

Empirical Study on the Family Livelihood Vulnerability of Employees at the State-owned Forest Area in China’s Northeast Region

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Abstract - The authors, based on the documents of livelihood vulnerability from China and other countries, take the employee's family as the research unit and conduct this study on the cause of background and livelihood capital of the Family Livelihood Vulnerability of Employee at the State-owned Forest Area in China’s Northeast Region (FLVESFACNR) by means of applying the Sustainable Livelihood Analysis (SLA) of UK’s Department for International Development (DFID) and the sample data tracked and monitored by surveying the Employee at the State-owned Forest Area in China’s Northeast Region. Therefore, the strategic selection and implementation of, as well as the result out of the employee's family livelihood have been proposed for the local community or government to formulate supportive policies and measures.

Keywords - SLA Analysis Framework; Employee Families; Livelihood Vulnerability; Empirical Study

I. FOREWORD

Since the 1980s and 1990s, both the Chinese government and other governments in the world have recognized that reducing the vulnerabilities and strengthen the social resilience are effective ways to promote the progress of human society as well as the sustainable development of economy while developing economy and trade. The 18th National Congress of the Communist Party of China (CPC) had incorporated the household’s family livelihood into the overall layout of China's national economic development. Thus, to accelerate the reduction of the livelihood vulnerability of employee at forest area has been an eternal topical subject of social progress and academic study.

World Bank has studied the theories related to livelihood vulnerability in the sociological field since 1986. Reardon Vosti (1995) believes that the livelihood vulnerability is the probability of household’s family assets loss in a certain period in the future or of reducing to a level below the baseline which is defined at present. Formulated by UK's DFID in 2000, the SLA framework, or the analysis framework of "Livelihood Vulnerability", has been accepted and applied by many organizations and scholars from China and other countries.

Searching by typing the "households family livelihood" and "vulnerability" on China National Knowledge Internet (CNKI), one can find out there are more than 100

Papers or documents in this regard. Tan Xuewen et al. summarized the 3 major factors of formation of livelihood vulnerability (market imperfection, economic globalization and the impact of economic crisis) and its corresponding interventions. However, there is no formal study on the household’s family livelihood vulnerability of employee at the state-owned forest area. In China, the attention and study on FLVESFACNR are still in incubation.

II. SLA FRAMEWORK THEORY

A Model Theory

SLA framework was formulated by UK's DFID in 2000, and the core objective of this theory is the sustainability of matters' development and improvement. Comparing with other study methods of households family livelihood, SLA framework is more normalized and systemized and accepted by many domestic and international scholars.

The framework objectivizes and systemizes the theories of vulnerability of Sen et al., and forms a full set of individual, more operational and sharable methodology to direct and formulate livelihood strategies' conditional restriction on individual family. The creative points lie in its offering of a relative key items list for the study on livelihood vulnerability and generalization of mutual connections, in reminding of putting attention to influence and process, and in emphasizing on the influential factors of interplays on households family livelihood. Fig.1 indicates the SLA framework, and the center of this Fig. indicates there is no (or has zero) value, while the external periphery means the maximum value.

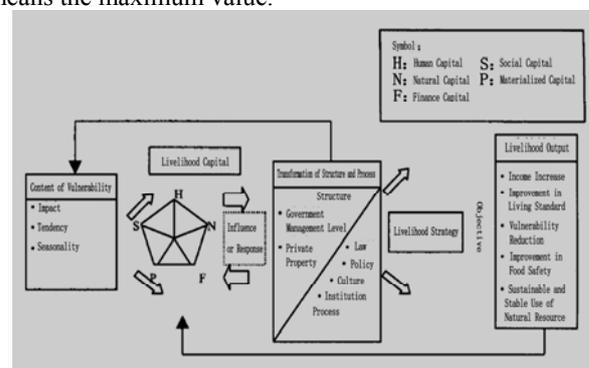


Fig.1 SLA Framework

B Data and Methodology

1) *Data Source and Samples*

The data of this study comes from the fixed follow-up survey samples of stated-owned forest area in Inner Mongolia in China's northeast region. During the period from July 21 to August 11, 2016, the author participated in “the 2016 Program for the Monitoring, Investigation and Research of Key State-owned Forest Area”, a project sponsored by China’s State Forestry Administration, and selected 770 households in a single forest area that being consecutively tracked and surveyed in 2014 and 2015 for data collection. The recovery rate of this door-to-door questionnaire was 100% including 768 effectives with the acceptability of 99.74%.

