Exploring the Path of High-quality Development of Family Farms

-- A Case Study of the "Transformation, Expansion, and Construction" of the Family Farm in Liulang Town, Wuhu

Hongchang Wang, Yajie Lin, Tianyi Song, Jialing Ge, Boxiao Li

Anhui University of Finance and Economics, China

Abstract

With the introduction of China's rural revitalization strategy, the rural economy is undergoing further transformation and upgrading. Family farms, as a vibrant and dynamic new form of rural economic development, are highly regarded by farmers. This study conducted on-site research on the operational status of family farms in Liulang Town, Wuhu City, and identified the existing problems in the development process of the "new family farm" model. To achieve high-quality development, family farms need to undergo "changes" in marketing concepts, "expansion" of modernization scale, and "establishment" of agricultural ecological protection technology. This process requires the coordination and collaboration of government policy guidance, support from agricultural financial institutions and research organizations, and improvement in farm management.

Keywords

Family Farm; Liulang Town; Wuhu City; High-quality Development; Principal Component Analysis; Improvement; Expansion; And Construction.

1. Family Farm Overview

1.1. The Meaning of a Family Farm

Since the 18th National Congress of the Communist Party of China, the construction of agricultural modernization in our country has made significant progress and has the basic conditions to transition from an agricultural power to an agricultural powerhouse. The report of the 20th National Congress of the Communist Party of China emphasized the need to accelerate the construction of an agricultural powerhouse and comprehensively promote rural revitalization, which is of great significance. The "Rural Revitalization Strategy" aims to prioritize the development of agriculture, rural areas, and farmers, accelerate the economic development of agriculture and rural areas, promote comprehensive agricultural upgrading, drive comprehensive rural development, and promote the all-round progress of farmers. In the new era, accelerating the implementation of the rural revitalization strategy is reflected in the innovation of agricultural development models and the acceleration of the agricultural development process. It is necessary to ensure breakthroughs in development quantity and quality, and to break away from conventional methods and pursue a path of agricultural modernization with Chinese characteristics. The family farm model is one of the most important models in the process of rural modernization development.

According to the latest "Plan for the High-Quality Development of New Agricultural Management Entities and Service Entities (2020-2022)" released by the Ministry of Agriculture and Rural Affairs, the current development of family farm models in China is still in its early stages, with low development quality and weak driving capacity, among other issues that need to be urgently addressed.

1.2. Main Operation Models of Family Farms in China

There are three main operation models of family farms in China, with Shanghai Songjiang, Jilin Yanbian, and Anhui Langxi as the main pilot areas. These models have gradually expanded to surrounding areas and continuously upgraded and improved during the development process, forming the current diversified new operation models of family farms.

The first model is the Songjiang model in Shanghai, characterized by "intensive operation." With developed industries and scarce land resources in Shanghai, the main land tenure model in Songjiang is collective leasing. Under the guidance of the local government, this model aims to achieve unified planning and layout of agricultural production through collective land leasing. By adopting intensive methods, such as investing more labor, capital, and technology per unit of land, this model aims to increase agricultural output, optimize land resource allocation, greatly improve the efficiency of agricultural production, and achieve the scale, specialization, and commercialization of agricultural development.

The second model is the Yanbian model in Jilin, characterized by "large-scale operation." In the sparsely populated and fertile land of Northeast China, there is a shortage of rural labor, and individual farmers often lack sufficient funds. The Yanbian model encourages the participation of capital from other industrial and commercial enterprises in the construction of family farms. This model effectively promotes land circulation in rural areas and implements large-scale mechanized production due to the concentration of land, achieving economies of scale and improving agricultural efficiency.

The third model is the Langxi family farm model in Anhui, characterized by "small-scale diversification." Located in hilly areas, Langxi is rich in natural resources but not suitable for large-scale operations. However, it is suitable for various types of operations, such as grain, fruits and vegetables, tea, nursery, and agroforestry. In addition, the Langxi County in Anhui has established a brand management model for family farm operations called "One Village, One Product," which integrates the entire process from planting to sales of agricultural products. This model introduces modern enterprise brand-building concepts, with a focus on developing distinctive agricultural product brands. The Langxi family farm model has achieved significant breakthroughs during the pilot process. By the end of 2015, there were 683 family farms in Langxi County, with a total operating land area of 150,000 acres. According to statistics, in 2017, 88.6% of family farms in Langxi County had an annual income of over 100,000 yuan. According to officials from the County Agricultural Commission, the per capita net income of Langxi family farms is about 30,000 yuan, which is four times the per capita net income of farmers in the county and twice that of urban residents.

