

Research on the Impact of Livelihood Capital on Livelihood Strategies of Poverty Alleviation Households in Northwest China— —Based on the Survey Data of Poverty Alleviation Households in Shaanxi, Gansu and Ningxia

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Abstract. Livelihood capital is an important basis for farmers to carry out different livelihood activities. In order to consolidate the achievements of poverty alleviation, it is necessary to clarify the specific impact of the livelihood capital of poverty alleviation households on their livelihood strategies. Based on the livelihood capital assessment of poverty alleviation households, this paper analyzes the impact of poverty alleviation households' livelihood capital on livelihood strategies from two aspects: dominant livelihood strategies and diversified livelihood strategies. The study found that financial capital was significantly positively correlated with the dominant strategy of agricultural management, human capital and social capital were significantly positively correlated with the dominant strategy of migrant labor, and physical capital and natural capital were significantly positively correlated with the dominant strategy of transfer payments; the richer the livelihood capital, the more diverse the livelihood strategies of the poverty alleviation households, the human capital and social capital have an important impact on the diversity of the livelihood strategies of the poverty alleviation households.

1 INTRODUCTION

In order to achieve the grand goal of building a moderately prosperous society in an all-round way, the Party Central Committee has launched a nationwide poverty alleviation campaign. After years of unremitting efforts, my country's 98.99 million rural poor people have all been lifted out of poverty, which is a phased achievement that is very worthy of recognition. At this stage, China is focusing on consolidating the achievements of poverty alleviation, and how to achieve sustainable livelihood of poverty alleviation households has become the focus of this stage. The sustainable livelihood theory holds that in livelihood activities, the poverty alleviation households, as rational decision-makers, can make livelihood decisions that are most conducive to the realization of household livelihood goals based on the various types of available livelihood and combined with external risks, so that household livelihoods consolidated and optimized [1]. Livelihood capital is an important basis for farmers to carry out different livelihood activities, and the impact of different livelihood capital on livelihood strategies is differentiated. In the framework of sustainable livelihood analysis, the livelihood capital of farmers is composed of five types of capital, including physical capital, natural capital, financial capital, human capital and social capital. Physical capital refers to the infrastructure and means of

production that farmers use to maintain their livelihoods[2], social capital refers to the non-institutionalized cooperation methods and relationship networks established by farmers in social interactions [3], and natural capital refers to the Resources for living and production[4], financial capital refers to the financial resources used by farmers in the process of achieving their livelihood goals [5], and human capital refers to the sum of knowledge, skills and health status possessed by farmers [6]. In order to explore the impact of the livelihood capital of the poverty alleviation households on the livelihood strategy, this paper will conduct a detailed study from the two aspects of the dominant livelihood strategy and the diversity livelihood strategy based on the livelihood capital assessment of the poverty alleviation households.

2 LIVELIHOOD CAPITAL EVALUATION

2.1 Indicator selection

First, this paper evaluates the livelihood capital of poverty alleviation households to explore the impact of poverty alleviation household livelihood capital on livelihood strategies. Referring to previous studies, 10 indicators were selected to measure five types of livelihood capital, including physical capital, natural capital, financial capital,

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human capital and social capital. Physical capital includes: house and drinking water [7]. The housing conditions of the poverty alleviation households are measured by whether they have safe housing, and the drinking water conditions of the poverty alleviation households are measured by the way of drinking water. Natural capital includes: cultivated area and forage area [8]. Because the sample data in this paper are from three provinces of Shaanxi, Gansu and Ningxia, most of the poverty alleviation households in this area will carry out animal husbandry, and forage resources are a necessary condition for animal husbandry, so this paper adds the forage area indicator to the natural capital. Financial capital includes: poverty alleviation microcredit and agricultural insurance [9][10], measure the poverty alleviation microcredit situation of poverty alleviation households by the amount of poverty alleviation microcredit, and measure the agricultural insurance situation of poverty alleviation households by whether they participate in agricultural

insurance. Human capital includes: age and mandarin [11], the main age of users is an indicator of age, and the proportion of households who can speak Putonghua is used to measure the Putonghua situation of poverty alleviation households. Social capital includes: personal relationship and social concern [12]. The number of times the person in charge of assistance visits the poverty alleviation households in a year is used to measure the personal relationship of the poverty alleviation households, and the number of channels for the poverty alleviation households to obtain village information is used to measure the social concern of the poverty alleviation households. Among the above indicators, except for cultivated area and forage area, which can be obtained from local statistical data, other indicators need to be obtained through separate surveys of poverty alleviation households. The specific evaluation indicators of the livelihood capital of the poverty alleviation households are shown in Table 1.

