Research on Restrictive Factors and Countermeasures of Modern Agriculture Development in Western Region Based on rough Sets

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Abstract: Developing Modern Agriculture is the Primary Task of Building a New Socialist Countryside. the Development Level of Modern Agriculture is Related to the Realization of National Modernization, Industrialization and Integration of Cities and Towns. It is an Important Way to Comprehensively Promote the Construction of New Countryside. It is Necessary to Realize a Major Transformation from Traditional Agriculture to Modern Agriculture. in This Paper, rough Set Theory is Used to Reduce the Original Index Group of Modern Agricultural Development and to Quantitatively Analyze the Development Level of Modern Agriculture in the Western Region. the Results Show That the Development of Modern Agriculture in the Western Region is Remarkable during This Period. in the Future, We Should Focus on Strengthening the Construction of Agricultural Management Informatization and Agricultural Management Organization, and Strengthen the Protection and Management of Agricultural Ecological Environment. Based on This, Some Countermeasures and Suggestions Are Put Forward to Improve the Development Level of Modern Agriculture in the Western Region.

1. Introduction

Modern Agriculture is Supported by Modern Science and Technology, Modern Industrial Equipment, Modern Management Methods, and Modern Agricultural Service System, Making All Links of Agricultural Production Closely Linked [1]. Using Modern Industrial System to Promote Agriculture, Using Modern Management Forms to Promote Agriculture, Using Modern Development Concepts to Lead Agriculture and Using a Comprehensive Agricultural System to Train New Farmers to Develop Agriculture. Generally Speaking, the Western Region Has Harsh Natural Conditions, Backward Foundation and Many Factors. the Traditional Mode of Agricultural Production Has Not Fundamentally Changed, and It Cannot Meet the Basic Requirements of Modern Agriculture "Intensive Input of Factors, Market-Oriented Allocation of Resources, Scientific and Technological Means of Production, and Integration of Industrial Management" [2]. the State Has Given Great Support to the Development of Agriculture in the Western Region and Has Invested Tens of Billions of Yuan in Infrastructure Construction for the Development of Agriculture in the Western Region. the Agricultural Production Conditions in the Western Region Have Been Greatly Improved and the Level of Agricultural Science and Technology Has Been Significantly Improved.

In Order to Comprehensively and Systematically Reflect the Real Level of the Development of Modern Agriculture in the Western Region, Related Research Often Chooses as Many Indicators as Possible When Constructing the Indicator System. Although It Helps to Improve the Integrity and Coverage of Information, It Inevitably Brings about the Problem of Cross Redundancy of Information. from the Point of View of System Theory, Regional Investment Environment Evaluation is a Complex Large-Scale System, Which Consists of Many Subsystems, Such as Economic Environment, Infrastructure Environment, Social Environment, Resource Environment, Etc. Each Subsystem is Relatively Independent, Dynamic Development and Mutual Restriction, Which Jointly Affect Regional Investment Environment Evaluation [3]. rough Set Has Strong Ability to Deal with Uncertain and Incomplete Data, and Does Not Need Any Prior Intervention. It is Very Suitable for Decision Table Reduction in Decision Support System [4]. rough Set Has Strong Ability to Deal with Uncertain and Incomplete Data, and It Does Not Need Any Prior

Intervention. It is Very Suitable for Decision Table Reduction in Decision Support System. in This Paper, the Attribute Reduction Method in rough Set Theory is Used to Reduce the Relevant Indicators of Modern Agricultural Development. on the Basis of Ensuring the Reliability of the Evaluation Results, the Key Evaluation Indicators Are Obtained, and a Multi-Index Comprehensive Evaluation Model is Established. Entropy Weight Method is Used to Determine the Weight of the Indicators. the Development Level of Modern Agriculture in the Western Region and All Parts of the Country is Quantitatively Analyzed, and the Corresponding Conclusions and Enlightenment Are Obtained.

2. the Basic Concept of rough Set

The Characteristic of Systematic Evaluation with rough Set Theory is That It Does Not Need Any Prior Knowledge, But Directly Starts from the Given Data Set and Extracts the Interdependent Relationship between Empirical Data from the Given Problem [5]. the System Evaluation Process Based on rough Set is Shown in Figure 1.
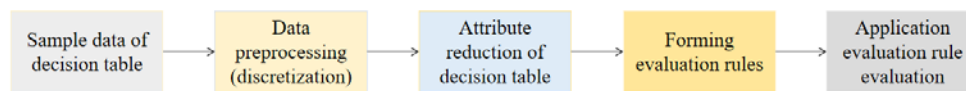

Fig.1 Based on rough Set, the Karyotype Structure Diagram of the System is Comprehensively Evaluated

Assuming that given the universe U of the research object and a concept in the representation of subset $X \subseteq U$, the knowledge in U is expressed as a family set of concepts, and a classification family on U is defined as a knowledge base on U, which constitutes a specific classification. In this way, the knowledge base expresses various basic classification modes of one or a group of intelligent institutions, and constitutes the basic component of the required definition's relationship with the environment or itself.

