Analysis on the Competency of New Professional Farmers and Its Influencing Factors

Li Chen¹* and Zhiqing Chen²
¹School of Sichuan Agricultural University, Chendu, China
²School of Chongqing University, Chongqing, China

*Corresponding author e-mail: li_chen@sicau.edu.cn

Abstract. Using the competent quality onion model, starting from the hierarchical structure, based on the four dimensions of the new professional farmers' psychological quality, knowledge application, technical skills and management, construct a new professional peasant competency evaluation index system. Based on the survey data of 270 new professional farmers in Pujiang and Chongzhou, Sichuan Province, using factor analysis and optimal scale regression analysis, the author analyzes the competency of the new professional farmers and its influencing factors. The results show that the overall quality of the new professional farmers is not high. The individual differences are obvious. According to the level of competency of the new professional farmers, the psychological quality, knowledge application, technical skills, and management are presented in a hierarchy of internal and external expansion. For those with lower competency, management, technical skills and knowledge application have a significant positive impact and higher importance on their competency; for those with higher competency, psychological quality, knowledge application, technical skills, Management has a significant positive impact and higher importance on its competency; therefore, relevant government departments should guide the social responsibility of “revitalizing agriculture”, enhance their psychological quality and strengthen knowledge based on the professional values of new professional farmers. Application and technical skills education and training, building a practical training base focusing on business management, and promoting the upgrading of the quality of new professional farmers.

Keyword: new professional farmers, competency, evaluation, influencing factors

1. Introduction
Cultivating new professional farmers and improving the quality of farmers is the need for China to achieve agricultural modernization. For five consecutive years since 2012, the “Central No. 1” document clearly stated that it is necessary to vigorously cultivate new professional farmers, improve the quality of farmers, and achieve sustainable development of agriculture. According to the "National New Professional Peasant Development Report" of the Ministry of Agriculture and Rural Affairs of China, the scale of the new professional peasant team has continued to expand. At the end of 2017, the
total number has exceeded 15 million, accounting for 4.78% of the total number of agricultural production and management personnel in the third national agricultural census. The training of new professional farmers has begun to take effect, but there is a contradiction between the quality and the demand. The basic quality of the participating personnel is uneven, and the overall quality of the new professional peasant team is low [1]. In 2018, the No. 1 Document of the Central Committee once again pointed out that to implement the strategy of rural revitalization, we must give priority to the development of human resources, foster new professional farmers, and strengthen the cultivation and promotion of the competency of new professional farmers. So what kind of competency should a new professional farmer possess and how to improve its competency level? These issues are especially worthy of attention.

Some scholars at home and abroad have paid attention to the quality of the new professional farmers and its influencing factors. Regarding the new professional peasant competency evaluation system, scholars have different methods and perspectives, and the quality of the new professional peasants should be different. P.L. Nuthall study found that improving the technical skills of farmers to improve their production efficiency [2]. Influence of T. Gwandu's Knowledge Application Quality of Farmers on Agricultural Soil Fertility Management[3]. Domestic scholars have built a competency quality evaluation system based on different perspectives: knowledge quality, psychological quality and skill quality[4,5].

2. Theoretical Basis and Model Construction

2.1. Theoretical Analysis and Indicator Selection

Competency quality onion model is to summarize the competency quality into a hierarchical structure from the inside to the outside, the inner layer includes self-image and values, social roles, the outer layer includes knowledge, skills, the outermost performance of the outer layer, easy to cultivate and evaluate; the inner layer The most dynamic, difficult to evaluate and learn [6]. Obviously, the onion model can be applied to the internal mechanism analysis of the competency of the new professional farmers.

According to the existing research, the author summarizes and compiles a representative new professional peasant competency evaluation index system. As shown in Table 1, the five-point Likert score is used, including 5 dimensions[7].