Table 1. THE EVALUATION INDEX SYSTEM OF LIVELIHOOD CAPITAL OF POVERTY ALLEVIATION HOUSEHOLDS

Primary Indicator	Secondary Indicator	Indicator Description	Indicator Property	Indicator Source
Physical Capital	House	Is there safe housing?	Positive indicator	Huang Zhigang, etc., 2021
	Drinking Water	Tap water, centralized water supply facilities, decentralized independent water collection, decentralized independent water storage.	Positive indicator	
Natural Capital	Cultivated Area	The per capita arable land area of the village.	Positive indicator	Lin Jing, etc., 2021
	Forage Area	Per capita pasture area in the village.	Positive indicator	
Financial Capital	Poverty Alleviation Microfinance	Amount of Poverty Alleviation Microcredit.	Positive indicator	Wu Lijuan, etc., 2019
	Agricultural Insurance	Whether to participate in agricultural insurance?	Positive indicator	Cui Yalan, etc., 2018
Human Capital	Age	Age of head of household.	Negative indicator	Wang Guohong, 2018
	Mandarin	Percentage of families who speak Mandarin.	Positive indicator	
Social Capital	Personal Relationship	The number of visits to the person in charge of assistance in a year.	Positive indicator	Liu Hongbin, etc., 2016
	Social Concern	Number of channels for obtaining village information.	Positive indicator	

2.2 Method

In addition to scientifically selecting the evaluation indicators of the livelihood capital of the poverty alleviation households, this paper refers to the evaluation method of the livelihood output of the poverty alleviation households, and selects the entropy method to calculate the weight of each indicator, so as to achieve an objective evaluation of the livelihood capital level of the poverty alleviation households. The indicator weight determination process is as follows:

Step 1: Standardization of indicator data. In order to eliminate the large differences in units, magnitudes and types of each indicator data, each indicator data should be standardized before the indicator weight is determined. In this paper, the extreme value method in the normalization method is used to process the index data, and the data value is limited in the range of 0 to 1, thereby eliminating the adverse effects of extreme value samples and realizing the convergence and dimensionless quantification of the index data.

Suppose there are n evaluation indicators and m samples in the system, x_{ij} ($i=1, 2, \dots, m, j=1, 2, \dots,$

n) is the value of the j th indicator under the i th sample, and y_{ij} is the value of x_{ij} after normalization. The formula is as follows:

$$y_{ij} = \begin{cases} \frac{x_{ij}-x_{min}}{x_{max}-x_{min}} + 0.01, & x \text{ is a positive indicator} \\ \frac{x_{max}-x_{ij}}{x_{max}-x_{min}} + 0.01, & x \text{ is a negative indicator} \end{cases} \quad (1)$$

Where positive indicators are normalized using the first equation in (1), and negative indicators are normalized using the second equation Ln (1). In addition, the Ln function will be used when calculating the information entropy. In order to avoid the meaningless influence of Ln (0), this paper performs non-negative translation on all normalized values, that is, adds 0.01 to all values.

Step 2: Calculate the weights.

First, use the standardized index data to calculate the proportion P_{ij} of the j th index under the i th sample. The formula is as follows:

$$P_{ij} = \frac{y_{ij}}{\sum_{i=1}^m y_{ij}} \quad (2)$$

Second, calculate the information entropy of the j th index, the formula is as follows:

$$e_j = -\frac{1}{\ln m} \sum_{i=1}^m p_{ij} \ln p_{ij} \quad (3)$$

Finally, calculate the weight of the j th indicator, the formula is as follows:

$$W_j = \frac{1-e_j}{\sum_{j=1}^n (1-e_j)} \quad (4)$$

Step 3: After accurately applying the evaluation index system of livelihood capital, the following formula is used to calculate the livelihood capital score of the i th sample:

$$S_i = \sum_{j=1}^n W_j \times P_{ij} \quad (5)$$

2.3 Results

Through the calculation and sorting of 5 first-level indicators and 10 second-level indicators of the livelihood capital evaluation system of poverty alleviation households in Shaanxi, Gansu and Ningxia, the weight of each indicator in the entire evaluation system is obtained. The specific results are shown in Table 2.

