Research on the Cultivation of New Professional Farmers in Jilin Province Based on the Strategy of Promoting Agriculture by Green Environmental Protection Science and Education

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Abstract. The key to agricultural modernization and environmental protection and green development depends on the progress of agricultural science and technology and the cultivation of new professional farmers. The cultivation of new professional farmers is the reality and future of modern green agriculture. The 19th National Congress of the Communist Party of China proposed a strategy for rural revitalization, which is the general plan for the work of "agriculture, rural areas and farmers" in the new period. Vigorously cultivating new-type professional farmers is a basic requirement for implementing the strategy of promoting agriculture through science and education and realizing agriculture and rural modernization. This article takes Jilin Province as a case, and on the basis of combing related research results, referring to the analytic hierarchy process and multiple regression analysis, analyses the causes of the formation of new professional farmers from multiple perspectives, and then analyses Jilin under the strategy of green agriculture through science and education. The logical path for the cultivation of new-type professional farmers in the province proposes to adhere to the road of cultivation of new-type professional farmers that is "endogenous-led and exogenous-driven".

1. Introduction

Urbanization, industrialization and informatization have a huge impact on the rural labour force. On the one hand, urbanization attracts many young and middle-aged laborers from rural areas to accelerate into cities. On the other hand, the basic status of agriculture and the urgent reality of developing modern agriculture require that rural areas have a capable talent team. Cultivating new types of professional farmers has become an inevitable choice to improve the quality of the rural talent team and achieve the "four synchronizations." Only by adopting scientific evaluation methods and clarifying the many factors that affect the cultivation of new-type professional farmers, can the effectiveness and pertinence of cultivation be improved. In view of this, this article constructs an evaluation index system of new-type professional farmers' influencing factors from multiple perspectives, and applies [1] Analytic Hierarchy Process (AHP) determines the weight of evaluation indicators, and at the same time uses the Vector Error Correction Model (VECM) to analyse the...
impact factors of rural labour forces, in order to deeply study the formation mechanism of new professional farmers, clear the cultivation path, and improve the government for new professional farmers Foster the environment and promote the cultivation of new professional farmers to provide a theoretical basis.

2. Problems existing in the cultivation of new professional farmers
At present, although some achievements have been made in the cultivation of new professional farmers, there are still some problems, mainly in the following aspects:

2.1. Cultivation of ideas is not in place
The new professional farmer cultivation project is an important part of the rural revitalization strategy. It is also a benefit project for farmers to receive free cultivation. The purpose is to cultivate a new type of professional farmer team with culture, know-how, and management skills, and effectively promote agricultural modernization, Rural modernization, to achieve strong agriculture, rich farmers, and rural beauty. However, the leaders of some departments and localities did not understand the significance of the new-type professional farmer cultivation project. Some of them are important to speak, and the phenomenon of being unimportant is an objective phenomenon, which leads to some cadres not being able to recognize their ideas, procrastinating their work, and inadequate implementation; some farmers ‘friends Lack of awareness of the cultivation of new-type professional farmers, no strong desire for new-type professional farmers, and low initiative.

2.2. The structure of the cultivated object is not good
The current status of the rural labour force is that most of the young and middle-aged people go to work in developed areas. The rest are almost older. They are engaged in agricultural production and take care of their grandchildren. This group has aging ideas, old ideas, Low cultural level, poor acceptance, limited energy and other characteristics. However, the reality of training is not to be optimistic. Most of the participants are elderly people. They have not really attracted young people who have knowledge, ideals, want to start a business, and want to do something. In the long run, it is not conducive to new types of careers. The cultivation of farmers is not conducive to the smooth progress of the rural revitalization strategy.

2.3. Fostering resource decentralization
New types of professional farmer training involve industry sectors such as education, human resources, agriculture, agricultural machinery, forestry, animal husbandry, poverty alleviation, etc., and training institutions such as vocational and technical schools, agricultural technology extension service centres, rural adult education schools, and farmers night schools. Intangible causes the dispersion and waste of training resources, which is not conducive to standard management and scientific setting of training content.