| Psychological quality | Knowledge application | Technical skills | Management quality |
|-----------------------|-----------------------|------------------|--------------------|
| x₁ Love agriculture   | x₇ Learning ability   | x₁₃ Professional technology mastery | x₂₁ Financial ability |
| x₂ Self-confidence    | x₈ Agricultural Production Knowledge | x₁₄ Technical Information Seeking | x₂₂ Financing Capabilities |
| x₃ Anti-stress         | x₉ Legal knowledge   | x₁₅ Technical problem solving | x₂₃ Organizational coordination ability |
| x₄ Social Responsibility | x₁₀ Resource Ecology | x₁₆ Technical Guidance Capabilities | x₂₄ Market Observing Capabilities |
| x₅ Innovative spirit  | x₁₁ Financial knowledge | x₁₇ Application writing ability | x₂₅ Sales expansion ability |
| x₆ Service Spirit      | x₁₂ Market Economy Knowledge | x₁₈ Computer Application Capability | x₂₆ Risk Processing Capability |
|                       |                       | x₁₉ Network application ability | x₂₇ Interpersonal communication ability |
|                       |                       | x₂₀ Agricultural Machinery Operational Capability | x₂₈ Research and Research Capability |
|                       |                       |                               | x₂₉ Decision making ability |
|                       |                       |                               | x₃₀ Execution capability |
|                       |                       |                               | x₃₁ Personal influence |
2.2. Constructed model

2.2.1. Factor Analysis. In this study, 31 observation variables were selected, but the above competencies were summarized based on human subjective cognition, and there may be some correlation between them. Therefore, this study intends to use factor analysis for dimensionality reduction. The matrix of the model is:

\[ F = AX + \epsilon \]  

Among them, the element \( a_{mn} \) in the matrix \( A \) is called the factor load, and \( \epsilon \) is a special factor and is a factor specific to the component \( F_m \) (\( m = 1, 2, ..., m \)) of the vector \( F \). The composite factor score can be calculated by taking the ratio of the common factor variance contribution rate to the cumulative variance contribution rate as the weight. Based on this, the quality of the new professional farmers and the level of each component are evaluated.

2.2.2. Optimal scale regression analysis. The optimal scale regression can analyze the degree of influence and importance level of each explanatory variable on the interpreted variable. In this study, the comprehensive score of the new professional peasant competency quality factor is taken as the explanatory variable, and each observed variable is used as the explanatory variable to analyze the influence degree and importance level of each observed variable on the competency level of the new professional peasant. The most scaled regression models are as follows:

\[ Y = f(X) + \mu \]  

In the formula, \( Y \) is the explanatory variable of the comprehensive score of the new professional peasant's competent quality factor; \( X \) is the explanatory variable reflecting the psychological quality, knowledge application, technical skills and management of the new professional peasant; \( \mu \) is the random interference term.

3. Data Source and Empirical Analysis

3.1. Data Sources
The data used in this study were sampled and the research team conducted a field survey of new professional farmers in Pujiang and Chongzhou in Sichuan Province from July to September 2018. The two regions have created a good environment for cultivating new professional farmers, and the survey of new professional farmers in the two regions has certain typicality and representativeness. The research team issued a total of 307 questionnaires. After preliminary screening, the number of questionnaires in this study was 270. The questionnaire mainly includes: personal characteristics of farmers, family characteristics, input and output of crop farming, current status of new professional farmers training, management, technical skills, knowledge application, psychological quality.

3.2. Descriptive statistical analysis
It can be seen from Table 2 that the overall score in the “Knowledge Application” dimension is higher, and the highest single score also appears in this dimension, namely “x\textsubscript{8} agricultural production knowledge”, indicating that the new professional farmers pay more attention to the application of agricultural knowledge. The “Psychological Capital” score is at an intermediate level and the overall status is good. The overall rating of “management management” is low, indicating that the emphasis on management of new professional farmers needs to be improved. Some indicators of the “Technical Skills” dimension have a low score of less than 3 points, indicating that the new professional farmers are not paying enough attention to the “x\textsubscript{17} computer application” and “x\textsubscript{18} network application ability”, and they still need to be strengthened in the development of modern agriculture. In view of the above analysis, this study initially judges that the overall competency level of the new professional farmers is not high and needs to be improved.
Table 2. Descriptive statistics of variables

| Variable | N  | Mean       | Standard deviation |
|----------|----|------------|--------------------|
| x_1      | 270| 3.5889     | 0.59542            |
| x_2      | 270| 3.5222     | 0.61700            |
| x_3      | 270| 3.1111     | 0.81040            |
| x_4      | 270| 3.6556     | 0.63646            |
| x_5      | 270| 3.4        | 0.74375            |
| x_6      | 270| 3.3222     | 0.82922            |
| x_7      | 270| 3.5556     | 0.65289            |
| x_8      | 270| 3.6889     | 0.55167            |
| x_9      | 270| 3.3556     | 0.70544            |
| x_10     | 270| 3.5556     | 0.71798            |
| x_11     | 270| 3.3111     | 0.77091            |
| x_12     | 270| 3.2444     | 0.78049            |
| x_13     | 270| 3.4222     | 0.71590            |
| x_14     | 270| 3.3        | 0.76809            |
| x_15     | 270| 3.1556     | 0.85678            |
| x_16     | 270| 3.2889     | 0.79372            |