Table 2. WEIGHTS OF EVALUATION INDICATORS FOR LIVELIHOOD CAPITAL OF POVERTY ALLEVIATION HOUSEHOLDS

Primary Indicator	Secondary Indicator	Comprehensive weight
Physical Capital	House	0.0032
	Drinking Water	0.0113
Natural Capital	Cultivated Area	0.1011
	Forage Area	0.436
Financial Capital	Poverty Alleviation Microfinance	0.101
	Agricultural Insurance	0.0853
Human Capital	Age	0.0254
	Mandarin	0.0753

Social Capital	Personal Relationship	0.0815
	Social Concerns	0.0799

First, standardize the raw data of poverty alleviation households to eliminate the influence of dimensions on the results. Secondly, the standardized data is calculated according to the weight ratio, and the livelihood capital score of each poverty alleviation household is obtained. Finally, according to the score, the K-means cluster analysis method is used to divide the livelihood capital score of poverty alleviation households into 4 levels, they are poor grade [0.0383, 0.1633], a total of 967 households, accounting for 21.97%, general grade [0.1634, 0.2985], a total of 3099 households, accounting for 70.42%, good grade [0.2986, 0.4808], a total of 250 households, accounting for 5.68%, Excellent grade [0.4809, 0.8132], a total of 85 households, accounting for 1.93%. The average score of livelihood capital of poverty alleviation households in Shaanxi, Gansu and Ningxia is 0.2077, which is in the general level. The specific results are shown in Figure 1.

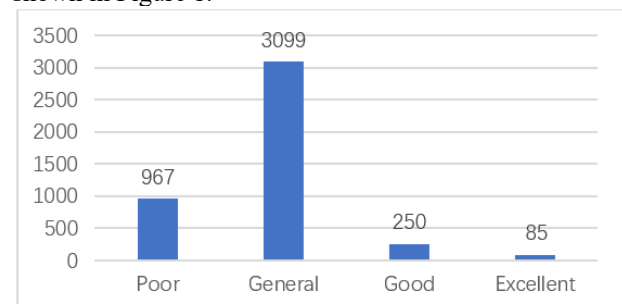


Fig. 1. Distribution of livelihood capital of various poverty alleviation households in Shaanxi, Gansu and Ningxia

3 RESEARCH DESIGN

3.1 Data Sources

The research data in this article comes from the first-hand data obtained in the 'Monitoring and Investigation of 100 Villages of Poverty Governance Effectiveness' carried out by the Rural Governance Research Center of Beijing Normal University in Shaanxi, Gansu, and Ningxia in August 2019, involving a total of 19 impoverished counties, 95 impoverished villages, and 5,808 impoverished populations in Shaanxi, Gansu and Ningxia were involved in the cross-sectional data at the end of 2018. After excluding invalid and vacant values, a total of 4401 poor population data are included.

In order to explore the impact of the livelihood capital of the poverty alleviation households on the livelihood production strategy, this paper will conduct a detailed analysis from the two aspects of the dominant livelihood strategy and the diversity strategy, and build a binary logistic regression model and a multiple linear regression model for research. Combined with the survey data, this paper divides the livelihood strategies of poverty alleviation households into the following four categories. First, the agricultural management-based livelihood strategy specifically refers to the main source of income of the poverty alleviation households through agricultural

management. Second, the wage labor-based livelihood strategy specifically refers to the main source of income of the households lifted out of poverty is through labor. Third, the transfer payment-based livelihood strategy specifically refers to the way that the main source of income of the poverty alleviation households is through government subsidies. Fourth, the asset dividend-based livelihood strategy specifically refers to the fact that the main source of income for poverty alleviation households is to invest in shares through cash, land, etc., so as to obtain dividend income. The dominant livelihood strategy referred to in this paper is that the income proportion of a certain livelihood strategy is the highest value of the income proportion of each livelihood strategy, then this livelihood strategy is the leading livelihood strategy of the poverty alleviation household. In addition, this paper will use the number of income sources of poverty alleviation households to measure the diversity of their livelihood strategies.

