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Construction of the Government Support and Evaluation Index System of Farmers' Cooperative Economic Organizations

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Abstract On the basis of expounding the necessity of evaluation index system of farmers' cooperative economic organization, the three first level indexes including organization development index, member development index and social development index and 13 second level indexes including aggregate capital of cooperative organization, annual profit share of cooperative organization, annual total income of cooperative organization, *etc.*, are established according to the principles of Systematics and the methods of Statistics and Quantitative economics. By using the analytical hierarchy process, the weight of each index is tested and the operation result and evaluation mode is established, as well as the index standard value and comprehensive value. As for the result of the evaluation, it is suggested that the government should support the farmers' cooperative organizations in hierarchy and targeted way according to local conditions. Though the construction of index system and comprehensive score, the government should establish the entry and exit mechanism of farmers' cooperative organizations to reasonably guild the rapid development of cooperators.

Key words Farmers' cooperative economic organization, Governmental support, Evaluation system, Analytical hierarchy process, China

Farmers' cooperative economic organization is supplementation and perfection of household contract system on the basis of household operation. The cooperative economic organization takes serving their members as the object and "established by the people, managed by the people and benefit for the people" as the organization principles. The object and principles have not only improved the organization degree of farmers, but also transferred the organization to farmers' own organization. As farmers' own organization, farmers' cooperative economic organization suits the demand of agricultural modernization, agricultural commercialization and agricultural specialization. Besides, farmers' cooperative organization has become an indispensable section in rural social service system and it has injected new energy to agricultural production and operation.

Comparing with farmers' cooperative economic organizations in developed countries, there are still many problems in the development of Chinese farmers' cooperative economic organizations. From the perspective of the current operation, the problems in the development of farmers' cooperative economic organization include limited coverage of Chinese farmers' cooperative economic organizations, low overall developmental level, and small scale of universal existence, substandard management norm, and low efficiency and so on^[1]. In the perspective of the developmental experiences of foreign farmers' cooperative economic organization, the governmental support on

cooperative organization is the key strength for the development of cooperative organization. In the recent years, Chinese government has issued substantial measures on supporting farmers' cooperative economic organization from various aspects, but the actual results are not so satisfactory. One of the major reasons of the unsatisfactory situation is the lack of correct selection and scientific evaluation on supporting subjects. And the situation is accountable for the lack of supporting measures and capitals. Therefore, a set of effective system should be established to evaluate the farmers' cooperative economic organization. Thus, for one thing, the cooperative economic organization can guide farmers to make correct adjustment to absorb more rural households to participate in farmers' cooperative organizations. For another thing, the effective evaluation system is conducive to letting the government subjectively know the operation of farmers' cooperative economic organization, as well as the major evidence for the policy support and capital support. The scientific evaluation of the operation effects on farmers' cooperative economic organization can further standardize the operation mechanism of farmers' cooperative economic organization; promote the cooperation spirit and promote the faster and better development of Chinese farmers' cooperative economic organization.

1 The design of evaluation index of farmers' cooperative economic organization

1.1 The necessity of designing the evaluation index system of farmers' cooperative economic organization

Chinese farmers' cooperative economic organization is characterized by complexity, dynamicity and multiple objectives. At pres-

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ent, Chinese farmers' cooperative economic organization is launched in the areas with different recognition degree, so the organization forms must be multiplied. On the primary stage of farmers' cooperative economic organization, it must get the support from local governments, so it has to communicate with farmers, as well as communicate with governments in order to get their support. In the process of operation, the organization has to not only contact with suppliers in the upper stream, but also with circulation fields of agricultural products of processing and sellers in the downstream. So although the organization is small, its businesses are complex. In the meantime, as grass-root rural economic organization for suiting the agricultural development in current stage, farmers' cooperative economic organization develops rapidly facilitated by rural households' drive and market competition. The internal management regulation, distribution cases and capital channel should be reformed according to local advantages, or else, the development of organization will deviate from the developmental track and get away from construction aim. The cooperative economic organization should give consideration to equality and effectiveness, which determines the dual aim of organization. The organization should get profits from the external environment, and en-