4. Evaluation of Competency of New Professional Farmers

4.1. Comprehensive evaluation of the competency of new professional farmers

This study used SPSS 20.0 for exploratory factor analysis. First, the factor model adaptive analysis of the data was performed using KMO and Bartlett spherical tests. The results showed that the KMO value was 0.885, the Bartlett spherical test statistic was 6197.297, and the Sig value was 0, which had a significant level. Explain that there is a significant correlation between variables, which is suitable for factor analysis. In the factor analysis, according to the criterion that the eigenvalue is greater than 1, the study extracted 14 common factors, and the cumulative variance contribution rate reached 85.382%, as shown in Table 3.

Table 3. Total variance of factor analysis interpretation

| Common factor | Eigenvalues | Variance contribution rate% | Cumulative variance contribution rate% |
|---------------|-------------|------------------------------|----------------------------------------|
| F1            | 14.107      | 45.505                       | 45.505                                 |
| F2            | 2.067       | 6.669                        | 52.174                                 |
| F3            | 1.278       | 4.124                        | 56.298                                 |
| F4            | 1.216       | 3.924                        | 60.222                                 |
| F5            | 1.093       | 3.527                        | 63.749                                 |
| F6            | 0.988       | 3.188                        | 66.937                                 |
| F7            | 0.941       | 3.036                        | 69.973                                 |
| F8            | 0.874       | 2.82                         | 72.792                                 |
| F9            | 0.79        | 2.549                        | 75.341                                 |
| F10           | 0.743       | 2.398                        | 77.74                                  |
| F11           | 0.654       | 2.108                        | 79.848                                 |
| F12           | 0.639       | 2.062                        | 81.91                                  |
| F13           | 0.559       | 1.803                        | 83.713                                 |
| F14           | 0.517       | 1.669                        | 85.382                                 |

Through calculation, the minimum score of factor score is about -1.756, the maximum value is 0.990, the standard deviation is 0.470, and the variance is 0.221, which indicates that the new professional farmers have a higher degree of dispersion and heterogeneity. According to the level of factor scores, the new professional farmers are divided into two types: the factor score is equal to or lower than the average is the lower competency; the factor score is higher than the average is the
higher the competency. Among the 270 respondents, 126 were the lower qualified, accounting for 46.67% of the sample size; 144 were the higher the qualified, accounting for 53.33% of the sample, indicating that only half of the farmers basically met the new professional farmers. The standard of competency. The results of this study are consistent with the preliminary judgments of the above descriptive statistical analysis, that is, the level of competency of the new professional farmers is not high and needs to be further improved.

4.2. Analysis of the Factors Affecting the Competency of New Professional Farmers

The optimal scale regression analysis was carried out for two types of new professional farmers by SPSS20.0. In the process of processing, a stepwise regression method is adopted to avoid the collinearity problem. The tolerance of the two regression independent variables is greater than 0.1 before and after the conversion, indicating that the model does not have a collinearity problem. The determination coefficient and the adjustment coefficient of the regression model are both above 95%, and the model has good goodness of fit. The variance analysis of the two regressions shows that the models pass the significance test; the normalized regression coefficient symbol directions of each explanatory variable are Positive, in line with theoretical expectations; specific regression results are shown in Table 4 and Table 5.

4.2.1. Analysis of the Factors Affecting the Low Quality of New Professional Competence. As can be seen from Table 4, resource ecological knowledge (X10) technical problem solving skills (X15), network application ability (X19) financial management ability (X21), sales expansion ability (X25), interpersonal communication ability (X27) is the new professional farmers' competency quality The main influencing factors are 0.112, 0.138, 0.111, 0.178, 0.168, and 0.161. Those with lower quality are particularly interested in financial management ability, and the new professional farmers who attach importance to financial management ability are 0.257 higher than those who do not pay attention to. Compared with traditional farmers, professional farmers are no longer an identity, but a career choice. Instead of targeting their livelihoods, they use agriculture as an industry to improve their financial management capabilities. The lower quality of new professional farmers is second to the degree of sales expansion, and 0.290 lower than the quality of emphasis. It is not difficult to find that innovative sales methods have expanded the market scope, enhanced the competitiveness of operators, and promoted the development of family farms and large-scale farmers.