3.2 Methods

3.2.1 Binary Logistic Regression.

Binary logistic regression is an analysis that the dependent variable is a dichotomous variable. When studying the impact of livelihood capital on the dominant livelihood strategy, the dependent variable is whether a certain type of livelihood strategy is the dominant livelihood strategy. regression analysis. Let the dependent variable be y , and a value of '1' means that the poverty alleviation households use a certain type of strategy as the leading livelihood strategy, and a value of '0' means that the poverty alleviation households do not use a certain type of strategy as the leading livelihood strategy. The independent variables that affect y are denoted as x_1, x_2, \dots, x_m . Set the conditional probability that the poverty alleviation households take a certain type of strategy as the dominant livelihood strategy as $p(y = 1|X) = p_i$, $1 - p_i$ represents the probability that the poverty alleviation households do not take a certain type of strategy as the dominant livelihood strategy, the condition for the establishment of this formula is that the livelihood strategies of the poverty-stricken households are the above four types of livelihood strategies. The nonlinear function composed of the independent variable X is shown in formula (6):

$$p_i = \frac{1}{1 + e^{-\left(\alpha + \sum_{i=1}^m \beta_i x_i\right)}} = \frac{e^{\alpha + \sum_{i=1}^m \beta_i x_i}}{1 + e^{\alpha + \sum_{i=1}^m \beta_i x_i}} \quad (6)$$

Logarithmically transform the ratio $(p_i/1 - p_i)$ of the probability that a certain type of strategy is the dominant livelihood strategy of the poverty alleviation households to the probability of not using a certain type of strategy to obtain the linear expression of the binary logistic regression model formula, as shown in formula (7):

$$\ln\left(\frac{p_i}{1-p_i}\right) = \alpha + \sum_{i=1}^m \beta_i x_i \quad (7)$$

In formulas (6) and (7), α is a constant term; m is the number of independent variables; β_i is the coefficient

of the independent variable, which reflects the direction and direction of the influence of the independent variable on the livelihood strategy of the poverty alleviation households. degree.

Multiple Linear Regression.

Multiple linear regression analysis is a regression analysis of only one dependent variable but contains multiple independent variables. The degree of influence of variables, thus providing a reliable basis for scientific prediction. Multiple regression analysis can solve the following three problems: first, clarify the relationship expression between dependent variables and independent variables (ie, multiple regression equation), and determine the degree of relationship between variables; second, with the help of the obtained multiple regression Equations can predict or control the value of independent variables; third, determine the variables that can affect the dependent variable from among many variables.

The diversified livelihood strategies of poverty alleviation households will be affected by livelihood capital, and a multiple linear regression equation is established based on this correlation. Assume that the dependent variable is y , and the independent variables that affect y are denoted as x_1, x_2, \dots, x_n . The specific function expression is as follows:

$$y = \alpha + \sum_{i=1}^n \beta_i x_i + \varepsilon(8)$$

In formula (8), α is a constant term, n is the number of independent variables, ε is a random disturbance term, and β_i is the coefficient of the independent variable, which reflects the direction and degree of the influence of the independent variable on the diversity level of the livelihood strategies of the poverty alleviation households. x_i is the independent variable, including poverty alleviation households' the natural capital, physical capital, human capital, financial capital and social capital.

4 RESULTS AND DISCUSSION

In order to study the impact of accounting capital on dominant livelihood strategies, this paper establishes a binary logistic regression model to explore. The specific results are shown in Table 3. In the agricultural management dominant model, the Nagelkerke R square was 0.196, and the Hosmer-Lemeshow test value was 0.612 > 0.05, indicating that the model passed the test. In this model, financial capital has a significant positive correlation with the dominance of agricultural management, indicating that the more financial capital of poverty alleviation households, the higher their willingness to use agricultural management as their livelihood strategy. The financial support that the poverty alleviation households can obtain is mainly to help them develop the agricultural industry. Therefore, the poverty alleviation households with higher financial capital must be more willing to use agricultural management as the leading livelihood strategy. Human capital and social capital are significantly negatively correlated with agricultural management dominance, indicating that the more human capital and social capital of poverty alleviation households, the lower their willingness to take agricultural management as their main livelihood strategy.

