Research on Relationship between Rural E-commerce Development and Agriculture Industrialization of Ethnic Areas Based on Coupling Degree Model

Yongheng Meng¹², Xingchen Wei², Xia Zhao²*

¹Research Institute of Modern Enterprise Management of Guilin University of Technology, Guilin541004, China
²School of Management, Guilin University of Technology, Guilin541004, China

Abstract

Both increasing rural e-commerce development level of ethnic areas and ongoing agriculture industrialization can promote local economic level. This paper mainly focuses on how to coordinate them. Therefore, this paper summarizes the rural e-commerce development level of ethnic areas and development state of agriculture industrialization firstly. To discuss the coupling correlation between rural e-commerce development and agriculture industrialization of ethnic areas, we built the coupling degree model, and the model results show that rapid development of rural e-commerce actively promotes the development of agriculture industrialization and the development of agriculture industrialization also plays an important role in rural e-commerce development level in turn. But they seem a little incongruous, index weight values indicate that the development of rural e-commerce and agriculture industrialization of ethnic areas should be further optimized. Finally, we make many suggestions according to model results, for example, strengthen the infrastructure construction of rural e-commerce development and promote e-commerce poverty alleviation; strengthen the construction of logistics & express system to lower logistics cost; strengthen the online brand creation of agricultural products and promote the development of agricultural products industrialization.

Keywords: Ethnic Areas, Rural E-commerce, Agriculture Industrialization, Coupling Relationship.

1. RESEARCH BACKGROUND

1.1 Literature review

E-commerce means that two transactions sidescarry out various commercial trade activity based on Internet environment by browser or server without meeting face to face in business transactions through the world. In other words, e-commerce is typical “non-contact” economy, an innovative business operation of completing customers’ online consumption and Internet transaction with merchants, as well as online payment and various business, trade and financial activities and related integrated service activities (Wu, 2016). Emergence and development of e-commerce mainly depends on widely available Internet and computer. Internet sales is the result of the market competition with the development of modern science and technology and change of customer value and the value change is critical condition (Zou, 2016). E-commerce is mainly to help enterprises to raise incomes and explore emerging markets through network platform. However, the benefits of cost reduction and labor productivity increase can be realized after years because of coexistence of emerging and traditional business models (Cao et al., 2017). Regardless of current level of technology, the infrastructure of the industries and people’s habits can be changed after many years, so there is no doubt that the agriculture industrialization of ethnic areas makes use of e-commerce (Ma, 2016). What’s more, rate of contribution of current technological development level of ethnic areas to national economic development is less than 40%, and it is predicted that rate of contribution to technological development can reach 70% in 2050, of which e-commerce and network transaction can make important contribution to the economy of ethnic areas (Wang et al., 2017). This is an important research direction for research on coupling relationship between rural e-commerce development and agriculture industrialization of ethnic areas.

1.2 Research purpose
This paper mainly researches the impact relationship between ethnic e-commerce development level and agriculture industrialization and corresponding improvement suggestions on this theoretical basis. Generally, rural e-commerce development level of ethnic areas is subject to local industry scale and agriculture industrialization development degree depends on local e-commerce development level to a certain extent; in other words, rural e-commerce development level of ethnic areas needs to take advantage of local agricultural industry scale and there is a certain correlation between them. So, this paper focuses on the impact relationship between them and puts forward the coupling relationship and builds coupling degree model for low collaboration between rural e-commerce development level and agriculture industrialization of ethnic areas accordingly. According to the model, we can see that higher rural e-commerce development level of ethnic areas will drive local agriculture industrialization development scale; further increased agriculture industrialization scale will promote local rural e-commerce development level in turn. There, corresponding specific suggestions are put forwards according to the coupling relationship and there is certain reference value for coordinated development of rural e-commerce and agriculture industrialization of ethnic areas.

2. THEORETICAL BASIS FOR DEVELOPMENT OF RURAL E-COMMERCE AND AGRICULTURE INDUSTRIALIZATION OF ETHNIC AREAS

Nowadays, with extensive application of network technology and increasing rural network users as well as accelerated development of rural e-commerce of the country, e-commerce becomes the important engine of structure adjustment and transformation and upgrading of rural economy. The State Council issued the Instructions on Promotion of Accelerated Development of Rural E-commerce in 2015, laying a policy foundation for rural e-commerce development (Li and Zhou, 2016). Rural economic restructure has been important to promote continuous development of national economy. Firstly, compared with urban economic development level, rural production and life mode lags, with low added value, and development process cannot compare with urban economic development process.

Secondly, rural Internet technology of ethnic areas lags behind and information is less accessible, and there is only extensive economic development mode to sustain industrial economic growth, so it is difficult to transform to intensive and highly technical industrial management mode. But, the emergence of rural e-commerce completely solves this trouble and rural economy will also enter new e-commerce era (Bi, 2015).