2.4. Poor training results in poor training results
The decentralization of cultivation institutions will inevitably lead to the weakness of school running and the serious shortage of trained teachers, especially the professional and practical experience of teachers, which cannot meet the development needs of new professional farmers. Judging from the survey, the cultivation of new-type professional farmers has limited current conditions of hardware facilities in the cultivation institution, weak teachers, generally low quality of cultivation objects, single cultivation methods, inadequate management, and inadequate management by some leaders. And other issues.
3. Impact evaluation model of new professional farmer cultivation under the strategy of environmental protection and the development of agriculture through science and education based on the analytic hierarchy process

This article first determines the influencing factors of new professional farmer cultivation based on the restrictive indicators of new professional farmer cultivation in national policy documents, academic research on the characteristics of new professional farmer cultivation, and dimensional analysis of investment decisions in human capital investment theory. Adopted Delphi method to consult experts on agriculture, rural areas and farmers in universities and research institutes, as well as leaders of government-related agricultural departments, and formed a new index system for evaluating the factors affecting the cultivation of professional farmers (Figure 1).

![Figure 1. Evaluation index system for influencing factors of new professional farmer cultivation](image)

3.1. AHP Model Establishment

The basic calculation problem of hierarchical single ordering and one-time inspection is how to calculate the corresponding feature vector of the judgment matrix. The commonly used mathematical methods include "power method", "square root method" and "sum product method". This article intends to use the square root method, and the specific calculation process is as follows:

(1) Calculate the geometric mean of all elements in each row of the judgment matrix. First calculate the product of the elements in each row of the judgment matrix, that is, \( E_i = a_{i1}a_{i2}\cdots a_{in} \), and then calculate the n power of \( E_i \), \( \bar{E}_i = n\sqrt[n]{E_i} \), to obtain [2]:

\[ \]
\[ \vec{\omega} = (\vec{\omega}_1, \vec{\omega}_2, \ldots, \vec{\omega}_n) \]  

(1)

(2) Normalize \( \vec{\omega} \). Calculate \( \omega_i = \frac{\omega_i}{\sum_{j=1}^{n} \omega_j} \) to get the weight vector \( \omega = (\omega_1, \omega_2, \ldots, \omega_n)^T \), which is the approximate value of the eigenvector, where \( \omega_i \) is the relative weight of a certain factor corresponding to the upper-level factor.

(3) Calculate the maximum eigenvalue of the judgment matrix, \( \lambda_{\text{max}} = \sum_{i=1}^{n} \frac{(A\omega)_i}{n\omega_i} \), where \( (A\omega)_i \) is the \( i \)th element of the vector \( A\omega \).

(4) Check consistency. In order to check the consistency of the judgment matrix, we first need to calculate the consistency index: \( CR = \frac{CI}{RI} \), of which \( CI = \frac{\lambda_{\text{max}} - n}{n-1} \). When \( CR < 0.1 \), it can be judged that the hierarchical single-ranking result has satisfactory consistency; otherwise, the element values of the judgment matrix need to be readjusted.

According to the calculation, the weight and comprehensive ranking of the factors (A1, A2, A3, A4, A5) at the criterion level A in the "Influence Factor Evaluation Index System of New-type Professional Farmers Cultivation" are calculated. The CRs of the above judgment matrices are all less than 0.1, indicating a single level the rankings have satisfactory consistency, so the weight data of each layer of indicators can be summarized in Table 1.

