Research on the Construction of Modern Agricultural Industrial System in Daqing

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Abstract. Industrial prosperity is the key to the Rural Revitalization Strategy. It also requires all regions to expand industrial space, innovate industrial forms, promote industrial cross integration, accelerate the integration of rural primary, secondary and tertiary industries, and then explore the formation of a diversified and characteristic modern rural industrial system based on local resource endowment and market demand. Therefore, the construction of modern rural industrial system is not only related to the development pace of agricultural and rural modernization, the consolidation of poverty alleviation achievements, but also affects the overall promotion of Rural Revitalization Strategy.

Keywords: Rural Revitalization · Modern Rural Industrial System · Industrial Upgrading

1 Introduction

Building a modern rural industrial system is not only related to the development pace of agricultural and rural modernization, the consolidation of poverty alleviation achievements, but also the only way of all-round revitalization. In terms of the development planning of rural industrial system, the combination of important elements and standards contained in rural industrial system and intelligent technology is the key consideration in the formulation of industrial scheme or planning in rural areas [5]. Moreover, the efficient development of rural industry can maximize the speed of rural regional economic development, and is conducive to the sustainability of rural market development, the adaptability and flexibility of market environment [3]. As for the agricultural industry itself, Selvaraj Narayanan believes that compared with the large industrial system, the rural industry has low profitability and high risk [7]. Therefore, the upgrading of infrastructure for rural industrial development and the development of various fields of rural economy based on this should also be based on technological upgrading and iteration to continuously promote the industrial upgrading and rapid development of the industry in the region, So as to improve industrial efficiency. As for enterprises in rural industries, Sari pointed out after studying the food processing industry in Indonesia that this industry belongs to an industry with low R & D and sales ratio [6]. With the

continuous increase of food demand, the food processing industry will be forced to innovate. Enterprises are an important link in the development of rural industries. Borodina found that only a few powerful agricultural companies control a considerable part of the agricultural food processing industry in Ukraine due to market concentration through a study on the agricultural sector in Ukraine [1]. At the same time, small producers and processors have weak market power and are excluded from profitable markets. How to better integrate farmers and leading enterprises into rural industrial development, quir ó Z Estrada's research on the agricultural food chain makes it possible to evaluate the relationship between all actors and promotes the understanding of all possible economic and social gains and losses involved in the food chain [4]. Compared with the construction of industrial system, the construction of rural industrial system must rely on natural resource endowments such as land, take industrial technology as the means, and take the construction of agricultural whole industry chain or agricultural integration development pattern as the goal [8]. Mjonono analyzed the functions and values of small farmers' participation in the agricultural value chain, and found that the three main areas in which small farmers' participation in the agricultural value chain plays an important role in the upgrading of the agricultural value chain are the exertion of the functions of agricultural product production, process management and interest driving mechanism [2].

2   Empirical Analysis

2.1   Selection of Evaluation Indicators

According to the specific characteristics and development requirements of industrial integration in the guiding opinions on promoting the integrated development of rural primary, secondary and tertiary industries, the integrated development of rural primary, secondary and tertiary industries is market-oriented and realizes the cross integration of various industries within agriculture by breaking the barriers between various industries. Combined with the current situation of industrial integration development in Daqing, based on the principle that data can be obtained and quantified, and referring to the research results of Wang Mengyu and other scholars, this paper constructs the evaluation index system of rural industrial integration in Daqing, which includes 20 indexes. According to the availability of data and based on the realistic basis of the integration of primary, secondary and tertiary industries under the background of Rural Revitalization Strategy, this study constructs the evaluation index of rural industry development based on the relevant data of Daqing city from 2014 to 2019, analyzes the proportion of each index of rural industry in Daqing City in the process of industrial integration, and analyzes the coupling and coordination between each index.

2.2   Evaluation Method

In order to avoid the deviation caused by subjective evaluation, the evaluation method used in this study is entropy weight gc-topsis evaluation method. The use of this objective evaluation method can eliminate the deviation of subjective evaluation to the greatest extent. This study uses entropy weight method to calculate the objective weight of

each evaluation index of industrial integration development in Daqing City, and then uses TOPSIS method to evaluate each evaluation object, so as to evaluate and measure various factors involved in the process of industrial integration in Daqing City, and then calculate the comprehensive evaluation method of comprehensive evaluation value. The specific calculation steps of the evaluation method can be divided into the following links:

Construction of standardized evaluation matrix for rural industrial integration

$$A = (X_{ij})_{mn} = \begin{bmatrix} x_{11} & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{m1} & \cdots & x_{mn} \end{bmatrix}, \ i = 1, 2, \ldots, n \tag{1}$$

Different index dimensions will have an adverse impact on the evaluation results. Therefore, it is necessary to normalize the index data. For example, the i-th indicator in the j-th year is, which becomes after normalization.