sure equality from the internal organization. The organization should not only satisfy the demand of rural households' income growth, but also bear the burden of community construction and some other welfare businesses. But the operation businesses of farmers' cooperative organization are mainly the items with big risks and low profits. Thus, the scientific evaluation on farmers' cooperative economic organization becomes more important. Scientific and fair evaluation on farmers' cooperative economic organization is the engine for driving the development of organization, at the same time, the aim of evaluation is to find differences; perfect management and further develop farmers' cooperative economic organization.

Therefore, the "index system of hierarchy weight of general target" is established according to the principles of systematics, statistics and quantitative economics to comprehensively evaluate the operation efficiency of farmers' cooperative economic organization. The system is used to comprehensively evaluate the operation effects of farmers' cooperative economic organization. The comprehensive evaluation indexes are divided into three criteria levels including organization development index, member development index and social development index. Each criteria level has several sub-levels(Table 1).

Table 1 The evaluation index system for farmers' cooperative economic organization

First level index	Second level index	Description of evaluation system
Organization development index	Aggregate capital of cooperative organization	The evaluation on the developmental scale of farmers' cooperative economic organization can combine the growth rate of aggregate capital of cooperative organization to evaluate comprehensively
	Aggregate annual profits of cooperative organization	Indexes that represent the profit-making capability and development capability of cooperative organization
	Annual total income of cooperative organization	Indexes that represent the developmental capability of farmers' cooperative economic organization
	Number of members in cooperative organization	Scale indexes can discriminate share holders and community members and count them individually and combine the annual average members to evaluate comprehensively
	Settlement and system implementation of cooperative organization	Investigating whether the "three conferences" of farmers' cooperative economic organizations are perfect or not, as well as the execution of regulations and relevant system
Member development index	Comparison of members and non-members	The indexes that represent the developmental capability of cooperative organization in motivating members. The investigation can be conducted by comparing the annual average income of members with the annual average income of local farmers
	Proportion of members' cooperative organization to the total income	Index represents profit making situation of members from cooperative economic organization ; investigating the contribution rate of cooperative organization to total income of rural households
	Annual net income of members	Reflecting the index of income increase level of members which can be investigated by combining the total income of organization and the number of members in the organization
	Member' education and training situation	Reflecting the individual developmental situation of members in the cooperative organization. The annual number of training and the training fee can be used to survey.
Social development index	Situation of agricultural technology promotion	Reflecting the promoting functions of cooperative economic organization to local agricultural technology promotion, which can be evaluated by local agricultural economy station
	Situation of facilitating local industrial formation	Reflecting the promoting functions of cooperative economic organization to local industrial formation. It can be evaluated by the local annual economic report
	Situation of motivating neighboring rural households	Investigating promoting function to the local rural households and the income increase level of neighboring rural households
	Situation of implementing the governmental policies	Situations of using the governmental support capital and implementing the relevant policies issued by the government

2 The definite method of weight of hierarchy index system

The Analytic Hierarchy Process was first put forward by American scholar A. L. Saaty in 1970s. It is an evaluation and decision making method for multiple targets. It turns the thought process of decision-makers to complex system into mathematic process^[2]. The feature of the Analytic Hierarchy Process is to reasonably determine the index system of personnel measurement and weight system. When evaluating the

Table 2 Evaluation weight

Evaluation weight	Definition	Evaluation weight	Definition
1	as for Hs, the two factors are of equal importance	7	As for Hs, a factor is much more important than another factor
3	As for Hs, a factor is slightly more important than another factor	9	As for Hs, a factor is extremely more important than another factor
5	As for Hs, a factor is obviously more important than another factor	2,4,6,8	As for Hs, its importance is among the above mentioned evolution weight