2. Investigation Data and Model Design of Family Farms in Liulang Town, Wuhu City

2.1. Basic Overview of Liulang Town, Wuhu City

Liulang Town is located in the northwest part of Wuhu City, in the Wanbei District. It serves as a central hub between Wuhu City and the Wanbei urban area. The town is crossed by the Qingyi River, Wushen Canal, and Zhaoyi River. It has a subtropical monsoon climate with distinct four seasons. The total area of the town is 117 square kilometers, mainly consisting of plains and hills. It governs 19 villages and 2 communities, with a total population of 88,000. The main crops grown include rice, wheat, vegetables, and grapes. In recent years, the town has been committed to building a "livable, business-friendly, and tourist-friendly new town" and promoting the development of a "water-based slow city and ecological Liulang." The agricultural and rural bureau of Wanbei District has certified a total of 315 family farms in

Liulang Town, including 71 cooperatives. These family farms mainly focus on planting and breeding, with a few developing modern eco-tourism agriculture.

2.2.   Questionnaire Survey of Family Farms in Liulang Town, Wuhu City

The data used in this study comes from a questionnaire survey conducted among representatives of family farms in Liulang Town, Wuhu City. The data collection and processing process is as follows:

A representative sample of 30 to 50 family farms was selected in Wuhu City, Anhui Province. The farm managers were organized by the county-level agricultural management department to participate in training. After the training, they filled out the questionnaire online, which covered various aspects of the current development status of family farms.

The study focused on three types of family farms: grain, fruits and vegetables, and breeding. After processing and cleaning the monitoring data from the questionnaire survey of family farms, a total of 39 family farm samples were obtained. Among them, 21 households were engaged in fruits and vegetable cultivation, accounting for 53.85% of the total samples; 29 households were engaged in grain cultivation, accounting for 74.36% of the total samples; and 7 households were engaged in breeding, accounting for 17.95% of the total samples.

2.3.   Model Design for the High-quality Development of Family Farms in Liulang Town, Wuhu City

Table 1. Evaluation index system for high-quality development of family farms

Target layer	system level	Final index layer
sociality	Annual profit status	Under 100,000
		100,000-1 million
		More than 1 million
	Main source of land	Land transfer market lease
		Land transfer market purchase
		Self-owned land
		Village cooperative organization distribution
economical efficiency	sources of funds	funds in the hands of the localities
		bank advance
		Government funding
Ecology	Protection of ecological protection	fallow, round tillage
		Rely on technical equipment to protect the ecological environment
		Use the drip irrigation method
		other
strategic	Agricultural products sales channel	pension parachute
		pedlars' market
		network platform
		Personal Tailor
		pick
	The proportion of family members	Under 25%
		25%-50%
		More than 50%

Based on the current development status of family farms in Liulang Town and the exploration of evaluation indicators and standards for high-quality development of family farms, the model design should emphasize "quality," "efficiency," and "ecology." Therefore, the evaluation

indicator system for the high-quality development of family farms should comprehensively consider the economic, strategic, social, and ecological aspects of family farm development. Initially, a preliminary evaluation indicator system for the high-quality development of family farms was established, consisting of 21 specific indicators in 6 subsystems, including annual profitability, main sources of land, sources of funds, proportion of family members involved in self-operated farms, ecological protection mechanisms, and agricultural product sales channels. Please refer to Table 1 for details.

The questions set in this survey questionnaire reflect the current development status of family farms. After preliminary data processing, a binary coding method was used, where each option was recorded as a variable. If an option was selected, its corresponding variable was recorded as 1; if not selected, it was recorded as 0. Then, using the basic principles of principal component analysis (PCA) with the SPSS statistical software, a statistical correlation analysis was conducted on the 21 data variables. By examining the eigenvalues, eigenvectors, and cumulative variance explained by the sample data, five principal component factors that influence the future development of family farms were identified. Based on this, the current development status of family farms was quantified and summarized, resulting in the following evaluation indicators for the development status and issues of family farms.

