Summer 5-26-2017

A Study on Regional E-commerce Development in China and Its Influencing Factors

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Abstract: This paper defines the concept of regional e-commerce by analyzing the literature. According to the definition, this paper extracted the core indicators of regional e-commerce development, and used the principal component analysis to evaluate the development level of regional e-commerce. Finally, this paper analyzes the impact factors of regional e-commerce development from qualitative and quantitative perspective and puts forward relevant hypotheses. Regression analysis is used in this paper to validate the hypothesis in the analysis of the influencing factors of regional E-commerce. The empirical results has showed that the industrial structure, network coverage, logistics infrastructure are key factors of regional e-commerce development.

Keywords: Regional e-commerce; Principal component analysis; Influencing Factors of Regional E-commerce Development

1. INTRODUCTION

With the rapid development of e-commerce, many domestic provinces have placed the e-commerce as the focus of the provincial industrial development and promulgated a lot of e-commerce-related policies. E-commerce plays a vital role in regional economic growth. However, due to the differences of the regional industrial structure and development strategy, the development of regional e-commerce presents different development characteristics. Understanding the regional differences in e-commerce development and influence factors can help provinces to develop appropriate policies to reduce the differences and improve regional competitiveness of e-commerce, improve the level of regional economic development.

2. THE DEFINITION OF REGIONAL E-COMMERCE

Narrow e-commerce refers to the use of the Internet in business or activities. The generalized e-commerce refers to the use of a variety of electronic tools to engage in business activities [1].The thesis uses the concept of generalized e-commerce to define e-commerce. E-commerce includes tools ranging from basic telegraphy, telephony, broadcasting, television, faxing to computers, computer networks, to modern systems such as NII (National Information Infrastructure-Information Superhighway), GII (Global Information Infrastructure), Internet and so on [2]. E-commerce refers to the business activities from the demand for goods to the reasonable and legitimate consumption，except for the typical production process after all the activities [3]. Therefore, Regional e-commerce is defined as carrying out e-commerce activities in a particular region.

There are few papers on the analysis of regional e-commerce development differences, and most of the research methods also remain in the qualitative level. In this paper, the difference of regional e-commerce is measured by the method of regional economic difference measurement. It will select the principal component analysis method to measure the level of development of e-commerce, and make the regional e-commerce development of the comprehensive score.

There are many researches on the influencing factors of e-commerce at domestic and abroad. These researches can be divided into two aspects: one is based on macroscopic factors, the other is microcosmic. This

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paper mainly discusses the factors that influence the development of E-commerce from the perspective of macro-factors.

3. THE STATUS OF REGIONAL E-COMMERCE DEVELOPMENT IN CHINA

The development of e-commerce in China is mainly based on the point of surface [2]. E-commerce developments of the better areas are mainly concentrated in a few provinces, such as Zhejiang, Beijing, Guangdong. And the e-commerce industry of Northeast, central and western regions developed late and slow. In general, the development of China's regional e-commerce shows a trend of imbalance. According to the definition of generalized electronic commerce and the availability of data, four indicators are taken as a measure of regional e-commerce development level indicators. The four indicators are E-commerce transaction volume(EX1), high-tech enterprise number(EX2), IPV4 quantity(EX3), and the number of provincial websites(EX4) [4].

The amount of e-commerce transactions (EX1) can reflect the economic benefits of e-commerce activities. it can show that the development of e-commerce is good or bad. Therefore, it is one of the common indicators to judge the differences in the development of regional e-commerce.

The number of high-tech enterprises in each province (EX2) refers to the number of enterprises to carry out high-tech activities in the provinces. E-commerce activities are based on Internet and other modern information systems to carry out. The number of high-tech enterprises can reflect the level of regional information technology development and aggregation level, which can be used as a measure of the level of development of e-commerce indicators.

The number of IPV4 in each province (EX3) is measured by the proportion of IPV4 in each province to the total number in the country. The number of IPV4 represents the number of network terminals. The number of network terminals reflects the province's e-commerce development of infrastructure, and it is one of the important indicators to measure the level of development of e-commerce.

The number of sites in the provinces (EX4) is mainly measured by the ratio of the number of websites in each province to the total number of websites in the country. Web site is a business platform for e-commerce activities. It is the premise and basis for e-commerce activities. So it is reasonable to be a indictor to measure of the development of e-commerce.

