

# *Research on the Quality Formation Mechanism and Cultivation Path of New-Type Professional Farmers under the Background of Digital Transformation*

Zhuoya Li<sup>1,\*</sup>, Wenbo Zhang<sup>2</sup>

<sup>1</sup>*School of Accounting and Finance, the Open University of Shaanxi, Shaanxi, China*

<sup>2</sup>*Changzhou Senior Vocational School, Jiangsu, China*

\**Corresponding author*

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**Abstract:** Agricultural digital transformation drives the restructuring of agricultural business forms. As the core human capital of agricultural modernization, the quality of new-type professional farmers directly determines the implementation efficiency of digital agriculture. This paper sorts out the basic theories of quality cultivation for new-type professional farmers and analyzes their enabling mechanism for agricultural modernization; judges the current quality status, demand characteristics and influencing factors of cultivation; defines core quality elements and constructs an indicator system based on the three-dimensional framework of meta-quality, formative quality and promotion ability quality; analyzes the internal mechanism of quality formation and the functional relationship of key factors; and explores precise cultivation paths combined with digital means, so as to provide support for the revitalization of rural talents and the integration of agricultural digitalization.

## **1. Current Quality Status and Demand Characteristics of New-Type Professional Farmers in the Digital Context**

### **1.1 Analysis of Current Quality Status**

Based on field visits in county and township areas and stratified sampling survey data, the overall quality of new-type professional farmers in China currently presents the characteristics of "weak foundation, unbalanced structure and insufficient adaptation"<sup>[1]</sup>, which cannot fully meet the needs of agricultural modernization under digital transformation.

In terms of age and educational structure, there is a prominent age gap in the team of new-type professional farmers: those over 45 years old account for more than 70%, while the proportion of young people returning to farming is low. The overall educational level is relatively low, with a high proportion having senior high school education or below, and less than 20% holding junior

college or higher degrees. This limits their ability to accept digital technologies and learn professional knowledge, making it difficult to quickly adapt to the development of smart agriculture.

In terms of quality structure, firstly, digital literacy is an obvious shortcoming. Most professional farmers are only proficient in basic functions of smartphones, lacking proficiency in digital tools such as agricultural big data, IoT equipment and cloud-based production and marketing platforms, and showing reluctance toward digital operation<sup>[2]</sup>. Secondly, professional skills are single: most farmers only master traditional planting and breeding skills, with insufficient command of new skills such as smart planting and breeding, intensive processing of agricultural products and digital traceability. Thirdly, operation, management and innovation capabilities are weak. Lacking market-oriented thinking and risk prevention awareness, farmers struggle to cope with complex changes in the agricultural market under digitalization, and are insufficient in innovating production models and expanding industrial forms.

### **1.2 Analysis of Demand Characteristics**

Against the background of digital transformation, the quality demand of new-type professional farmers features distinct pertinence, compounding and dynamics, highly matching the development needs of agricultural digitalization and modernization.

First, the demand for compound competence is prominent. It is no longer limited to traditional planting and breeding skills, but urgently requires compound quality integrating "digital literacy + professional skills + operation management + innovative thinking", which can balance production, operation, innovation and other needs to adapt to the whole-chain development of digital agriculture. Second, differentiated demand is obvious. Farmers in different regions and production sectors have varied needs: those in plain areas focus more on smart agricultural machinery operation, those in mountainous areas on digital planting and breeding technologies for characteristic crops, and those in suburban areas on e-commerce operation and brand building. Third, dynamic demand is significant<sup>[3]</sup>. With the iteration of digital technologies and upgrading of the agricultural industry, farmers' quality demands keep updating, requiring continuous learning of new technologies and models to adapt to industrial changes. Fourth, practical demand is strong. Professional farmers prefer skills directly applicable to production practice, with low acceptance of highly theoretical and less practical training content, emphasizing practicability and operability.

## **2. Analysis of Influencing Factors on the Cultivation of New-Type Professional Farmers in the Digital Context**

From the perspective of individual factors, age, education level and learning willingness are core influencing factors. Young and highly educated farmers have stronger ability and willingness to learn new things and digital technologies. In contrast, middle-aged and elderly farmers with low education levels have weaker learning ability and traditional mindset, leading to low acceptance of digital training. Meanwhile, fragmented farming time makes it difficult for them to participate in centralized training. In addition, farmers' own learning ability, innovation awareness and income expectation also affect their enthusiasm for training.

From the perspective of educational factors, the misalignment between training supply and demand is the main problem. Existing training courses are highly homogeneous and lack pertinence, failing to meet the differentiated needs of farmers in different regions and sectors. Training methods are relatively simple, dominated by theoretical lectures, with insufficient application of field practice, case teaching and digital training. The structure of teaching staff is unreasonable: the

proportion of university theoretical lecturers is relatively high, while backbone talents with front-line practical experience in digital agriculture are insufficient, resulting in disconnection between training content and production practice. Unreasonable training duration and frequency also affect training effectiveness.

From the perspective of social environmental factors, digital infrastructure and industrial atmosphere provide important support. In remote rural areas, inadequate digital infrastructure, insufficient high-speed network coverage and shortage of smart training equipment restrict the development of digital training. The agglomeration degree of digital agriculture in rural areas is low, and the rural farming circle still relies on traditional production models, lacking a digital working atmosphere and failing to form a positive learning and demonstration effect. In addition, social network resources, technology extension services and information access channels also affect the quality improvement of professional farmers<sup>[4]</sup>.