In order to facilitate mathematical derivation, the equivalent set is used instead of classification in rough set theory. When R is used to represent the equivalence relationship between objects in the universe U, then U / R represents all families of equivalence classes formed by the objects in U according to the relationship R. If $P \subset R$ and $P \neq \phi$, then $\cap P$ (the intersection of all the equivalence relations in P) is also an equivalence relation, called an indistinguishable relation on P, denoted as IND (P).

$$[X]_{IND(P)} = [X]_R, P \subset R \quad (1)$$

The indistinguishable relationship is the equivalent relationship in the domain U when the object corpse is expressed by the attribute set. It reveals the granular structure of knowledge, and the granularity of knowledge is the reason why certain concepts cannot be accurately represented using existing knowledge. Under the definitions of U and R, the knowledge base can be defined as the division of the elements in U that belong to the relationship in R, denoted by K = (U, R).

3. Construction of Evaluation Index System for Modern Agricultural Development

3.1 Build the Original Index Group

Rough set theory can solve the bottleneck problem of knowledge discovery in project bid evaluation decision support system, such as rule discovery and representation, case retrieval, etc., and reduce the redundancy of knowledge through reduction, etc., greatly improve the efficiency of rule reasoning and case reasoning, and provide strong theoretical and practical support for project bid evaluation decision [6]. According to the "12th Five-Year Plan" for the National Rural Economic Development and the "National Modern Agricultural Development Plan (2011-2015)" and other planning documents, combining the connotation of modern agricultural development and the historical background of the "13th Five-Year Plan", the original index group [7] including 4

primary indexes and 23 secondary indexes is constructed, as shown in Table 1.

Table 1 the Original Index Group for Evaluating the Development of Modern Agriculture

Target layer	Primary indicator	Secondary index	Unit
The level of development of modern agriculture	Agricultural comprehensive output capacity	Per capita agricultural output value	Ten thousand yuan per person
		Agricultural land productivity	Billion yuan/ha
		Per capita net income of farmers	Ten thousand yuan per person
		Commodity rate of agricultural products	%
		Export rate of agricultural products	%
	Agricultural material and technical equipment	Per capita number of agricultural tractors	Tai/ten thousand people
		Electricity consumption per unit area of cultivated land	10,000 kWh/ha
		All households have productive investment in fixed assets	Yuan/household
		Effective irrigation rate	%
		Total power of agricultural machinery per unit area	Kilowatt/ha
		Fertilizer application per unit area	Tons per thousand hectares
		Proportion of education above junior high school	%
		Proportion of education above junior high school	%
		Proportion of agricultural technicians	%
	Agricultural management organization and management	Coverage rate of agricultural information services	%
		Average computer ownership per 100 households	Tai
		Per capita arable land	Ha/person
		The average number of farmers' professional cooperatives per million households	Ge
		Proportion of sales income of leading enterprises above designated size	%
	Agricultural resources and environment	forest coverage	%
		Agricultural disaster rate	%
		Soil erosion control rate	%
		Per capita possession of biogas produced by biogas digesters	m^3/person
		Comprehensive utilization rate of agricultural wastes	%

3.2 Index Reduction under rough Set Theory

Rough set theory is a mathematical tool to describe incompleteness and uncertainty. Because it can effectively analyze various incomplete information such as imprecision, inconsistency and incompleteness [8]. The information system is represented by S, S = (U, Ω), U is the domain of discussion mentioned above, Ω is a finite attribute set, including conditional attribute set C and decision attribute set D. A knowledge expression system with both conditional attributes and decision attributes is called a decision table, that is, when $\Omega = C \cup D$, $C \cap D = \phi$, the information system (U, Ω) is called a decision table. Uncertainty and fuzziness in rough set theory are boundary-based concepts, that is, a fuzzy concept has a fuzzy boundary. Each uncertain concept is represented by a pair of exact concepts called upper and lower approximations: given a knowledge base K = (U, R), for each subset XU and an equivalent relationship R = IND (K), The set X can be divided according to R's basic set description:

$$R_*(X) = \cup\{\gamma \in U / R : \gamma \subseteq X\}$$
$$R^*(X) = \cup\{\gamma \in U / R : \gamma \cap X \neq \phi\} \quad (2)$$

In the formula, $R_*(X)$ and $R^*(X)$ are called the lower and upper approximation sets of a set, respectively. The lower approximate set of a set is a set containing all the basic sets in a given set, and the upper approximate set of a set is the smallest set containing all the basic sets in the elements of a given set.