Table 2. KMO and Bartlett tests

KMO price		0.766
Bartlett Sphelicity test	Approximate chi square	2411.677
	df	210
	P value	0.000

Table 3. Table of variance interpretation rates

number	characteristic root			Principal component extraction		
	characteristic root	Variance interpretation rate%	accumulate%	characteristic root	Variance interpretation rate%	accumulate%
1	3.255	15.499	15.499	3.255	20.499	20.499
2	2.595	12.358	27.857	2.595	15.358	35.857
3	2.366	11.266	39.123	2.366	14.266	50.123
4	1.758	8.373	47.496	1.758	13.373	63.496
5	1.671	7.958	55.454	1.671	12.958	76.454
6	1.486	7.076	62.530	-	-	-
7	1.451	6.908	69.439	-	-	-
8	1.357	6.461	75.899	-	-	-
9	0.996	4.744	80.644	-	-	-
10	0.883	4.204	84.848	-	-	-
11	0.675	3.213	88.061	-	-	-
12	0.628	2.991	91.052	-	-	-
13	0.561	2.669	93.721	-	-	-
14	0.395	1.882	95.604	-	-	-
15	0.362	1.726	97.329	-	-	-
16	0.267	1.273	98.602	-	-	-
17	0.188	0.896	99.499	-	-	-
18	0.091	0.431	99.930	-	-	-
19	0.015	0.070	100.000	-	-	-
20	0.000	0.000	100.000	-	-	-
21	-0.000	-0.000	100.000	-	-	-

Principal component analysis (PCA) was used to condense the information in the data. From the table above, it can be seen that the Kaiser-Meyer-Olkin (KMO) measure is 0.766, which is greater than 0.6, meeting the prerequisite requirements for PCA. This means that the data can be used for PCA research. The data also passed the Bartlett's test of sphericity ($p < 0.05$), indicating that the data is suitable for principal component analysis.

The analysis of the table above indicates that a total of 5 principal components were extracted in the principal component analysis. The eigenvalues of these 5 principal components are all greater than 1. The variance explained by these 5 principal components is 20.499%, 15.358%, 14.266%, 13.373%, and 12.958% respectively, with a cumulative variance explained of 76.454%.

Additionally, the analysis extracted 5 principal components, and their corresponding weighted variance explained rates, or weights, are as follows: 20.499/76.454=26.81%; 15.358/76.454=20.09%; 14.266/76.454=18.66%; 13.373/76.454=17.49%; 12.958/76.454=16.95%.

Table 4. Table of the load coefficient

| name | coefficient of load | | | | | Common degree (common factor variance) |
	major constituent 1	major constituent 2	major constituent 3	major constituent 4	major constituent 5	
X1	-0.466	-0.559	-0.017	0.364	-0.416	0.883
X2	0.456	0.596	0.201	-0.365	0.326	0.942
X3	-0.057	-0.178	-0.424	0.064	0.134	0.752
X4	0.561	0.410	-0.297	0.030	-0.369	0.854
X5	-0.028	-0.602	0.321	-0.069	-0.004	0.621
X6	-0.674	0.175	0.227	0.093	0.427	0.817
X7	-0.612	0.159	0.154	-0.109	0.183	0.630
X8	0.072	0.404	-0.030	-0.231	-0.248	0.633
X9	0.084	-0.088	0.476	0.232	0.073	0.610
X10	0.201	-0.149	0.506	0.321	-0.082	0.616
X11	0.075	-0.190	-0.566	0.469	0.462	0.884
X12	-0.514	0.332	-0.116	-0.229	-0.622	0.913
X13	0.465	-0.189	0.565	-0.136	0.270	0.833
X14	-0.659	0.470	-0.023	-0.048	0.224	0.906
X15	0.428	0.121	0.300	0.082	-0.214	0.893
X16	0.440	-0.190	-0.401	-0.043	-0.033	0.817
X17	-0.023	0.598	0.172	0.441	0.197	0.744
X18	0.348	-0.324	-0.261	-0.524	0.318	0.690
X19	0.302	0.417	-0.112	0.377	-0.069	0.605
X20	0.270	0.066	0.469	0.322	-0.140	0.572
X21	0.214	0.151	-0.401	0.485	0.123	0.724

Note: color in the table: blue indicates the absolute value of load coefficient greater than 0.4, red indicates the common degree (common factor variance) less than 0.4.