From the perspective of policy factors, policy support lacks pertinence and long-term effectiveness. Most existing training subsidies are one-time grants, without incentives for farmers' continuous learning. Supporting policies such as training absence subsidies and skill certification subsidies are imperfect, failing to alleviate farmers' concerns about participating in training. The lack of a closed-loop mechanism including follow-up guidance and advanced skill training makes it difficult to consolidate training effects. Meanwhile, insufficient policies for attracting and supporting outstanding professional farmers to return to and stay in rural areas and start businesses hinder the inflow of young talents and the optimization of the professional farmer team.

### **3. Diversified and Precise Cultivation Paths for New-Type Professional Farmers in the Digital Context**

#### **3.1 Accurately Investigate Demands and Construct a Hierarchical and Classified Cultivation System**

Relying on the grid-based management mechanism in county and rural areas, conduct full-coverage surveys on the age, education, digital foundation, production type, quality shortcomings and training needs of new-type professional farmers, and establish electronic dynamic talent information files. According to current quality and demand differences, divide professional farmers into three groups: basic adaptation group, advanced improvement group and backbone leadership group. Combined with industrial characteristics of plains, mountainous areas, suburbs and other regions, formulate differentiated training programs. For example, the basic adaptation group focuses on basic digital operation and traditional skill improvement; the advanced improvement group on smart planting, breeding and operation management; and the backbone leadership group on innovative thinking and collaborative radiation ability, so as to eliminate homogeneous training and realize "teaching on demand and precise empowerment"<sup>[5]</sup>.

#### **3.2 Innovate Cultivation Modes and Strengthen Digital Practical Training**

Abandon the traditional single theoretical lecture mode and construct a diversified cultivation model of "digital theory + field practice + case review + online micro-lectures". On the one hand, rely on digital training bases to carry out practical training on smart agricultural machinery operation, IoT equipment maintenance, live-streaming e-commerce operation, etc., and invite front-line digital agriculture backbones and large-scale producers to give on-site lectures to enhance practicality. On the other hand, build an online digital training platform to push fragmented short-video micro-lectures, online Q&A and case analysis, adapting to farmers' fragmented time

and enabling "independent learning anytime and anywhere". Meanwhile, introduce scientific research methods such as meta-analysis to integrate existing training resources, optimize training content and methods, and improve the scientificity of cultivation.

### **3.3 Improve the Teaching Team and Optimize the Quality of Training Supply**

Build a compound teaching team consisting of "university experts + enterprise backbones + front-line experts". On the one hand, invite experts in agricultural-related majors from universities to provide theoretical teaching and technical guidance to ensure professionalism. On the other hand, recruit technical backbones from digital agricultural enterprises, local leaders of new-type professional farmers and top agriculture-supporting streamers to the teaching team to share practical experience and entrepreneurial cases, enhancing practicality. Meanwhile, establish a teacher training mechanism to organize regular learning of new digital technologies and cultivation methods, update training content synchronously, and ensure alignment with the needs of agricultural digital transformation.

### **3.4 Strengthen Policy Support and Improve the Long-Term Cultivation Mechanism**

Optimize the policy support system, increase investment in training funds, and improve supporting policies such as training absence subsidies, skill certification subsidies and agricultural material preferences to reduce farmers' training costs. Establish a full-cycle closed-loop cultivation mechanism of "centralized training+ follow-up tracking+advanced empowerment", provide regular one-on-one field guidance after training, and organize regular quality re-assessment and advanced skill training to consolidate effects. Meanwhile, improve policies such as incentive evaluation for outstanding new-type professional farmers, support for returning to rural areas to start businesses, and credit interest discounts to attract young talents to agriculture, optimize the structure of the farmer team, and promote long-term quality cultivation<sup>[6]</sup>.

### **3.5 Consolidate Environmental Support and Create a Favorable Working Atmosphere**

Accelerate the construction of rural digital infrastructure, fill gaps in high-speed networks and smart training equipment in remote rural areas to provide hardware support for digital training. Cultivate digital agricultural industrial clusters and build smart agriculture demonstration bases to play a leading role and drive more farmers to participate in digital agricultural practices. Set up exchange platforms for professional farmers, organize skill competitions and experience-sharing activities to create a positive atmosphere of mutual learning and competition, stimulate learning and innovation enthusiasm, and promote continuous quality improvement.

## **4. Conclusion and Prospect**

The formation of the quality of new-type professional farmers results from the synergy of individual endogenous drivers and external environmental empowerment, affected by multiple factors including individual characteristics, educational background, social environment and policy support. Constructing a scientific quality indicator system and optimizing cultivation paths can effectively improve training effectiveness and help farmers' quality adapt to digital transformation. In the future, combined with the actual development of digital agriculture in different regions, we can deepen quantitative and empirical research on the quality indicator system, dynamically optimize cultivation modes and content, strengthen the integration and sharing of digital training resources, continuously improve the long-term cultivation mechanism, promote the quality and

efficiency of the new-type professional farmer team, and provide stronger talent support for agricultural digital transformation and modernization.

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