural e-commerce development in Heilongjiang Province, the statistical data of various regions are not comprehensive, and some statistics are missing. In order to compare the gap between the formal development of rural e-commerce in Heilongjiang Province, considering the availability of data and the rigor of research, the index data of rural e-commerce development in Heilongjiang Province in 2010-2017 years were evaluated. Partial missing values are filled according to other linear schemes.

4. Results and analyze

Through the above analysis and evaluation, the comprehensive score of rural e-commerce development in Heilongjiang Province from 2010 to 2017 is obtained. The readiness, application and impact scores are shown in Table 1. The comprehensive evaluation, readiness and application degree

of rural e-commerce in Heilongjiang Province showed an upward trend, while the Impact degree was polyline bypass mode. Before 2013, the economic source of Heilongjiang Province mainly came from the economic benefits of the secondary industry. Due to the influence of the industrial economy, the impact measurement score was slightly higher. In 2014, China's economy basically entered the New Normal Economy, the social and economic benefits changed from high-speed growth to medium-high-speed growth. Heilongjiang Province implemented a supply-side reform strategy based on “the integration of information and industrialization” as a means to promote industrial economic restructuring and economic development. The center gradually tilted toward the tertiary industry. Since 2014, Heilongjiang Province has promoted e-commerce into rural comprehensive demonstration, “Internet +” agriculture and other strategic programs. Under the joint promotion of government support, e-commerce to the countryside, and college students returning to their hometowns, the e-commerce preparations in Heilongjiang Province The degree of application and application increased, the social and economic benefits gradually recovered, and the reform of the structural supply side of the rural economy was promoted smoothly, accelerating the development of the tertiary industry. In 2015, the total retail sales of social consumer goods exceeded 750 billion yuan, and the contribution rate of the third industry reached 50%. To visually observe and analyze the results, Table 1 is drawn as Figure 3.

Table 1 Comprehensive scores

Time	Readiness	Application	Impact	Score
2010	0.6008	0.5539	2.9855	4.1401
2011	1.4555	3.6051	4.6601	9.7208
2012	2.7095	2.7056	4.2958	9.7109
2013	3.4142	3.8933	3.0166	10.3241
2014	4.3451	4.4337	3.9288	12.7076
2015	3.9480	4.6129	4.1280	12.6889
2016	4.8626	6.8503	5.2479	16.9607
2017	5.8785	10.0755	7.7927	23.7468

As can be seen from Figure 3, from 2010 to 2017, the composite score showed a steady upward trend in S-type, and in 2017, it increased by 40.01% compared with 2016. Compared with 2010, the comprehensive score increased by nearly 6 times. Rural e-commerce has outstanding advantages in promoting Heilongjiang Province's economic upgrading, revitalizing the rural economy, and realizing agricultural modernization. Since the government decided to develop rural e-commerce in 2014, Heilongjiang Province has truly upgraded and transformed its economy, solving the problem of lagging economic growth and building a new socialist countryside. The development of rural e-commerce has a good guiding role in promoting farmers' employment, returning college students to their hometown, and logistics construction. For example, the express delivery volume in Heilongjiang Province reached 23.185.63 million in 2017, an increase of 6.50% over the same period of last year. The application degree of rural e-commerce in Heilongjiang Province exceeds the impact degree, indicating that the development of rural e-commerce has a significant effect on promoting the structural transformation of Heilongjiang Province's economy. Moreover, the degree of application indirectly drives the growth of the measurement score, indicating that the development of rural e-commerce can effectively promote the social and economic stability, healthy and sustainable growth of Heilongjiang Province. The development of rural e-commerce has provided a new path for the improvement of rural economic industry, optimized the allocation of rural resources, stimulated the vitality of rural economy, and increased the income of farmers.