Agriculture industrialization cannot be separated from rural e-commerce development. China put forward important strategies from 2013 to 2015, and accelerated the promotion of agriculture industrialization, with the subject of rural e-commerce, reform of agricultural reclamation and land reform. Enhancing agricultural production efficiency is the nature of agriculture industrialization (Wang and Ning, 2015). Specifically, it means the rural agricultural mechanization level, technological level of agricultural production, and agricultural informatization level of ethnic areas. Traditional agriculture is transited to modern agriculture mainly through agricultural informatization. Construction of rural e-commerce of ethnic areas, big agricultural data, Internet of Things and other advanced technologies revolutionize previous agricultural production way and business mode of ethnic areas and improve the agricultural production and operation efficiency of ethnic areas. Besides, applying plantation, animal vaccine and other advanced biotechnologies can raise the farming and breeding efficiency and complete main contents of agricultural modernization (Liu, 2016). Hence, coordinated development of rural e-commerce and agriculture industrialization of ethnic areas has confronted with new challenges. The rural areas of Chinese ethnic areas are transiting to open information society from closed agricultural society; the agriculture is changed to intelligent, standard and branding modern agriculture; the farmers become new farmers that master income increase secrete of whole industry chain from agricultural business.

3. EMPIRICAL ANALYSIS OF COUPLING RELATIONSHIP BETWEEN RURAL E-COMMERCE DEVELOPMENT AND AGRICULTURE INDUSTRIALIZATION OF ETHNIC AREAS

3.1 Model building

Coupling relationship means the phenomenon that two or more systems or motion forms affect each other under the interaction. Specifically, coupling degree model is built according to coupling model theory, which can reflect the impact degree among all factors and the trend of impact from chaos to order (Zhang et al., 2017). Given this, this paper built the model of coupling relationship between rural e-commerce development and agriculture industrialization of ethnic areas in virtue of coupling connotation in physics. Because the rural e-commerce development and agriculture industrialization of ethnic areas are different systems, the indexes of
two systems are processed by threshold nondimensionalization method, and the formulas are as shown in below:

\( v_{ij} \) is positive index

\( v_{ij} \) is negative index

Where, \( v_{ij} \) means the j index of the i system in rural e-commerce development, representative value \( x_{ij} (i=1,2; j=1,2…n) \), and \( \min(x_{ij}) \) and \( \max(x_{ij}) \) are the maximum and minimum of \( x_{ij} \).

3.2 Numeric calculation

To verify the coupling between rural e-commerce development and agriculture industrialization of ethnic areas, the linear weighting method is used and the formula is as shown in (2) below:

\[
U_{1+2} = \sum_{i=1}^{2} \phi_{ij} u_{ij}
\]

(1)

Where, \( U_1 \) and \( U_2 \) present synthetic evaluation functions of rural e-commerce development system and agriculture industrialization system of ethnic areas respectively; \( \phi_{ij} \) represents the weight index of them. For the purpose of more accurate calculation, the entropy weighting method is used for these indexes, which avoid the errors of subjective factors of the experimenter to some extent. The coupling model of rural e-commerce development and agriculture industrialization is obtained through calculation of aforesaid indexes accordingly:

\[
C = \frac{(U_1 \times U_2)}{(U_1 + U_2)} \cdot \frac{1}{2}
\]

(2)

Because of big difference between rural e-commerce development subsystem and agriculture industrialization subsystem, there may be the result of two low subsystems and high coupling, and this differs from principle of high development level of two subsystems and similarly high coupling degree of them. So, to minimize the illusion, the coupling coordination degree model of them is introduced mainly to objectively reflect coordinated development of rural e-commerce system and agriculture industrialization system of ethnic areas. During the process of coordinated development, rapid development of rural e-commerce of ethnic areas will boost the development of agriculture industrialization, while the agriculture industrialization development should comprehensively consider many factors, and the evaluation system construction will be carried out next.

3.3 Evaluation system construction

<table>
<thead>
<tr>
<th>Item</th>
<th>Primary index</th>
<th>Weight value</th>
<th>Secondary index</th>
<th>Weight value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural e-commerce development level</td>
<td>Ordinary income</td>
<td>0.2541</td>
<td>Employee</td>
<td>0.3517</td>
</tr>
<tr>
<td></td>
<td>Employment income</td>
<td>0.3676</td>
<td>Knowledge &amp; skill</td>
<td>0.5247</td>
</tr>
<tr>
<td>Agriculture industrialization</td>
<td>Traditional agriculture</td>
<td>0.1473</td>
<td>Industry scale</td>
<td>0.2412</td>
</tr>
<tr>
<td></td>
<td>Precision agriculture</td>
<td>0.3854</td>
<td>High-tech agriculture</td>
<td>0.3618</td>
</tr>
</tbody>
</table>

According to rural e-commerce development situation and agriculture industrialization development level of ethnic areas and coupling characteristics of them, follow the scientific and accurate index selection, and setting and screening is carried out by frequency statistical method and theoretical analysis method. First of all, collected 2006-2016 data of rural e-commerce development and local agriculture industrialization development level in the database of ethnic areas by frequency statistical method and selected relatively frequent data indexes of recent years. Then, built the evaluation index system by theoretical analysis method and primary and
secondary indexes and their weight values are as shown in Table 1.