According to the principle of principal component analysis, the data of 15 major provinces in China were selected for processing. Data come from China e-commerce Yearbook (2012-2014), China Science and Technology Yearbook (2012-2014), Internet Development Statistics Report (28th to 35th). Since indicators cannot be directly compared, they need to be dimensionless. The processing of EX and F (the regional e-commerce integrated development index) is shown in the following:

$$EX_{ij}^{*} = \frac{EX_{ij} - \overline{EX_j}}{s_j} \tag{1}$$

$$\overline{EX_j} = \frac{1}{n}\sum_{i=1}^{n} EX_{ij} \tag{2}$$

$$s_j^2 = \frac{1}{n-1}\sum_{i=1}^{n} (EX_{ij} - \overline{EX_j})^2 \tag{3}$$

$$F_j = \sum_i W_i * EX_{ij}^{*} \tag{4}$$

(i represents the indicator, i=1,2,3,4; j represents the province, j=1,2,3…,15)

It determines the weight of each index according to the principal component analysis method, and finally calculates the regional e-commerce development index. Table 1 shows the distribution of the weight of the indicators， Table 2 shows the integrated score of regionalE-commence development.

Table 1. Distribution of the weight of the indicators

Indicator	Weight
EX1	0.16630567
EX2	0.19318644
EX3	0.31869177
EX4	0.32181612

Table 2. The integrated score of regional E-commence development

provinces	years	EX1	EX2	EX3	EX4	Total score F
Beijing	2011	0.29714	-0.2105	3.38026	2.02821	1.738722032
Guangdong	2011	2.39183	3.28533	0.79797	1.93753	1.91029096
Zhejiang	2011	1.65063	0.8625	0.09961	0.99455	0.792939541
Shandong	2011	0.78053	0.49247	0.03465	-0.03911	0.223401532
Shanghai	2011	0.62192	-0.00694	-0.03032	0.94014	0.394977579
Hebei	2011	-0.08957	-0.54253	-0.29017	-0.92262	-0.50909422
Sichuan	2011	-0.1218	-0.21954	-0.30641	-0.36553	-0.27795197
Henan	2011	-0.22589	-0.22316	-0.32265	-0.38366	-0.30697215
Hubei	2011	-0.39733	-0.38511	-0.37137	-0.5106	-0.42314814
Fujian	2011	-0.51882	-0.33806	-0.43634	0.0697	-0.2682187
Jiangxi	2011	-1.10213	-0.42582	-0.46882	-0.78262	-0.66682192
Chongqing	2011	-0.77508	-0.64928	-0.48506	-0.63754	-0.61408757
Guangxi	2011	-1.01571	-0.62848	-0.53378	-0.92642	-0.75858033
Tianjin	2011	-0.70554	-0.42763	-0.5825	-0.71008	-0.61410077
Beijing	2012	-0.27576	-0.2799	3.38215	2.16578	1.674913
Guangdong	2012	2.61954	3.25369	0.79377	2.14781	2.008381
Zhejiang	2012	1.37425	0.85686	0.09814	-0.83591	0.356346
Shandong	2012	0.78896	0.63658	0.03343	0.00965	0.267947
Shanghai	2012	0.63815	-0.05798	-0.03128	1.01585	0.411875
Hebei	2012	-0.06513	-0.54868	-0.29011	-0.33173	-0.31604
Sichuan	2012	0.20368	-0.23634	-0.30629	-0.2958	-0.20459
Henan	2012	-0.1998	-0.20757	-0.32247	-0.3497	-0.28864
Hubei	2012	-0.36916	-0.33991	-0.371	-0.45751	-0.39253
Fujian	2012	-0.49369	-0.3358	-0.43571	0.33307	-0.17865
Jiangxi	2012	-1.06602	-0.40977	-0.46806	-0.72702	-0.63958
Chongqing	2012	-0.74275	-0.64567	-0.48424	-0.65515	-0.61342
Shanxi	2012	-0.75769	-0.59307	-0.48424	-0.61922	-0.59418
Guangxi	2012	-0.9806	-0.67033	-0.53277	-0.74499	-0.70212
Tianjin	2012	-0.67401	-0.4221	-0.58131	-0.65515	-0.58973
Beijing	2013	-0.57587	-0.31071	3.38065	1.75353	1.485904
Guangdong	2013	2.36771	3.28819	0.795	2.36014	2.041888
Zhejiang	2013	1.66686	0.8428	0.09979	0.37263	0.591746
Shandong	2013	0.61558	0.57324	0.04011	-0.09201	0.196289
Shanghai	2013	0.7137	-0.13722	-0.03409	0.98327	0.397751
Hebei	2013	0.26516	-0.51001	-0.29056	-0.4447	-0.29014
Sichuan	2013	0.40533	-0.26841	-0.30185	-0.31592	-0.18231
Henan	2013	-0.33057	-0.20246	-0.32604	-0.30948	-0.29759
Hubei	2013	-0.4795	-0.2763	-0.36475	-0.60654	-0.44456