In the labor-dominated model, the Nagelkerke R square is 0.122, and the Hosmer-Lemeshow test value is 0.285>0.05, indicating that the model has passed the test. In this model, natural capital and financial capital are significantly negatively correlated with the dominance of migrant labor, indicating that the more natural capital and financial capital of poverty alleviation households, the lower their willingness to rely on migrant labor as their livelihood strategy. In addition, human capital and social capital are significantly positively correlated with the dominance of migrant labor, indicating that the more human capital and social capital of poverty alleviation households, the higher their willingness to rely on migrant labor as their livelihood strategy. In the transfer payment dominant model, the Nagelkerke R square is 0.150, and the Hosmer-Lemeshow test value is 0.174>0.05, indicating that the model has passed the test. In this model, material capital and natural capital are significantly positively correlated with transfer payment dominance, indicating that the more material capital and natural capital of poverty alleviation households, the higher their willingness to use transfer payment as their livelihood strategy. Human capital and social capital are significantly negatively correlated with transfer payment dominance, indicating that the more human capital and social capital of poverty alleviation households, the lower their willingness to take transfer payment as their livelihood strategy.

To sum up, physical capital and natural capital are important capitals that affect poverty alleviation households with transfer payment as the leading livelihood strategy. Capital is mainly physical capital and natural capital. In the Shaanxi-Gansu-Ningxia region, the subsidy for returning farmland to forest is a subsidy that farmers can obtain. The poverty alleviation households with more natural capital are more likely to receive more subsidies for returning farmland to forest. Financial capital has a positive correlation with the dominance of agricultural operations and a negative correlation with the dominance of labor, indicating that the abundance of financial capital has an important impact on the livelihood strategies of poverty alleviation households with agricultural operations as the dominance. The financial support that the poverty alleviation households can obtain is mainly to help them develop the agricultural industry. Therefore, the poverty alleviation households with higher financial capital must be more willing to use agricultural management as the leading livelihood strategy. Human capital and social capital are negatively correlated with the dominance of agricultural operations and transfer payments, and positively correlated with the dominance of migrant labor, which shows that human capital and social capital are important capital for poverty alleviation households to obtain labor from labor, and migrant labor can be obtained by poverty alleviation households. Channels with higher labor returns will inevitably attract more human capital and social capital, which are chosen by the poverty alleviation households. At the same time, the richer human capital and social capital can not only improve the labor opportunities for the poverty alleviation households, but also help the poverty alleviation households obtain more labor opportunities. Guarantee of

better employment opportunities.

Table 3. REGRESSION RESULTS OF THE IMPACT OF LIVELIHOOD CAPITAL ON DOMINANT LIVELIHOOD STRATEGIES

Variables	Agricultural Management-dominated	Labor-dominated	Transfer Payment-dominated
Physical Capital	-18.835 (17.559)	-4.638 (15.909)	44.387* (25.229)
Natural Capital	-0.487 (0.539)	-2.084*** (0.472)	3.531*** (0.549)
Financial Capital	20.065*** (1.521)	-12.101*** (1.049)	-1.915 (1.292)
Human Capital	-13.998*** (2.882)	30.448*** (2.666)	-36.175*** (3.683)
Social Capital	-12.355*** (2.051)	14.288*** (1.834)	-9.800*** (2.610)
Constant term	-1.599*** (0.290)	0.076*** (0.250)	-1.035*** (0.380)
Nagelkerke R ²	0.196	0.122	0.150
Hosmer-Lemeshow Test	0.621	0.285	0.174
Observations	4401	4401	4401

Note: *, **, *** indicate significance levels at 10%, 5%, and 1%, the standard error of each variable is in parentheses.