$$\overline{X}_{ij} = \frac{x_{ij} - \min(x_j)}{\max(x_j) - \min(x_j)} \tag{2}$$

$$\overline{X}_{ij} = \frac{\max(x_j) - x_{ij}}{\max(x_j) - \min(x_j)} \tag{3}$$

$$y_{ij} = \frac{\overline{X}_{ij}}{\sum_{i=1}^{n} \overline{X}_{ij}} \tag{4}$$

Calculate the entropy value and weight of index I. The information entropy calculation formula and the weight of each index are as follows:

$$c_j = -k \sum_{i=1}^{m} y_{ij} \ln(y_{ij}), \ i = 1, 2, \ldots, m \tag{5}$$

$$d_j = \frac{1 - c_j}{\sum_{i=1}^{n} 1 - c_j}, \ j = 1, 2, \ldots, n \tag{6}$$

$$k = 1/\ln (m) > 0$$

2.3 Data Sources

The sample time of this study is 2014–2019. The data used are mainly from Daqing statistical yearbook, Heilongjiang statistical yearbook, China Rural Yearbook and Daqing national economic and social development statistical bulletin. In the process of data collection, the data of some indicators need to be calculated, and there is no such indicator in some years in the Yearbook, resulting in the lack of data. Therefore, such data uses different data sources in the calculation process, which affects the accuracy of the data to a certain extent, and then has a certain impact on the empirical analysis.

2.4   Evaluation Results of Rural Industrial Integration Development

According to the set model, the weight of each index affecting industrial integration in Daqing is calculated through the relevant data of rural primary, secondary and tertiary industry integration in Daqing. Specifically, the entropy weight method is used to calculate the weight of secondary indicators, and then the linear summation method is used to calculate the weight of primary indicators.

2.5   Empirical Analysis Results

It can be found from Table 1 that the top five indicators in the evaluation index weight of rural industrial integration development in Daqing are the total output value of agricultural industrialization, per capita disposable income of rural residents, total power of agricultural machinery, e-commerce transaction volume of agricultural products and total output value of agriculture, forestry, animal husbandry and fishery. In other words, in the process of promoting rural industrial integration, these five indicators play a greater role than other indicators, and play an obvious role in promoting the development of rural industry in the implementation of Rural Revitalization Strategy.

   In terms of weight, the total output value of agricultural industrialization in Daqing ranks first, which is inseparable from the policy of early start and rapid development of agricultural industrialization in Daqing, and is also the result of the integrated development of agriculture and secondary and tertiary industries in Daqing. The per capita disposable income of rural residents shows that Daqing has done solid work in poverty alleviation and has certain industrial advantages and good policy guidance in promoting the rapid growth of farmers' income, which has continuously improved the living standards of rural residents; The total power of agricultural machinery shows that the development level of agricultural mechanization and modernization in Daqing has improved rapidly, and the agricultural socialized service system is in the process of rapid development and continuous maturity, which provides a foundation for the development of modern agriculture and industrial integration in Daqing and an opportunity for the development of agricultural service industry in Daqing. It has a good role in promoting the development of industrial integration in Daqing city; the promotion effect of e-commerce transaction volume of agricultural products on the development of industrial integration benefits from the establishment and rapid development of Daqing e-commerce Industrial Park, which creates a premise for the combination of agricultural products and modern marketing means. It is an important model for the in-depth integrated development of production, processing and marketing of agricultural products in Daqing; The total output value of agriculture, forestry, animal husbandry and fishery is closely related to Daqing's strong support for the development of agricultural industry. The output value of animal husbandry in Daqing accounts for more than half of the total agricultural output value for many years. In addition, the characteristics of planting industry are constantly highlighted, and the development speed of fishery and forestry is constantly improving, which have created the industrial foundation for the integrated development of industries in Daqing.

Table 1. Evaluation index system and weight of rural industrial integration development in Daqing.

Primary index	Second index	Unit	Weight
Extension of the agricultural industry chain	Number of agricultural products processing enterprises	Family	0.053
	The output value of the primary industry accounts for the local GDP	%	0.069
	Total power of agricultural machinery	10,000 kWh	0.117
Agricultural multifunctional	Farmers' Professional Cooperative	indivual	0.074
	Rural tourism annual operating income	Ten thousand yuan	0.047
	Number of Tourists Received in Rural Tourism Year	Thousand people	0.052
Service industry integration	Agricultural products e-commerce transaction volume	Ten thousand yuan	0.098
	Total output value of agricultural industrialization	Ten thousand yuan	0.164
Farmers' income increase and agricultural efficiency	Per capita disposable income of rural residents	Yuan	0.129
	Income ratio of urban and rural residents	%	0.054
	Engel Coefficient of Rural Residents	%	0.046
	Total output value of agriculture, forestry, animal husbandry and fishery	Ten thousand yuan	0.097

Therefore, from the perspective of weight, the larger five aspects play a strong role in promoting and driving the development of rural industry integration in Daqing. They are an important part of rural industry development and even the establishment of rural industrial system, and are the key areas of concern in the construction of modern rural industrial system in Daqing. However, the development of rural industrial integration in Daqing is still in the initial stage of growth. Measures need to be taken to promote the rapid development of industrial integration and the construction of modern rural industrial system in Daqing.