The four major factors of importance are from the second, third and fourth floors of the new professional farmers' competency model. Some elements of the psychological quality dimension have a significant positive impact on the overall competency, but its importance is lower than the second, third and fourth layers, indicating that for the lower quality, there are certain management, technical skills and knowledge application competence. Force, but due to lack of psychological quality as a support, failed to improve the overall competency level.
Table 4. Type one most scaled regression analysis results

| Explanatory variables | Bcoefficient | Standard error | df | F     | Sig.  | Importance | Tolerance After conversion | Before conversion |
|-----------------------|--------------|----------------|----|-------|-------|------------|-----------------------------|------------------|
| X₃                    | .222***      | .050           | 2  | 19.775 | .000  | .087       | .469                        | .399             |
| X₄                    | .094**       | .051           | 2  | 3.436  | .038  | .027       | .467                        | .335             |
| X₅                    | .110         | .081           | 2  | 1.822  | .169  | .048       | .365                        | .415             |
| X₆                    | .085         | .078           | 2  | 1.191  | .310  | .010       | .127                        | .133             |
| X₇                    | .117**       | .061           | 2  | 3.685  | .016  | .067       | .286                        | .262             |
| X₁₀                   | .278**       | .070           | 3  | 15.685 | .000  | .112       | .322                        | .191             |
| X₁₁                   | .155***      | .058           | 3  | 7.008  | .000  | .082       | .511                        | .311             |
| X₁₂                   | .118         | .087           | 2  | 1.864  | .163  | .036       | .486                        | .311             |
| X₁₃                   | .221***      | .046           | 4  | 23.028 | .000  | .138       | .293                        | .394             |
| X₁₄                   | .109*        | .068           | 3  | 2.565  | .062  | .003       | .135                        | .357             |
| X₁₅                   | .152***      | .070           | 3  | 4.720  | .005  | .063       | .264                        | .478             |
| X₁₆                   | .302***      | .096           | 3  | 9.855  | .000  | .111       | .416                        | .116             |
| X₁₇                   | .141**8      | .051           | 3  | 7.630  | .000  | .049       | .369                        | .418             |
| X₁₈                   | .257***      | .062           | 2  | 17.163 | .000  | .178       | .300                        | .217             |
| X₁₉                   | .085*        | .055           | 4  | 2.436  | .055  | .054       | .298                        | .372             |
| X₂₀                   | .290***      | .058           | 3  | 24.744 | .000  | .168       | .288                        | .191             |
| X₂₁                   | .055         | .061           | 3  | .834   | .480  | .020       | .392                        | .246             |
| X₂₂                   | .290***      | .060           | 3  | 24.874 | .000  | .161       | .374                        | .359             |
| X₂₃                   | .108***      | .034           | 2  | 10.083 | .000  | .052       | .530                        | .421             |
| X₂₄                   | .210***      | .049           | 2  | 18.656 | .000  | .088       | .557                        | .384             |
| X₃₀                   | .164         | .107           | 2  | 2.337  | .104  | -.063      | .284                        | .211             |

4.2.2. Analysis of the Factors Affecting the Competency of New Professional Farmers. In the optimal scale regression of the higher quality type 2, network application ability (X₉), research and research ability (X₂₈), technical problem solving (X₁₅), interpersonal communication ability (X₂₇), self-confidence (X₂), market economy Knowledge (X₁₂) is the main influencing factor of the competency of new professional farmers. The importance levels are 0.189, 0.106, 0.101, 0.089, 0.79, and 0.070. Judging from the importance of the six people's importance level, it can be seen that the new professional farmers have more understanding and mastery of technical skills, management and knowledge application than psychological quality. Most of the new professional farmers still stay at the external level, understanding. The reason may be the technical and business management training that new professional farmers receive more in training, and in recent years, training institutions have rarely guided the psychological quality of new professional farmers, leading to the understanding of the importance of social responsibilities and other psychological qualities of new professional farmers. It is difficult to respond positively to the call for the development of modern green agriculture in the country, and it is difficult for farmers to make a decision to change production behavior and innovative agricultural methods.
Table 5. Type 2 most scaled regression analysis results