In order to study the impact of career capital on diverse livelihood strategies, this paper establishes a multiple linear regression model to explore, and the specific results are shown in Table 4. In the livelihood diversity model, financial capital, human capital and social capital have a significant positive correlation with the diversity of livelihood strategies, indicating that the more financial capital, human capital and social capital of poverty alleviation households, the richer their livelihood strategies. The correlation analysis results are consistent. The poverty alleviation households have abundant financial capital, which means that they have more funds or easier financing, so they can more easily carry out other livelihood activities other than agricultural operations, so as to realize the diversity of livelihood strategies. Human capital is the basis for farmers to carry out all livelihood activities, and its quantity and quality determine the use of other capitals. The poverty alleviation households with abundant human capital are more able to engage in non-agricultural livelihood activities. Therefore, in order to increase the source of income and obtain more and higher labor returns, they will inevitably engage in a variety of livelihood strategies. As a catalyst for farmers to carry out non-agricultural livelihood strategies, social capital will promote farmers to realize the diversity of livelihood strategies. Therefore, poverty alleviation households with rich social capital will carry out various livelihood activities such as agriculture and work, and have more diverse livelihood strategies. In addition, although the impact of physical capital and natural capital is not significant, their impact coefficients are all positive.

Combining the impact coefficients of the other three types of capital shows that livelihood capital is positively correlated with livelihood diversity to a certain extent. The richer the livelihood capital, the better the poverty alleviation households are more willing to choose a variety of livelihood strategies. Among various types of capital, human capital and social capital have more prominent influences, with the coefficients of 5.610 and 4.398, respectively, indicating that human capital and social capital have an important impact on the choice of livelihood strategies of poverty alleviation households.

Table 4. REGRESSION RESULTS OF LIVELIHOOD CAPITAL AFFECTING DIVERSE LIVELIHOOD STRATEGIES

Variables	Livelihood Diversity
Physical Capital	0.567 (4.765)
Natural Capital	0.234 (0.147)
Financial Capital	1.729*** (0.286)
Human Capital	5.610*** (0.809)
Social Capital	4.398*** (0.545)
Constant term	2.365*** (0.075)
R ²	0.241
F-test	37.432
Observations	4401

Note: *, **, *** indicate significance levels at 10%, 5%, and 1%, the standard error of each variable is in parentheses.

5 CONCLUSIONS

Through the above analysis, this paper draws the following conclusions:

In terms of the influence of livelihood capital on the dominant livelihood strategy, financial capital only has a positive impact on the dominance of agricultural management, indicating that the poverty alleviation households with more financial capital are more willing to choose agricultural management as the dominant livelihood strategy. Most of the poverty alleviation households with abundant financial capital can obtain more financial support, and most of the financial support in poverty alleviation areas is mainly to support the development of the agricultural industry. Therefore, the poverty alleviation households with rich financial capital must use agricultural operations as the leading livelihood strategy. Human capital and social capital only have a positive impact on the dominance of migrant labor, indicating that the poverty alleviation households with richer human capital and social capital are more willing to choose migrant labor as the dominant livelihood strategy, which is consistent with the conclusions of many scholars. Therefore, in order to guide the poverty alleviation

households to achieve sustainable livelihood through labor, it is necessary to improve their human capital and social capital. Physical capital and natural capital only have a positive impact on the dominance of transfer payments, indicating that the poverty alleviation households with abundant physical capital and natural capital are more willing to take transfer payments as their main livelihood strategy. The poverty alleviation households whose livelihood strategy is based on transfer payments are all elderly households who have lost their labor force. They cannot engage in other labor, so they can only rely on government subsidies to make a living. Most of the children of these elderly households are migrant workers all year round. Therefore, the physical capital of the family and the Natural capital is taken care of by the elderly, so these poverty alleviation households are rich in material capital and natural capital, but they do not have the ability to work and can only make a living with government subsidies.

In terms of the impact of livelihood capital on diversified livelihood strategies, financial capital, human capital and social capital have a positive impact on diversified livelihood strategies, indicating that the more financial capital, human capital and social capital of poverty alleviation households, the richer their livelihood strategies. In addition, from the perspective of the influence coefficient, human capital and social capital are important capitals that affect the diversity of livelihood strategies of poverty alleviation households. The poverty alleviation households rich in financial capital will have more funds to carry out livelihood activities other than agricultural operations, which will enrich the income structure of the family. Abundant human capital and social capital can obviously help poverty alleviation households to implement off-farm livelihood strategies, and implementing off-farm livelihood strategies is also an important way for poverty alleviation households to achieve diversified livelihood strategies. Diversity plays an important role. The comprehensive influence of financial capital, human capital and social capital shows that the richer the livelihood capital of the poverty alleviation households, the more diversified their choice of livelihood strategies.

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