3.4 Result analysis and discussion

Different economic development levels of ethnic areas cause bigger gap of their rural e-commerce development levels, which affects the process of local agricultural industrialization to some extent. From the aspect of agricultural industrialization, many people of ethnic areas are still in poverty, so the poverty is still the urgent problem to be solved. Table 1 shows that there is bigger difference between primary and secondary indexes of rural e-commerce development level and agriculture industrialization, which indicates that rapid development of rural e-commerce has positive effect on the development of agriculture industrialization; the development of agriculture industrialization is also important to rural e-commerce development level, but their development is still uncoordinated. Index weight values show that the development of rural e-commerce and agriculture industrialization of ethnic areas should be further optimized.

4. COORDINATED DEVELOPMENT PATH OF RURAL E-COMMERCE AND AGRICULTURE INDUSTRIALIZATION OF ETHNIC AREAS

To better coordinate their relationship, this paper suggests the ethnic areas to improve the following aspects.

Firstly, strengthen the infrastructure construction of ethnic areas, promote e-commerce development and boost e-commerce poverty alleviation. Governmental agencies of ethnic areas shall continuously perfect rural Internet system. Through the cooperation of Mobile, Unicom and Telecom companies, the government shall make detailed plan for rural network infrastructure construction, promote the optical fibers in rural market of ethnic areas to townships and villages, boost 4G network coverage, and build e-commerce platform suitable for agriculture industrialization development of ethnic areas through effective utilization of network advantages to increase farmers’ income and promote rural e-commerce poverty alleviation of ethnic areas.

Secondly, strengthen the construction of rural logistics & express system of ethnic areas to lower rural logistics fee and give assistance to the development of agriculture industrialization. The government shall make use of rural cooperatives, e-commerce service stations and resources of ethnic areas, establish and add express service outlets in ethnic areas, continuously encourage and develop special rural logistics, build professional logistics system and improve the efficiency of distribution via Internet. Focus on planning and building logistic parks of ethnic areas by logistics subsidies, tax and cost relief and other methods, direct the smooth information communication between e-commerce enterprises and express & logistics parksin ethnic areas by various forms, channels and types and fully develop rural modern logistics distribution system and cold-chain logistics system. Furthermore, choose farms with strong sense of responsibility and service awareness in ethnic areas to organize and build own logistics service team to provide corresponding services to logistics companies and farmers. Energetically develop agriculture industrialization through perfecting rural e-commerce of ethnic areas and effectively coordinate the development of rural e-commerce and agriculture industrialization.

Thirdly, build online agricultural product brands of ethnic areas and promote the development of agriculture industrialization. Rural e-commerce enterprises shall stipulate and issue an agricultural product brand cultivation plan to expand selection discount of rural online loans. In addition, the enterprises shall confirm characteristic industry and featured agricultural product and focus on boosting the cultivation of geographical indication of agricultural products, green food and other product marks; make the production and processing standards for special agricultural products and enlighten enterprises, cooperatives and farmers on planting, production, processing and packing according to standards to guarantee the quality of supply of online agricultural products of ethnic areas from the source; control the supervision of quality of agricultural products of ethnic areas in intermediate links, promote the construction of online agricultural product quality traceability system, monitor intermediate links and eliminate hidden quality problems; according the principle of “One industry for one county” and “one product for one village”, strive to develop characteristic agricultural industry, cultivate featured agricultural product brand, and actively cultivate online product brand to increase farmers’ income.

5. CONCLUSION

In conclusion, with increasing social and economic level, the rural e-commerce development of ethnic areas gets more and more attention; development of local agriculture industrialization has a positive effect on promotion of local rural e-commerce development and they affect each other. This paper built the coupling model of rural
e-commerce development situation and agriculture industrialization scale of ethnic areas and discussed coupling relationship between them by model. According to the model, it can be seen that rural e-commerce development level of ethnic areas can promote the development of agriculture industrialization to some extent and further expansion of agriculture industrialization scale will also boost the rural e-commerce development level of ethnic areas in turn. Hence, to coordinate their development, strengthen e-commerce infrastructure construction and boost e-commerce poverty alleviation; reinforce the construction of logistics & express system to lower the logistics cost; enhance the online agricultural product brand cultivation and promote the agricultural product industrialization.

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