Fujian	2013	-0.58901	-0.33939	-0.44057	0.37877	-0.18203
Jiangxi	2013	-1.02266	-0.37236	-0.47121	-0.8672	-0.67126
Chongqing	2013	-0.61091	-0.59676	-0.48089	-0.811	-0.63113
Shanxi	2013	-0.82117	-0.58314	-0.48896	-0.77254	-0.65366
Guangxi	2013	-1.01916	-0.65555	-0.52928	-0.8511	-0.73871
Tianjin	2013	-0.5855	-0.45194	-0.58735	-0.77788	-0.6222

4. EMPIRICAL ANALYSIS ON THE INFLUENTIAL FACTORS

4.1 Hypothesis

The proportion of the tertiary industry in the industrial structure is an indicator of the development status of the regional service industry and circulation industry [5]. E-commerce industry is a new industry based on the service industry. The proportion of the tertiary industry on the development of e-commerce has a significant role [6]. Thus, this paper raises the following hypothesis:

H1：The proportion of the tertiary industry is positively related to the regional e - commerce development.

E-commerce activities need to rely on logistics to carry out. So the logistics facilities are affecting the efficiency of e-commerce activities. With the increasing demand for online shopping, e-commerce enterprises are increasingly focusing on the "last mile" problem, which put forward higher requirements for logistics facilities [7]. Therefore, it states the following assumptions:

H2：Logistics facilities and regional e-commerce development is positively related.

E-commerce is the "technology + business" industry [8]. Technology, especially Internet technology is the fundamental e-commerce. A complete e-commerce activity requires continuous advanced technology to support. Technology investment and the development of e-commerce are closely related. Therefore, it proposes the following assumptions:

H3：Technology investment and regional e - commerce development is positively correlated.

Population factors include the number and quality of the population. This paper uses two dimensions to measure the impact of population factors, which is network penetration and education level. Population factor is the basis of business activities, but also the basis for e-commerce activities [9]. As a result, it presents the following assumptions:

H4：The network penetration and the development of e-commerce is positively related.

H5：The education level is positively related to the development of e-commerce.

4.2 Regression analysis

Regression analysis is a statistical analysis method that determines the quantitative relationship between independent and dependent variables. This paper chooses the level of e-commerce development in each province as the dependent variable to measure the level of regional e-commerce development, and select the industrial structure, technology investment, logistics facilities and population factors as independent variables. Because natural resources and policies cannot be measured with specific indicators, the analysis does not consider these variables temporarily. The industrial structure factor is replaced by the ratio of the regional tertiary industry GDP and the regional GDP. Technology investment factors will use regional R&D funding to express. The logistics infrastructure factor will be represented by the length of the province's line transport accounts for the proportion of the total length of the country. Population factors will be used by regional network penetration rate and the regional ratio of the population above the high school.

Therefore, the regression equation is defined as:

$$Y= b_0+ b_1X_1+ b_2X_2+ b_3X_3+ b_4X_4+ b_5X_5 \quad (5)$$

X_1, X_2, X_3, X_4 and X_5 are independent variables, which indicate industrial structure, logistics facilities,

investment in science and technology, network penetration rate and education level.b_0 is a constant. Y represents the dependent variable, refers to the regional e-commerce integrated development index.

Using SPSS19.0, the analysis results are shown in the following table:

Table 3. Regression analysis of regional E-commerce influencing factors

Model	Non - normalized coefficient		Standard coefficient	t	Sig.	B 95.0% confidence interval	
	B	Standard deviation	trial version			Lower limit	Upper limit
(constant)	-5.824	.874		-6.666	.000	-7.592	-4.055
Proportion of the tertiary industry (X_1)	.104	.021	1.501	4.876	.000	.061	.148
Logistics facilities (X_2)	32.630	5.188	.788	6.290	.000	22.128	43.133
investment in science and technology (X_3)	-.360	.231	-.569	-1.560	.127	-.826	.107
network penetration rate (X_4)	.029	.007	.511	4.223	.000	.015	.043
education degree (X_5)	-1.322	1.887	-.172	-.701	.488	-5.143	2.498
Square R	.831						
F value	37.269						
Sig.	.000						

According to the results in Table 4.1, the fitting degree of the model (square R) is 0.831 which indicates that the goodness of fit of the model is very good. The F value of the model is 32.269，the significance of T test is 0.00,which means that the regression model is very significant. There is a very significant correlation between the independent variable and the dependent variable.