2.2 Establishing the evaluation matrix By using pair comparison to compare the relevant indexes at the same level and the evaluation matrix $A = \{a_{ij}\}$ can be established according to the score of the evaluation weight. The form is as follows:

$$\begin{matrix}
 Hs & A_1 & A_2 & \dots & A_n \\
 A_1 & a_{11} & a_{12} & \dots & a_{1n} \\
 A_2 & a_{21} & a_{22} & \dots & a_{2n} \\
 A_3 & \vdots & \vdots & \vdots & \vdots \\
 A_4 & a_{m1} & a_{m2} & \dots & a_{mn}
 \end{matrix}$$

The element a_{ij} in evaluation matrix A means the relative importance of A_i to element A_j from the perspective of the evaluation criteria Hs. That is $a_{ij} = W_i/W_j$, a_{ij} should satisfy the following requirements:

$$a_{ii} = W_i/W_i = 1 \quad a_{ji} = W_j/W_i = 1/a_{ij} \quad a_{ij} = 1/a_{ji}$$

2.3 Calculating weight

2.3.1 Calculating the weight W_i of characteristic vector W .

$$W_i = [\prod_{j=1}^n a_{ij}]^{1/n} \quad i=1, 2, \dots, n$$

In the formula, n is order of evaluation matrix

2.3.2 Volume normalization and calculating the weight of each index. Supposing $W_A = \sum_{i=1}^n W_i$, and then the results after normalization is weight W_i of A_i concerning Hs.

$$W_i^p = W_i/W_A = W_i/\sum_{i=1}^n W_i$$

2.3.3 Consistency check.

$$C.I. = \frac{\lambda \max - n}{n - 1} \text{ in which: } \lambda \max = \frac{\sum_{i=1}^n (AW)_i}{nW_i}$$

In the equation, $C.I.$ is a consistent index

When $C.I. > 0.1$, the consistency test is unqualified, a new evaluation matrix should be established.

When $C.I. \leq 0.1$, the consistency test is standard, that is to say, the evaluation matrix is reasonable.

3 The establishment operation effects and the determination of weight

3.1 Establishment of the evaluation model of operation results of farmers' cooperative economic organization Ac-

members in the economic organization, the pair comparison method can be used to improve the accuracy of prediction. When analyzing and processing the results, the reasonability of them should be judged and selected. The AHP test is adopted, for it can improve the test efficiency, reduce the disturbance of subjective factors. The specific steps can be seen on Table 2^[3].

2.1 Determining the evaluation weight Taking a certain factor Hs in the upper level as an evaluation standard, the evaluation weight can be determined (Table 2).

According to the above analysis, the evaluation index system of farmers' cooperative economic organization and the analytic hierarchy method, the following evaluation model of operation results can be established.

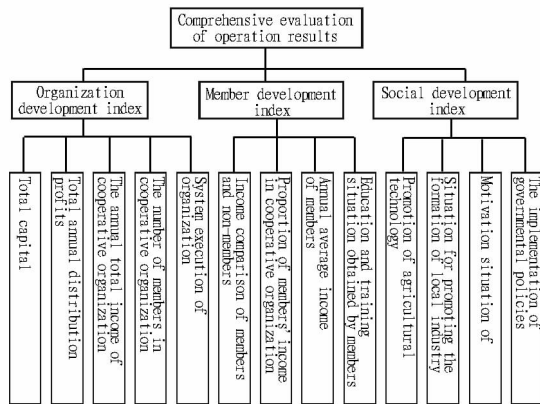


Fig. 1 The evaluation mode of operation mode of farmers' cooperative economic organization

3.2 The determination of index weight According to the analytic hierarchy process, the operation results of farmers' cooperative economic organization are divided into two levels. There are three first grade indexes, the weights are a_1 , b_1 and c_1 ; thirteen second level indexes, the weights are a_{11} , a_{12} , a_{13} , a_{14} , a_{15} , b_{11} , b_{12} , b_{13} , b_{14} , c_{11} , c_{12} , c_{13} , c_{14} .