In this paper, the reduction of indexes is carried out in three steps by rough set method. First, attribute reduction information table is constructed, and the index values of each evaluation index are summarized into the same information table. Each column in the information table is an attribute, and all attribute values of each behavior are set. Rough set theory is actually very similar to human cognitive characteristics, and the imprecision of knowledge is mainly caused by its too large granularity. The solution is to form a partial order structure of the knowledge base and find the minimum reduction through operation. According to the discrete requirements of rough set theory on sample data, the indexes are discretized. Each interval corresponds to a discrete value. Discretization algorithm is still one of the main problems in rough set research. The simplest discretization is equal distance partition method, which divides attribute values into breakpoint segments with equal distance according to parameters given by users, regardless of the number of attribute values in each breakpoint segment. In this paper, the fuzzy C-means clustering method is adopted, and the specific data of each index are classified by means of findcluster in FCM of fuzzy logic toolbox in matlab [9]; Finally, the discernibility matrix of the information system is calculated and the discernibility function f (x) is constructed. Because the kernel is included in all the reductions, and the calculation can be directly performed, it can be interpreted as a set of knowledge features that cannot be eliminated during knowledge reduction.

3.3 Entropy Weight Method Determines the Weight of Indexes At All Levels

In rough set theory, the knowledge of an object is described by specifying its basic characteristic attributes and their characteristic values. In this paper, entropy weight method is used to determine the index weight. Entropy weight method is an objective evaluation method. Entropy weight is calculated according to the variation degree of each index. The more drastic the index change, the greater its impact on the overall development of modern agriculture [10]. The data of the knowledge expression system is expressed in the form of a relational table, the rows of which correspond to the objects to be studied, the columns correspond to the attributes of the objects, and the information of the objects is expressed by specifying the attribute values of the objects. The weight is given correspondingly, which avoids the subjective arbitrariness of analytic hierarchy process, and the weight obtained is objective.

First determine the entropy of the system P_{ij} and the entropy of the i th index:

$$P_{ij} X_{ij} / \sum_{j}^{m} X_{ij} \quad (3)$$

$$e_i = -(1/\ln m)\sum_{j=1}^{m} P_{ij} \ln P_{ij} \quad (4)$$

Second, calculate the entropy weight of the i-th index, including the cross-section entropy weight and the time-series entropy weight, and then average them.

$$W_{ij} = (1 - e_i) / \sum_{j=1}^{m}(1 - e_i) \quad (5)$$

4. Evaluation on Development Level of Modern Agriculture in Western Region

The development of modern agriculture is an inevitable choice to promote the construction of a new socialist countryside in the west and the "sound and fast" development of the rural economy in

the west. However, in fact, the development of modern agriculture in the western region is facing a series of complicated problems and severe challenges. On the basis of the above analysis, through the establishment of a dynamic panel data model, the restrictive factors of the development of modern agriculture in the western region of the western region are deeply discussed. This part of data comes from China Statistical Yearbook, China Rural Statistical Yearbook, China Agricultural Yearbook, China Agricultural Statistics Data and so on. According to the fuzzy set method to reduce the index and entropy weight method to determine the index weight, the modern agricultural development index system is constructed. The specific indicators are shown in Table 2. The development level of modern agriculture in the western region from 2014 to 2018 is calculated.

Table 2 the Results Of Evaluating the Development Level of Modern Agriculture in the Western Region by Multi-Index Comprehensive Method

Indicator/Year	2014	2015	2016	2017	2018
Agricultural comprehensive output capacity	76.04	83.69	86.34	88.61	89.23
Agricultural material and technical equipment	68.65	70.54	75.16	80.24	85.51
Agricultural management organization and management	53.63	55.33	68.71	75.81	79.93
Agricultural resources and environment	67.18	68.46	75.52	79.96	84.18
Comprehensive development level of modern agriculture	69.11	72.49	79.93	82.33	85.52

The western region is an economically underdeveloped region in the western region. Most of the poverty-stricken areas in the western region are located in mountainous areas. Agriculture is of great importance, the agro-ecological environment is fragile, and the overall level of agricultural and rural economic development is low. Only by choosing a green agricultural mode can we achieve the organic combination of traditional agriculture and modern agriculture, the combination of production and protection, and the combination of rational development and utilization. At present, the agricultural non-point source pollution in the west is getting worse day by day, the standardization of agricultural production is low, and the safety problem of agricultural products is very serious. It can be seen that despite the complicated domestic and international economic environment and frequent natural disasters, the implementation effect of a series of agricultural policies during this period is still relatively significant, greatly improving the development level of modern agriculture in the western region. During this period, the implementation effect of a series of agricultural policies is still relatively significant, greatly improving the development level of modern agriculture in the western region. Among them, agricultural material and technical equipment are at the same level as the comprehensive development level of modern agriculture. Agricultural management organization and management and agricultural resources and environment are the two main factors that restrict the development level of modern agriculture in the western region. As the market advantage of green food is obviously higher than that of conventional agricultural products, it has high value added and is an ideal industrial form choice for developing from traditional agriculture to modern agriculture.