TABLE 2-1 DEFINITION OF SAMPLE INDICATORS

Type of Assets	Measurement Index	Weight	Indicators Formula
Human Capital	Labor Capacity (H1)	0.5	H1*0.5+H2*0.25+H3*0.25
	Adult Male Labor Force (H2)	0.25	
	Adult Male Labor Force Education (H3)	0.25	
Natural Capital	Acreage Per Capita (N1)	0.5	N1*0.5+N2*0.3+N3*0.1+N4*0.1
	Land Quality (N2)	0.3	
	Cultivation Industry (N3)	0.1	
	Under-forest Collection Industry (N4)	0.1	
Financial Capital	Total Expenditure (F1)	0.3	F1*0.3+F2*0.3+F3*0.2+F4*0.2
	Deposit (F2)	0.3	
	Loan (F3)	0.2	
	Other Liabilities (F4)	0.2	
Social Capital	Relative Resource (S1)	0.2	S1*0.2+S2*0.2+S3*0.25+S4*0.25+S5*0.1
	Cooperatives (S2)	0.2	
	Pension Insurance (S3)	0.25	
	Medical Insurance (S4)	0.25	
	Technical Assistance Frequency (S5)	0.1	
Material Capital	Housing (P1)	0.6	P1*0.6+P2*0.4
	Family Fixed Assets (P2)	0.4	

2) *Methodology*

Methodology used in this essay is mainly questionnaire survey, theoretical approach, measurement model, empirical analysis and normative analysis. The author, by means of using the data systemized and processed from questionnaires, applying the measurement of vulnerability FGT(1984 and the SLA framework theory of UK’s DFID, established the vulnerability-based FLVESFACNR model, conducted in-depth and essential analysis on the influential factors of the risks of family livelihood vulnerability of the employee at the state-owned forest area, and hereunder, proposed suggestions on and explorations into intervention policies and measures.

III. EMPIRICAL ANALYSIS

A Descriptive Analysis

Featured by human-oriented and family-based research, SLA framework, with the core part of livelihood capital, is composed of 5 parts, namely, natural, finance, materials, manpower and social capitals. All of these capitals are mutual transformable in different circumstance.

TABLE 3-1 STATISTICS OF FAMILY LIVELIHOOD CAPITALS IN 2015

Affiliated Unit	Area	Human Capital	Natural Capital	Finance Capital	Social Capital	Materials Capital	Total
Heilongjiang Logging Industry System	Mutankiang	0.3963	0.0856	0.6301	0.5322	0.4892	2.1334
	Suiling	0.3321	0.0842	0.4991	0.4598	0.5156	1.8908
	Qinghe	0.4646	0.0924	0.5891	0.4794	0.4824	2.1079
	Youhao	0.4002	0.064	0.6134	0.5002	0.4211	1.9989
Greater Khingan Forestry Management Bureau	Wuma River	0.4243	0.0433	0.6306	0.5216	0.5458	2.1656
	Ta River	0.412	0	0.6511	0.529	0.3998	1.9919
	Shiba Station	0.4453	0.023	0.6	0.6175	0.5185	2.2043
	Urqi Khan	0.3749	0.0285	0.6033	0.5249	0.3541	1.8857
Jilin Logging Industry System	Ituri River	0.4428	0.033	0.5692	0.5479	0.3915	1.9844
	Keyi River	0.4332	0.0135	0.6164	0.5068	0.3134	1.8833
Wangou	Wangou	0.4555	0.0257	0.652	0.5358	0.5458	2.2148
	Quanyang	0.475	0.086	0.6121	0.5631	0.5724	2.3086
	Sanchazi	0.3887	0.0069	0.6384	0.5168	0.4905	2.0413

TABLE 3-2 COMPOSITION OF EMPLOYEE'S FAMILY INCOME

Area	Forestry Bureau Income	Temporary Working	Farming	Under-forest Operation	Subsidiary Business	Pension	Government Subsidy	Others	Total Income
Mutankiang	24069.08	3396.72	1214.52	11953.85	655.74	7329.70	47.54	167.35	48834.50
Suiling	9542.97	7536.67	8725.83	333.33	3281.67	11593.07	1162.67	726.67	42902.87
Qinghe	17056.56	3755.74	2885.25	8443.70	16262.30	1749.18	550.16	0.00	50702.89
Youhao	17315.16	7829.35	3550.81	1080.65	925.81	2998.06	654.29	83.87	34438.00
Wuma River	32146.21	3531.03	784.48	1905.17	1088.36	3482.07	188.62	0.00	43125.95
Ta River	31452.65	2142.86	0.00	0.00	2248.98	1251.43	307.35	0.00	37403.27
Shiba Station	34988.33	4860.00	0.00	181.67	1603.67	2403.33	557.50	262.00	44856.50
Urqi Khan	20872.54	4089.83	0.00	1162.71	1610.17	2003.39	1307.05	0.00	31045.69
Ituri River	21387.07	4930.00	0.00	660.00	6.67	1386.67	53.33	0.00	28423.7
Keyi River	22484.48	3936.67	0.00	975.33	16.67	3902.00	171.00	0.00	31486.15
Wangou	41808.30	10607.88	0.00	1000.00	1431.00	6124.33	1436.50	91.67	62499.68
Quanyang	21340.34	9884.75	525.42	3757.29	2042.37	2884.75	819.40	0.00	41254.32
Sanchazi	25417.29	11742.37	0.00	218.64	5617.34	10207.41	1610.00	169.49	54982.54