The Significant T test results of the proportion of the tertiary industry is 0.00 less than the confidence level of 0.05, indicating the proportion of the tertiary industry has a significant impact on regional e-commerce development. The regression coefficient of the proportion of the tertiary industry is 0.104, indicating that the proportion of the tertiary industry has a positive effect on the development of regional e-commerce. That is, the hypothesis H1 is verified. Reasonable industrial structure has a very significant effect on economic development. The tertiary industry mainly includes the service industry and the circulation industry. Most of the e-commerce industry is based on the service industry. Therefore, the proportion of the tertiary industry is relatively high. The development of e-commerce is also very rapid.

The Significant T test results of network penetration is 0.00 less than the confidence level of 0.05, indicating the network penetration has a significant impact on regional e-commerce development. Internet penetration refers to the quantity of regional Internet users. All e-commerce activities cannot separable from Internet users. Internet users can either be the initiators of e-commerce activities or the recipients of e-commerce activities. So the number of Internet users on the number of regional e-commerce development has a certain impact.

The Significant T test results of logistics facilities is 0.00 less than the confidence level of 0.05, indicating logistics facilities has a significant impact on regional e-commerce development. Logistics facilities are essential to ensure the normal operation of e-commerce activities. The improvements of logistics facilities not only affect enterprises to carry out e-commerce activities, but also affect the consumers choose online shopping intention and experience. With the increase in e-commerce enterprises, product competition has stabilized. Enterprise and regional logistics infrastructure will have a direct impact on the competitiveness of e-commerce.

Therefore, the logistics base of regional e-commerce development has a very significant effect.

The Significant T test results of education level and investment in science and technology are more than 0.05, indicating that these two factors on the impact of regional e-commerce development effect is not significant. Technology investment is an indispensable part of e-commerce development. But the development of e-commerce in China is more emphasis on the economic benefits of business. So the impact of science and technology investment is not very obvious. From the distribution of Chinese Internet users, most Internet users focus on junior high school and high school education level. China's e-commerce market at this stage tends to be in the low-end market. So there is no significant relationship between the level of education and the development of e-commerce.

The results of hypothesis test based on empirical analysis are shown in Table 4.

Table 4. Hypothesis test conclusion

Hypothesis	Content of Assumptions	Verification conclusion
H1	The proportion of the tertiary industry is positively related to the regional e - commerce development.	confirmed
H2	Logistics facilities and regional e-commerce development is positively related.	confirmed
H3	Technology investment and regional e - commerce development is positively correlated.	disconfirmed
H4	The network penetration and the development of e-commerce is positively related.	confirmed
H5	The education level is positively related to the development of e-commerce.	disconfirmed

5. CONCLUSIONS

It aims to analyze the status of regional E-commence development in china and its impact factors. Firstly, it analyzes regional differences in the development of e-commerce by Principal Component analysis. Secondly, it establishes a regression model to analyze the relationship between industrial structure, logistics base, science and technology input and population factors and the development of regional e-commerce. It can be concluded that Industrial structure, logistics base, network penetration are the key factors affecting the development of e-commerce from this thesis. If the local government wants to develop e-commerce industry to become a pillar industry, they should adopt reasonable industrial structure, increase investment in logistics infrastructure and improve the network coverage. In particular, this article suggests the following：

Firstly, the regional government should vigorously develop the regional tertiary industry. Based on the above analysis, a reasonable industrial structure is indispensable for the development of e-commerce, and the development of e-commerce is closely related to the development of tertiary industry. The tertiary industry mainly includes the logistics industry and the service industry. In order to establish e-commerce as a regional pillar industry, the region should support the development of the tertiary industry, improve the operational efficiency of the regional service industry and circulation industry, and optimize the service circulation system.

Secondly, the region should increase the Internet penetration rate. The scale of Internet users is the basis for the development of E-commerce. The regions that E-commerce is developing well are Internet-intensive areas. In order to establish e-commerce as a regional pillar industry, the region should increase the regional popularity of internet, and build e-commerce development foundation.

Finally, the region should increase its investment in logistics infrastructure. The fundament of the development of E-commence is logistics facilities. E-commerce activities cannot be separated from the convenient logistics environment. In order to establish e-commerce as a regional pillar industry, the region should improve the investment in logistics facilities, so as to improve the level of regional e-commerce development.

ACKNOWLEDGEMENT

This research was supported by scientific research program of Hubei Provincial Department of Education of China under Grant Q20131103 and Humanities and Social Science Fund project of Hubei Province of China under Grant 15D008..

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