By converting the variance explained rate table, the loading coefficient matrix can be obtained. The loading coefficient table shows the information extraction of the principal components for the research items, as well as the correspondence between the principal components and the research items. From the table, it can be seen that the communalities of all research items are

higher than 0.4, indicating a strong correlation between the research items and the principal components. The principal components can effectively extract information.

The magnitude of the loading coefficients in the table indicates the dimension information represented by each principal component. The first principal component represents two dimensions: funding sources and profitability. The second principal component represents one dimension: land sources. The third principal component represents one dimension: personnel ratio. The fourth principal component represents one dimension: protection mechanisms. The fifth principal component represents one dimension: sales channels. Through the study and summary of these principal components, it can be concluded that the problems encountered in the development of family farms are concentrated in the following five aspects: funding, land, personnel, technology, and market.

3. Analysis of the Problems Faced by Family Farms in Liulang Town, Wuhu City, based on Principal Component Research Findings

3.1. Funding Issue

The majority of funding for family farms comes from their own capital, accounting for a high proportion of 79.74%, with only a small portion being government subsidies, accounting for 12.82%. This data indicates that farmers primarily rely on their own funds, but their own capital is insufficient to support modern agricultural development. The lack of sufficient government financial support for family farms, coupled with a lack of better financing options, exacerbates this issue.

3.2. Land Issue

The main source of land for family farms is land leasing in the land transfer market, accounting for 71.79%, with a small portion being self-owned land, accounting for 25.64%. There are also a few cases of land purchase in the land transfer market, accounting for 7.69%, as well as land allocation by village cooperatives, accounting for 10.26%. This indicates that land leasing in the market remains the mainstream method, highlighting the need to ensure standardized land transfer transactions.

3.3. Personnel Issue

More than half of the family farms have a majority of family members involved, accounting for 38.46%, while 43.59% have family members accounting for 25%-50%, and 17.95% have family members accounting for less than 25%. The personnel of family farms mainly come from individual farmers. The overall characteristics of the population are mainly low education levels and limited innovative thinking, which hinders the development of family farms in terms of scale and quality.

3.4. Technological Issue

The difficulties currently faced by family farms are mainly due to inadequate supporting facilities, accounting for 66.67%. More than half of them only have measures such as fallow rotation to protect the ecology, while only 17.95% rely on technological equipment to protect the ecological environment. This data indicates that modern technology has not been widely adopted in family farms, and farming methods remain primitive. Additionally, there is a lack of awareness regarding ecological benefits.

3.5. Marketing Issue

More than half of the agricultural product sales channels are wholesale markets, accounting for 51.28%, followed by corporate acquisitions, accounting for 43.59%. A small portion is sold through online platforms, accounting for 17.95%, and only 5.12% are sold through private

customization and picking. This data indicates that market information is still relatively closed, and sales channels have not been sufficiently diversified.

In conclusion, for the high-quality development of family farms in Liulang Town, Wuhu City, it is necessary to learn from successful domestic family farm management models and actively explore their own development paths.

4. Pathways for Achieving High-quality Development of Family Farms in Liulang Town, Wuhu City

4.1. Objective Basis for Pathway Selection

In terms of topography and soil, Langxi in Anhui Province is influenced by its inland location, characterized by hilly terrain and fragmented land with predominantly yellow-brown soil and reddish-brown soil. This type of land is not suitable for large-scale mechanized production, but the temperature is relatively suitable and the seasons are distinct, making it suitable for diversified agricultural production. In the process of achieving high-quality development of family farms, we emphasize the need to adapt to local conditions and develop appropriate strategies based on the actual circumstances of different environments.

4.2. Direction for Pathway Selection

To achieve high-quality development of family farms in Liulang Town, Wuhu City, based on successful domestic family farm management models, the main pathways are as follows:

1) "Change" the marketing concept: Construct family farms with local characteristics and unique sales channels that are tailored to the local conditions. Through government support, fully mobilize the self-creativity, initiative, and enthusiasm of agricultural production. The existing variety of family farm brands is diverse but inconsistent in quality. By introducing modern enterprise brand construction concepts, integrate various brands and establish and promote a brand with local characteristics.