### Table 1. Judgment matrix

| A    | A1   | A2  | A3  | A4  | A5  | W   | Comprehensive sort |
|------|------|-----|-----|-----|-----|-----|-------------------|
| A1   | 1    | 9/8 | 9/7 | 3/2 | 9/5 | 0.2571 | 1                  |
| A2   | 8/9  | 1   | 8/7 | 4/3 | 8/5 | 0.2286 | 2                  |
| A3   | 7/9  | 7/8 | 1   | 7/6 | 7/5 | 0.2000 | 3                  |
| A4   | 2/3  | 3/4 | 6/7 | 1   | 6/5 | 0.1714 | 4                  |
| A5   | 5/9  | 5/8 | 5/7 | 5/6 | 1   | 0.1429 | 5                  |

\[ \lambda_{\text{max}} = 5.0680; \ CI = 0.0170; \ RI = 1.12; \ CR = 0.0152 \]

3.2. Results analysis

In terms of investment subjects, the county and township governments are the most important subjects, followed by agricultural economic organizations such as village collectives, agricultural professional cooperative organizations, and agricultural enterprises; in terms of training content, practical agricultural technology and management knowledge are the most important. Basic cultural knowledge should also be an important part of cultivation. In terms of cultivation environment, the importance of each factor is ranked in terms of land transfer system, labour conditions, socio-psychological environment, and regional geographic conditions. In terms of cultivation methods, project-driven and participatory methods should be emphasized. Cultivation methods that emphasize farmers' subjectivity; systematic education in agricultural technology colleges in terms of cultivation carriers; practical training in agricultural technology extension stations, agricultural professional cooperative organizations, and agricultural enterprises should become the main cultivation platform for new-type professional farmers [3].
4. Regression analysis of Jilin Province's willingness to cultivate new professional farmers

4.1. Model settings

Using the binary logistic regression analysis method, sort out and test the factors assumed above, and analyse what is the factor that really affects their participation in training. The dependent variables of the analysis method here are two types of farmers' willingness and unwillingness. The binary classification regression equation is:

\[
\log it(p) = \ln \left( \frac{p}{1-p} \right) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_i x_i = \beta_0 + \sum \beta_i x_i
\]  

(2)

In the above formula, it is constant, \( p \) is the probability that farmers are willing to participate; \( 1 - p \) is the probability that they are not willing to participate; \( \beta_0 \) is a constant, \( \beta_1, \beta_2, \ldots, \beta_i \) is a regression coefficient; \( x_i \) is an explanatory variable; \( i \) is the number of independent variables. Then there are:

\[
\log it(p) = \ln \left( \frac{p}{1-p} \right) = \beta_0 + \sum \beta_i x_i
\]  

(3)

Knowing:

\[
\frac{p}{1-p} = \exp \left[ \beta_0 + \sum \beta_i x_i \right]
\]  

(4)

It can be deduced:

\[
p = \frac{1}{1 + \exp \left[ -\left( \beta_0 + \sum \beta_i x_i \right) \right]}
\]  

(5)

It can be seen from the above formula that the \( P \) value, that is, the probability that the farmer is willing to participate in the training, changes with other variables and is a growth function.

4.2. Model calculation process analysis

In the Spass statistics software, input the 15 variables from the previous section and use the forced regression method to get it. As shown in Table 2, the df value is 15 and the chi-square critical value is 24.99579 < 115.688, which is consistent with the normal regular direction; the significance value is 0.003 < 0.05, which can be concluded that these values are in line with the binomial logistic regression analysis. Both the log-likelihood value and the chi-square value also passed the maximum likelihood log-value test. Cox & Sne11R, NagelkerkeR square value is greater than 0.6; it is concluded that the degree of fit is high, these values are in line with binomial logistic regression analysis [4].

| Table 2. Model summary |
|-----------------------|
| 2 log-likelihood Cox&Sne11R NagelkerkeR |
| 76.996a 0.697 0.731 |

It can be obtained from the test table in Table 2 that the value still passes the test, and the significance value is also greater than 0.05, which passes the test. After the above operation analysis, we can get the following table 3:
Table 3. Final prediction classification table

| Observation         | Training willingness | Unwilling | Percentage correction |
|---------------------|----------------------|-----------|-----------------------|
| Training willingness| willing              | 101       | 9                     | 91.8                  |
|                     | Unwilling            | 11        | 52                    | 82.5                  |
| Total percentage    |                      |           | 88.4                  |                       |

From the table above, we can see that among the farmers’ willingness to cultivate, the willingness value is 110, and the unwillingness value is 63. Among the several factors previously predicted, 91.8% are willing, 82.5% are unwilling, for a total of 88.4%. Of the 173 samples, 20 predictions failed, and the overall model worked well.