In order to rank the importance of each index, in the first place, six scholars were investigated for three times by using the Delphi Method; in the second place, the scholars grouped and ranked the indexes and then judged the importance degree of each index. By using the pair comparison method, the first grade evaluation indexes and the second level indexes of farmers' cooperative economic organization are compared. According to the judgment scale, the indexes were scored and the judgment matrix is established. In the end, by using the analytic hierarchy process software yaahp 0.4.1, the judgment matrix and computer output results can be seen as follows;

It can be seen from Table 3 to 5, the proportion of each matrix consistency is smaller than 0.1, which indicates that the

Table 3 Evaluation matrix of first level evaluation index

H_s	a_1	b_1	c_1	W_i
a_1	1	1	4	0.444 4
b_1	1	1	4	0.444 4
c_1	1/4	1/4	1	0.111 1

Note: Proportion used for judging consistency of matrix is 0.000 0; the weight to general aim is 1.000 0.

Table 4 The evaluation matrix of organization development evaluation index

H_s	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}	W_i
a_{11}	1	1	2	4	4	0.328 0
a_{12}	1	1	2	4	4	0.328 0
a_{13}	1/2	1/2	1	3	3	0.192 9
a_{14}	1/4	1/4	1/3	1	1	0.075 6
a_{15}	1/4	1/4	1/3	1	1	0.075 6

Note: Proportion used for judging consistency of matrix is 0.005 9; the weight to the general aim is 0.444 4.

4 Determination of standard index and the comprehensive score

4.1 The determination of the standard indexes In order to try to effectively reflect the operation situation of farmers' cooperative economic organization, its operation results should be evaluated. Each item of the organization should be scored to

Table 7 The evaluation on the operation results of farmers' cooperative organization

Evaluation index		Best score	Better score	Good score	Bad score	Worse score	Weight %
A organization development indexes (44.44%)	A_{11} aggregate sum of cooperative organization	100	80	60	40	20	32.80
	A_{12} aggregate annual profits distributed	100	80	60	40	20	32.80
	A_{13} aggregate annual income of cooperative organization	100	80	60	40	20	19.29
	A_{14} the number of members in the cooperative organization	100	80	60	40	20	7.56
	A_{15} situation of department establishment and regulation execution	100	80	60	40	20	7.56
B members' development indexes (44.44%)	B_{11} income comparison of members and non-members	100	80	60	40	20	46.68
	B_{12} proportion of members' income to that of cooperative organizations	100	80	60	40	20	27.76
	B_{13} the annual net income of members	100	80	60	40	20	16.03
	B_{14} education and training provided to members	100	80	60	40	20	9.53
C social development indexes (11.11%)	C_{11} situation of agricultural technology promotion	100	80	60	40	20	35.98
	C_{12} promoting the formation of local industries	100	80	60	40	20	35.98
	C_{13} motivating neighboring rural households	100	80	60	40	20	19.91
	C_{14} the implementation of governmental policies	100	80	60	40	20	8.13

4.2 The calculation of comprehensive score A comprehensive score of organization development equals to $\sum a_{ij}$ evalu-

ation element score multiply the weight of each element.

Table 5 The evaluation matrix of members' development evaluation index

H_s	b_{11}	b_{12}	b_{13}	b_{14}	W_i
b_{11}	1	2	3	4	0.466 8
b_{12}	1/2	1	2	3	0.277 6
b_{13}	1/3	1/2	1	2	0.160 3
b_{14}	1/4	1/3	1/2	1	0.095 3

Note: Proportion used for judging consistency of matrix is 0.011 6; the weight to the general aim is 0.444 4.