2) "Expand" the modern scale of family farms: The expansion of family farms should shift from simple two-dimensional development of agriculture, including horizontal expansion and vertical enrichment of agricultural products, to multi-level and three-dimensional development of family farms. Due to the geographical and economic environment in Anhui Province, large-scale mechanization and fine production oriented towards commodities cannot be adopted. Instead, the focus should be on optimizing the industrial structure and developing multiple levels of industries, including tourism and animal husbandry. Target different age groups as customer bases. Make animal husbandry and planting the main business while complementing it with subsidiary businesses such as sightseeing tourism, crop adoption, experiential rural life, and study tours. Expand into a complete industrial chain that promotes coordinated development while considering economic, social, and ecological benefits.

3) "Establish" agricultural ecological protection technology: In the "change, expand, and establish" process of family farms in Liulang Town, Wuhu City, the transformation of family farms should align with the development of agricultural modernization. It should no longer solely focus on economic benefits but also consider ecological benefits. This includes selecting suitable crop varieties for land production, scientifically planning agricultural production, developing agricultural technologies, and promoting sustainable agricultural development.

5. Exploring the Pathways for High-quality Development of Family Farms in Liulang Town, Wuhu City

Based on the principal component analysis of the farm survey data and the guidance provided by the "change, expand, and establish" pathways, the main pathways for achieving high-quality

development of family farms in Liulang Town, Wuhu City can be explored in five major aspects: funding, land, technology, personnel, and market:

5.1. Enrich Capital Investment

First, the government can establish special funds to provide loans, subsidies, and incentives to family farms for purchasing agricultural equipment, improving agricultural infrastructure, and promoting advanced agricultural technologies. Second, the government can act as a credit guarantor for demonstration household family farms and collaborate with financial institutions to provide agricultural loans to family farms for purchasing production materials such as agricultural equipment, seeds, fertilizers, or for agricultural infrastructure construction and improvement. Third, financial institutions can establish agricultural investment funds to provide equity or debt investments to family farms, helping them expand their scale, introduce advanced technologies, and improve management capabilities. Finally, financial institutions can offer agricultural product pledge financing services, using the family farm's agricultural products as collateral to provide short-term financing support and address fund turnover issues.

5.2. Improve Land Transfer

The land contract responsibility system has led to restrictions on land transfer. Secondly, the scattered distribution of land in Anhui Province and the diverse terrain make it difficult to consolidate and connect land, and the suitability of soil for different crops varies. Therefore, it is necessary to choose appropriate crops according to local conditions. The government can introduce policies to support the development of family farms, reduce tax burdens, simplify approval procedures, and provide guarantees for land transfer and contracting systems, creating a favorable environment for the development of family farms.

5.3. Enhance Personnel Quality

Firstly, farm personnel can enhance their professional skills by learning about planting techniques, livestock management, agricultural product marketing, and other related areas. Secondly, they can participate in agricultural training courses, seminars, and workshops to acquire knowledge and skills in agricultural production, management, and operations. By doing so, they can explore new models and business opportunities that are suitable for their farms, thereby improving the competitiveness and sustainability of their farms.

5.4. Strengthen Technology Introduction

Firstly, in terms of organization, the government can take the lead in establishing cooperative relationships between family farm leaders and agricultural research institutions. Expert teams can be organized to provide agricultural technology consultation, training, and guidance to family farms. Technical exchanges and collaborative research can be conducted to help improve their production techniques and management capabilities. Secondly, in terms of technology, advanced agricultural technologies such as big data analysis and drone monitoring can be introduced to family farms. This can enable the implementation of smart agriculture and precision agriculture, achieving intensive operation and refined management, and improving production efficiency and resource utilization.

5.5. Improve Market Marketing

Firstly, the government can strengthen the quality supervision of agricultural products from family farms by establishing a sound quality testing system, providing quality certification and labeling, and enhancing consumer trust in agricultural products. They can also help promote agricultural product brands, expand market channels, and increase the added value of agricultural products. Secondly, establishing an agricultural information platform can provide family farms with market information, technical information, and policy information to help

them stay informed about market demand and industry trends. Lastly, family farms can establish direct cooperation relationships with agricultural processing enterprises, wholesale markets, e-commerce platforms, etc., to reduce intermediary costs, broaden sales channels, and enhance the market competitiveness of agricultural products.

In summary, for family farms to achieve high-quality development, it is necessary to "change" marketing concepts, "expand" the modern scale of family farms, and "establish" agricultural ecological protection technologies. In this process, it requires the guidance of government policies, support from agricultural financial institutions and research institutions, as well as the improvement of management by farm management.

Acknowledgments

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