5. Conclusions and Suggestions

5.1 Conclusions

During this period, the development of modern agriculture in the western region achieved remarkable results and the overall level was continuously improved. On the basis of continuous growth in grain science and technology input, we will continue to increase scientific and technological input to ensure grain production capacity, focusing on improving seed cultivation, planting technology, land and water resources alternative technologies, and technologies to cope with global climate change. And give priority support to the promotion and transformation of technological achievements, so that the transformation rate of new technologies and new achievements can be raised to the strategic height of promoting the country's overall grain production capacity. In the future, emphasis should be placed on strengthening the management of agricultural management organizations and the construction of agricultural resources and environment, including increasing the coverage rate of agricultural information services and strengthening the protection and management of agricultural ecological environment, so as to promote the common development of modern agriculture and informatization, urbanization, industrialization and greening and form a virtuous circle of mutual promotion.

5.2 Suggestions

5.2.1 Improve the Capability of Independent Innovation and Further Improve the Level of Agricultural Economic Agglomeration

Improving the independent innovation ability of agricultural science and technology, breaking through resource barriers and improving the level of comprehensive agricultural production are the overall direction and the only way to develop modern agriculture in the western region, and are the fundamental guarantee to improve the level of comprehensive agricultural production. To introduce and promote small practical, cheap, advanced technical performance of multi-purpose small mini tiller. It requires the control and rational use of chemicals, the recycling of production and living wastes, the strengthening of protection and utilization of agricultural and wild resources, and the gradual improvement of rural production, living and ecological environment. To strengthen the construction of agricultural science and technology innovation system. The main body of agricultural basic research and practical technical research should be gradually defined. To improve farmers' production and management capabilities. Actively advocate and implement the concept of integrated management of the whole agricultural process, and take high-quality, safe and nutritious green food as the production of end products and transform it into the whole process control before, during and after production. In order to meet the needs of the modern market economy, training in agricultural production skills, promotion and application of agricultural science and technology should be widely carried out in the western rural areas to continuously improve farmers' modern production skills and management capabilities, and to strengthen market awareness.

5.2.2 Constantly Improve the Quality of Agricultural Labor Force, Improve Agricultural Labor Productivity

The comprehensive quality of agricultural labor force directly affects the development level of modern agriculture, and improving the quality of rural laborers is an urgent requirement for the development of modern agriculture. The government's support, cultivation and development of agricultural specialized cooperative economic organizations and the improvement of farmers' organization are of great significance for accelerating the transformation from traditional agriculture to modern agriculture. We should give full play to the advantages of human resources in the western rural areas, greatly increase investment in human resources development, transform the advantages of population resources in the rural areas into the advantages of human resources, and provide strong intellectual support for the development of modern agriculture. Actively build a sound agricultural socialization service system. The western region should strengthen the service

ability before and after childbirth, and pay attention to the provision of agricultural means of production, funds, information and other factors of production, as well as the transportation, storage, packaging, marketing and other services of agricultural products. We will develop the processing industry of agricultural products with regional characteristics, extend the agricultural industry chain, intensively use agricultural production factors, and improve the level of agricultural industrialization.

5.2.3 Actively Develop Agricultural Circular Economy and Further Improve the Commercialization Rate of Agriculture

Good agro-ecological environment is the foundation of agricultural production and the inherent requirement of modern agricultural development. Active development of agricultural circular economy is an inevitable trend to effectively alleviate the contradiction between population growth, resource shortage and ecological imbalance and to develop modern agriculture. The government should actively guide agricultural specialized cooperative economic organizations to establish and perfect modern management mechanism, market management mechanism, effective incentive mechanism and benefit distribution mechanism, and continuously enhance the cohesion, radiation and influence of cooperative organizations. The key to the process of agricultural industrialization in the western region is to expand the scale of agricultural advantageous industries, actively cultivate regional agricultural industry groups and continuously improve the level of agricultural industry. And through the guiding investment in agricultural science and technology, scientific research institutions are urged to tackle the technical problems in agricultural circular economy and constantly explore new models suitable for local conditions. Give full play to the guiding role of government investment, gradually establish a diversified agricultural investment and financing system, promote rural financial reform and innovation, and improve the financial services of farmers and rural small and medium-sized enterprises.

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