5. Research on New Professional Farmer Training Methods in Jilin Province

5.1. Guidelines for career ideals
Everyone has their own ideals, including career ideals. The realization of career ideals must depend on the formulation and implementation of career plans, to motivate people to continuously improve and become experts in the industry. However, most farmers lack self-awareness, inadequate knowledge of employment information, and the need for learning and training is difficult to achieve effectively. There is a large difference between ideals and reality. These factors lead to confused career choices, ambiguous career positioning, and inadequate career planning, hindering farmers from achieving their career ideals. The ideal of employment and entrepreneurship in rural areas encourages farmers to continuously strengthen their learning and training, try to formulate a career development plan, and become a truly new type of professional farmer, ultimately achieving their ideals.

5.2. Vocational education support. Only high-quality agricultural labour
Only by mastering advanced agricultural production technology and management methods, can we popularize modern agricultural machinery, can we greatly increase agricultural labour productivity, and truly realize the transformation of agricultural growth from traditional extensive to intensive, specialized, and organized. However, except for some regions where large-scale operations have been implemented in China, most farmers still use the production and operation methods of one household. The total number of agricultural science and technology talents is relatively small, and the promotion and application of agricultural scientific and technological achievements are slow. If we can further develop agricultural vocational education, farmers can master modern agricultural production technology and operation skills, be proficient in the use of new agricultural machinery for agricultural production, actively promote and apply new and high-quality agricultural production technology, and have modern management and management knowledge. With a certain pioneering spirit and understanding of management and management, then I believe that not only can the above development problems be solved, but farmers are also willing to work in rural areas.

5.3. Accelerate overall urban-rural development and orderly guide farmers' professionalization
With the goal of cultivating a new type of professional farmer team with an appropriate number, high quality, strong competitiveness, and meeting the requirements of modern agricultural development, with the goal of breaking through the bottlenecks in the cultivation of various new types of professional farmers, and working hard to break down the urban-rural dual structure and institutional mechanisms, Accelerate the implementation of comprehensive urban and rural comprehensive supporting reforms based on giving farmers equal citizenship rights, land rights, labour rights, and property rights, and systematically design and comprehensively advance the deepening reforms of the land system, household registration system, property rights system, social security system, and social
management system [5], promote the integration of urban and rural infrastructure, public services and social security, and give farmers full social respect and due social status.

5.4. Improve supporting agricultural policies and optimize external development environment

Increase financial investment, and moderately favour new-type professional farmers. Compared with developed countries, China's financial support for agriculture has a large gap in the breadth and depth of its coverage. In the future, the financial investment of agricultural-related projects will increase substantially and optimize the structure. For the newly increased financial investment, full consideration should be given to new-type professional farmers and a moderate tilt should be given to encourage new-type professional farmers to give priority to various financial support projects. We will improve the construction of rural factor markets and actively provide various types of factor resources. First, we must actively promote the issuance of land rights, orderly and standardized land transfer, and improve the rural land market. Second, we must optimize the rural financial market, encourage financial institutions to innovate mortgage lending methods, and speed up the establishment of agricultural risk warning and prevention mechanisms. Innovative policies in project support, social security and social evaluation, cultivate a rural talent market, and speed up attracting foreign talents to join agriculture [6].

6. Conclusion

With the concept of green environmental protection and the national strategy of revitalizing agriculture through science and education, how to cultivate new types of professional farmers is a hotly debated topic today. As the main body of new agricultural production and management, the quality of farmers is directly related to the speed of the agricultural modernization process and the level of their income. In order to meet the needs of agricultural modernization, it is imperative to cultivate new types of professional farmers. This paper analyses the cultivation of new-type professional farmers in Jilin Province, finds out the problems existing in the cultivation of new-type professional farmers, evaluates their cultivation, and proposes countermeasures and suggestions to promote the cultivation of new-type professional farmers in Hunan Province.

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