Table 6 The evaluation matrix of members' development evaluation index

H_s	c_{11}	c_{12}	c_{13}	c_{14}	W_i
c_{11}	1	1	2	4	0.359 8
c_{12}	1	1	2	4	0.359 8
c_{13}	1/2	1/2	1	3	0.199 1
c_{14}	1/4	1/4	1/3	1	0.081 3

Note: Proportion used for judging consistency of matrix is 0.007 7; the weight to the general aim is 0.111 1.

comprehensively evaluate the operation results. Before scoring, the rational score standard should be made. According to the description of each second grade index and by combining the quantitative and qualitative method, the following score standard can be made for reference according to the weight of each index according to the analytic hierarchy process (Table 7).

ation element score multiply the weight of each element.

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new industrial chain of agricultural products in circulation section on the basis of on-line platform, the paper analyzed the standardization problem in the construction of industrial chain of fruits. Through discussing the three major sections including production and processing, on-line exhibition and trade and after-sale service, the systematic and standard industrial chain management thought pattern is put forward. The major conclusions include taking scale production to replace the dispersed and low-efficient farming; through the targeted and discriminated identity authentication to guarantee trade safety from the origin; building the famous brand of distinctive agricultural products and expanding the transaction scale through multiple and distinctive on-line exhibition, unified negotiation and high-quality after-sale service; taking strict credit evaluation mechanism and dispute solution to reduce the possibility of dishonest behaviors. The new industrial chain in the circulation section of distinctive agricultural products on the basis of network platform and

(From page 87)

B comprehensive score of members' development equals to $\sum b_{ij}$ evaluation element score multiply the weight of each element.

C comprehensive score of social development index equals to $\sum c_{ij}$ evaluation element score multiply the weight of each element.

Through the above analysis and calculation, the score of each second level index of farmers' cooperative economic organization can be obtained. According to the different weights taken by each first level index in the total score, the final evaluation score can be calculated.

The comprehensive score of operation effects of farmers' cooperative economic organization = A comprehensive score of the second level indexes \times A weights of first level indexes + B comprehensive score of first level indexes \times B weights of the first level indexes + C comprehensive score of the second level indexes \times C the weights of the first level indexes.

In the final score, the score between 80 and 100 is excellent; between 70 and 80 is good; between 60 and 70 is mediocre; and score lower than 60 is bad operation.

According to the above score results, the government should provide discriminated, targeted and systematical support for farmers; cooperative economic organization according to the specific situation of each area, the different developmental degree and different standard degree to facilitate the well development of farmers' cooperative economic organization.

In the process of developing Chinese farmers' cooperative economic organization, due to the special regulations, farmers, as the weak group, can not enter the market directly and compete fairly with their rivals. If the government do not supervise the market but let it go, the weak group will be nipped in the bud by the competitive one under harsh market law. Therefore, farmers' cooperative economic organization needs the government' encouragement, direction and support.

However, it should be known that the development of farmers' cooperative economic organization relies not only on

standard system is the necessary demand of modern agricultural products.

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the entire economic, social and cultural development level, but also its own professional level, socialized level and developmental scale, so it is a system project concerns wide areas and its development still needs a long process. As an external engine, the government just accelerates or postpones the developmental process of farmers' cooperative economic organizations, rather than basically changes the developmental role of farmers' cooperative economic organizations^[4].

Under the current developmental status, farmers' cooperative economic organization needs the interference of governments on the primary stage. But if the farmers' cooperative economic organization enters the normal state, the government should withdraw from the market and adopt new supporting pattern to avoid the old problems of indiscriminating the government and the enterprises. Therefore, when supporting farmers' cooperative economic organization, the government should not be excessive enthusiasm; that is to say, the government should help cooperative organizations to operate independently. The governmental functions on farmers' cooperative economic organization should be reflected on the macro aspects of making economic supporting policies and providing public goods to create healthy and favorable system space for the development of farmers' cooperative economic organization.

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