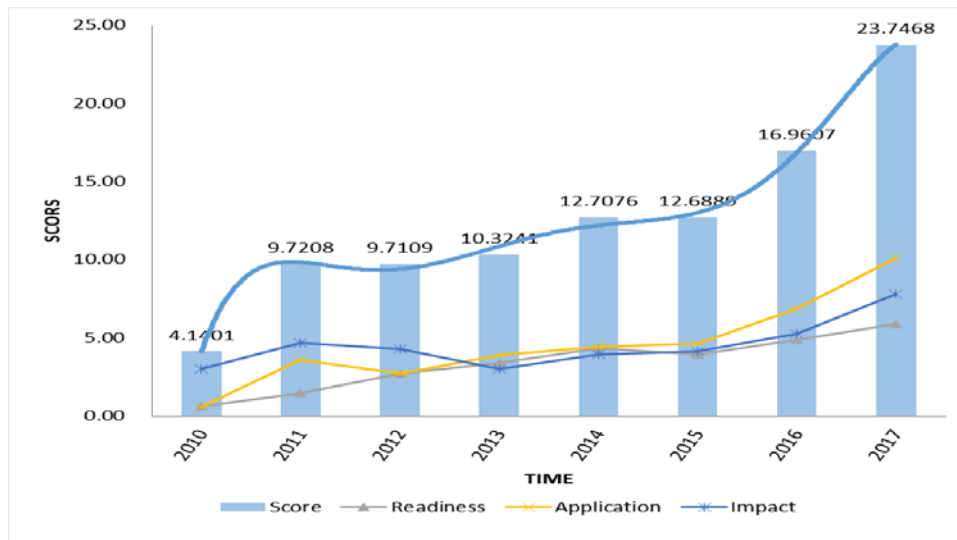


Figure 3 Analysis Score Analysis Chart

5. Discussion and Conclusions

In this paper, the e-commerce evaluation model of Heilongjiang Province is established by means of entropy weight method, and the relevant data of 2010-2017 is empirically analyzed to explore the internal dynamic mechanism of rural e-commerce to promote economic development. From the evaluation results, from 2010 to 2014, the comprehensive evaluation of rural e-commerce in Heilongjiang Province has increased by about 6 times, but there is still a certain gap with rural e-commerce development provinces such as Zhejiang and Jiangsu. From the analysis shows that Ali Research Institute, Chinese Academy of International Electronic Commerce Center jointly issued the "2014-2015 China E-Commerce Development Index Report", the e-commerce development index of Heilongjiang Province's administrative region is 10.8, which is nearly 7 times that of the first Guangdong Province, 69.67. It can be seen that rural e-commerce can promote the economic development of Heilongjiang Province to a certain extent. At the same time, in recent years, the state has also proposed the policy of "to take targeted measures in poverty alleviation", which is to identify clear poverty populations, causes of poverty, types of poverty, and implement policies such as education poverty alleviation, ecological protection and poverty alleviation, and low-income policies to solve poverty problems. The operation of rural e-commerce is in rural areas, which is more conducive to solving rural poverty problems and implementing the rural revitalization strategic plan.

Rural e-commerce promotes the potential of entrepreneurial innovation in rural areas through "energy empowerment" and promotes agricultural upgrading, rural progress, and peasant development. However, the wave of rural e-commerce has also caused large-scale entrepreneurs to blindly build e-commerce platforms, and has not done a good job in entrepreneurship planning. Many e-commerce platforms are basically at a loss. According to the previous analysis, the development of rural e-commerce can promote economic development. However, due to the proliferation of these e-commerce platforms, the pressure of homogenous competition, and the quality of products, the development of rural e-commerce has been seriously delayed. In order to solve such problems, in accordance with the government-led, market-operated methods, standardize market standards, integrate relevant resources, and attract investment in social assets, At the same time, reduce the redundant e-commerce operation platform, and gradually establish an ecosystem of multi-industry integration such as finance and Internet of Things, and at the same time take advantage of the border provinces to build a cross-border e-commerce platform. This model will effectively promote the integration of various local industries, the development of new agricultural models, the incubation of professional electric traders, improve the efficiency of rural economic circulation and the level of consumption of residents, and effectively solve the problem of supply

and marketing in the rural market, gradually moving towards the integrated rural e-commerce development model and expand the development space of rural e-commerce in Heilongjiang Province. At the same time, through market data analysis, the crop information with higher economic benefits can be transmitted to the countryside to avoid the occurrence of unsalable crops and losses.

Acknowledgements

Fund Project: Philosophy and Social Science Project of Heilongjiang Province in 2018: Research on Rural E-commerce Development Model and Countermeasures in Heilongjiang Province under the Background of New Countryside; Key Research Topics of Harbin Social Science Association: Current Situation and Countermeasures of Rural E-commerce Development in Heilongjiang Province from the Perspective of Internet Research (2018HSKZ0022).

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