| Explanatory variables | Standard coefficient | Standard error | df  | F      | Sig.  | Importance | Tolerance |
|-----------------------|----------------------|----------------|-----|--------|-------|------------|-----------|
| x1                    | .093***              | .030           | 1   | 9.745  | .002  | .025       | .611      |
| x2                    | .267***              | .049           | 1   | 30.119 | .000  | .079       | .439      |
| x3                    | .187***              | .042           | 2   | 20.145 | .000  | .068       | .623      |
| x5                    | .118***              | .052           | 2   | 5.169  | .007  | .035       | .526      |
| x7                    | .084***              | .029           | 2   | 8.398  | .000  | .001       | .940      |
| x8                    | .199***              | .049           | 1   | 16.393 | .000  | .069       | .308      |
| x10                   | .063                 | .044           | 1   | 2.029  | .157  | .022       | .378      |
| x12                   | .167***              | .058           | 2   | 8.312  | .000  | .070       | .431      |
| x14                   | .009                 | .049           | 1   | .036   | .850  | .004       | .306      |
| x15                   | .179***              | .048           | 1   | 13.671 | .000  | .101       | .500      |
| x18                   | .031                 | .064           | 2   | .232   | .794  | .014       | .224      |
| x19                   | .598***              | .194           | 2   | 9.510  | .000  | .189       | .399      |
| x20                   | .131***              | .048           | 2   | 7.450  | .001  | .041       | .656      |
| x21                   | .105***              | .043           | 2   | 5.895  | .004  | .056       | .372      |
| x22                   | .058                 | .082           | 1   | .506   | .478  | .010       | .235      |
| x24                   | .037                 | .083           | 2   | .196   | .822  | .016       | .136      |
| x25                   | .050                 | .068           | 2   | .546   | .581  | .019       | .316      |
| x26                   | .162***              | .048           | 1   | 11.454 | .001  | .089       | .402      |
| x27                   | .222***              | .053           | 1   | 17.395 | .000  | .106       | .248      |
| x28                   | .104**               | .051           | 1   | 4.114  | .045  | .000       | .356      |
| x29                   | .205***              | .072           | 2   | 8.094  | .001  | .065       | .175      |
| x30                   | .136***              | .039           | 3   | 12.225 | .000  | .023       | .832      |
| x31                   | .058                 | .082           | 1   | .506   | .478  | .010       | .235      |

5. Conclusions and Policy Recommendations

The above research results show that the overall quality of the new professional farmers is not high and the heterogeneity is strong. The quality of the new professional farmers is from low to high, which is technical skills, management, knowledge application and psychological quality. Extended hierarchy. For those with lower competency, management, technical skills and knowledge application have a significant positive impact and higher importance on their competency; for those with higher competency, psychological quality, knowledge application, technical skills, management and management Competency has a significant positive impact and has a higher importance; those with higher competency quality pay more attention to psychological quality, but the level of competency of the two types of new professional farmers is relatively shallow. The above research conclusions have the following policy implications:

First, guided by professional values, fostering a sense of social responsibility for new professional farmers to “revitalize agriculture” and enhance their psychological quality. In the process of cultivating, introduce the concept of modern agricultural development, the history of agricultural development and the status of agriculture in the national economy, and promote the new professional peasants to recognize the economic and social significance of promoting agricultural development, and guide them to cultivate good professional values; Cultivate the environment, fully mobilize the enthusiasm and innovation of the new professional farmers' agricultural production activities, and improve their psychological quality. The second is to strengthen education and training in knowledge application and technical skills. New-type professional farmers should also strengthen the training of resource ecological protection, market economy, laws and regulations and other related knowledge to meet the needs of modern agricultural production of new professional farmers. Regular lectures on agricultural science and technology will be held to ensure that new professional farmers receive timely and effective access to new agricultural technology information and acquire operational skills for new
technologies. The third is to build a practical training base focusing on business management. As a manager, new professional farmers must have a series of management and management capabilities such as organization and coordination, crisis management and decision-making. Relevant government departments can rely on modern agricultural parks and science and technology projects to carry out training, take the form of job-related training and participation in decision-making, and combine business management theory knowledge with practice to meet the increasing management needs of new professional farmers.

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