Building a modern rural industrial system requires the participation of all industrial departments. It is a process of close cooperation and mutual promotion in all links.

Building the whole agricultural industrial chain in Daqing includes various components of agriculture before, during and after production. It is a new measure to get rid of traditional agriculture, which only focuses on production and ignores the value-added process before and after production. It is also the key to the development of modern agriculture. The ultimate goal of industrial integration development is to continuously extend the industrial chain, realize the all-round value-added of the industrial chain, and let farmers and new agricultural operators enjoy the benefits of value-added of the value chain. In the process of building the whole industrial chain, it is inseparable from the application of modern science and technology and the construction and improvement of agricultural socialized service system. Agricultural science and technology should not only stay in the laboratory and experimental field, but also be transformed into all links of the agricultural industrial chain, effectively implement and create value, so as to truly promote the construction of modern rural industrial system and expand and strengthen rural industries. The improvement of agricultural socialized service level is often neglected in the past, and it is also an important part affecting the increase of farmers' income. Therefore, using modern technology to provide services for the entire agricultural industry chain can not only improve agricultural efficiency, promote the deep integration of agricultural production and service industries, but also improve the entire agricultural industry chain.

3   Conclusion

The key to rural revitalization is industrial revitalization. Daqing is at an important strategic node of industrial transformation and upgrading. Based on the advantages of regional resource endowment and market demand, and taking the integrated development of primary, secondary and tertiary industries as an opportunity, Daqing should vigorously innovate industrial forms, realize industrial integrated development, and gradually establish a diversified modern rural industrial system with its own characteristics, Realize the high-quality development of modern agriculture and rural economy in Daqing city. The conclusions are as follows:

3.1   Daqing has the Foundation of Building a Modern Rural Industrial System, and Modern Agriculture has Developed Rapidly

Through the analysis of the current situation of modern rural industrial system in Daqing, it can be found that Daqing has the basis for developing large-scale agriculture and modern agriculture. Under the macro-control of the whole city, the planting and animal husbandry in Daqing have developed well, the output scale of agricultural products is large and the quality is high. Driven by the development of agricultural industrialization, the production of agricultural products is closely connected with the upstream and downstream, and the development level of industrial integration is continuously improved. The emergence of well-known and powerful leading enterprises in agricultural industrialization at home and in the province has also spawned new industries, new formats and new business models, which has a strong role in promoting the continuous emergence and maturity of new agricultural business entities, and is also an effective

way to increase agricultural production and efficiency and farmers' income, It lays an industrial foundation for the construction of modern rural industrial system in Daqing and provides an effective way to choose.

3.2 The Development of Industrial Integration in Daqing Plays an Obvious Role in Promoting the Construction of Modern Rural Industrial System

Through empirical analysis, the factors that play an obvious role in promoting the process of agricultural industry integration in Daqing are the total output value of agricultural industrialization, per capita disposable income of rural residents, total power of agricultural machinery, e-commerce transaction volume of agricultural products and total output value of agriculture, forestry, animal husbandry and fishery, and these factors have a significant role in promoting and sensitivity to the development of industrial integration, It is the field and aspect that Daqing needs to focus on in formulating the construction of modern rural industrial system. Under the background of Rural Revitalization Strategy, how to determine the key point of building a modern rural industrial system is the main concern of Daqing city to comprehensively promote the extension and value-added of agricultural industrial chain. Therefore, keeping the main body of the industrial chain in the countryside and leaving more income from the value chain to farmers are the key points to better promote agricultural production and farmers' income.

3.2.1 Building a Modern Rural Industrial System in Daqing Faces Many Problems, Which Requires the Top Decision of Government Departments to Take the Development of Agricultural Industrialization as the Starting Point and Lead the Construction of a Modern Rural Industrial System

The construction of modern rural industrial system is not only a systematic project, but also a process of close cooperation and mutual promotion. Building the whole agricultural industrial chain in Daqing includes various components of agriculture before, during and after production. It is a new measure to get rid of traditional agriculture, which only focuses on production and ignores the value-added process before and after production. It is also the key to the development of modern agriculture. The ultimate goal of industrial integration development is to continuously extend the industrial chain, realize the all-round value-added of the industrial chain, and let farmers and new agricultural operators enjoy the benefits of value-added of the value chain. In the process of building the whole industrial chain, it is inseparable from the application of modern science and technology and the construction and improvement of agricultural socialized service system. Agricultural science and technology should not only stay in the laboratory and experimental field, but also be transformed into all links of the agricultural industrial chain, effectively implement and create value, so as to truly promote the construction of modern rural industrial system and expand and strengthen rural industries. The improvement of agricultural socialized service level is often neglected in the past, and it is also an important part affecting the increase of farmers' income. Therefore, using modern science and technology to provide services for the whole agricultural industrial chain can not only improve agricultural efficiency and promote the deep integration of agricultural production and service industry,but also improve the whole agricultural industrial chain.

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