Table 3-2 shows, as for forest area residents, wage and salary is the ultimate and absolute income among all other earnings. The under-forest operation, resourceful as it is, however, reaps relatively lower income, which indicates the local residents fail to develop under-forest economy by fully utilizing the natural resources. In comparison, out-migration workers earn more than that of under-forest operators. According to the survey, out-migration workers are adult male labor forces who paid out manpower and

time while earned not high with RMB 10, 000 per capita.

B Build the Livelihood Vulnerability Model

1) *About the Model*

Regression analysis is a statistical analysis technique of studying the linearity or nonlinearity relations between one or many independent variable and one dependent variable, which specifies the casual relationship of independent variable and dependent variable, builds the regression model and estimates the model parameters based on the field research data, and then revalue the degree of fitting of the regression model on the field research data to conduct the further prediction. As the most frequent and the most basic analytical method, regression analysis is the best fit statistical analysis technique for this study. The mathematical model formula of regression analysis is as follows,

$$y = \alpha + \beta_1x_1 + \beta_2x_2 + \dots + \beta_nx_n + \varepsilon \quad (3-1)$$

y is the Explained Variable, $\alpha = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_n \end{bmatrix}$

is the Model Intercept; $\beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_n \end{bmatrix}$

is the Predictive Parameters, $x = \begin{bmatrix} x_1 \\ x_2 \\ x_n \end{bmatrix}$

is the Explaining Variable. $\varepsilon = \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_n \end{bmatrix}$

is the Error Term. The analytical methods include the forward variable selection, the backward variable selection and the stepwise regression.

2) *Positivism Model*

Measurement method of the household's family livelihood vulnerability under the SLA framework:

$$V_{it} = \int_0^{\ln Z} f(\ln Y_{i,t+1}) d \ln Y_{i,t+1} \quad (3-2)$$

In the above formula, Y is benefit level(consumption or earning), i, t refer to family and time respectively, z stands for poverty line, f(Y_{i,t+1})signifies the probability density distribution function of the future welfare. It is clear that V_{it} is the probability of family benefit level under z at

the time of t+1. It can be calculated by the following variant formula:

$$(3-3)$$

lnZ is the lo $V_{it} = \int_0^{\ln Z} f(\ln Y_{i,t+1}) d \ln Y_{i,t+1}$ garithm of poverty line.

The square of R is the coefficient of determination, which is used to verify the goodness of fit of linear model. When the square of R is 1, it means all of the points into the line, when the square of R is 0, it signifies there is no linear dependence among variables. The error independence refers to verify an error independence through applying "Durbin-Waston" statistics D. The more close to 2 for D, the higher of independence will be. Generally, the range of D from 1.5-2.5 is acceptable.

TABLE 3-3 PER CAPITA INCOME IN 2015 BY AREA

Area	per Capita Income	Logarithm of Per Capita Income
Mutankiang	13270.9	9.493328947
Suiling	17247.68	9.755432921
Qinghe	14322.24	9.569568853
Youhao	11228.51	9.326211359
Wuma River	16038.81	9.682766689
Ta River	9547.8	9.16406604
Shiba Station	15422.77	9.643600268
Urqi Khan	11089.77	9.313778341
Ituri River	11315.18	9.333900466
Keyi River	7786.93	8.960201966
Wangou	13643.86	9.521044883
Quanyang	14905.84	9.609508361
Sanchazi	18360.43	9.817953084

SIG<0.05 indicates a better goodness of fit.

Income predicted value

$$Y=8.455+F_2*2.668+N_2*1.641+L_1*1.335+H_3*0.457+S_1*0.422$$

SIG<0.05 indicates the hypothesis of no 0 coefficient of independent variable.

TABLE 3-4 PREDICTIONS OF FUTURE VULNERABILITY BY AREA

Area	Vulnerability
Mutankiang	0.252758
Suiling	0.129367
Qinghe	0.169068
Youhao	0.50705
Wuma River	0.001348
Ta River	0.579068
Shiba Station	0.100279
Urqi Khan	0.588598
Ituri River	0.364136
Keyi River	0.797443
Wangou	0.000226
Quanyang	0.280362
Sanchazi	0.000127

A systematic cluster analysis of the results of the door-to-door survey on FLVESFACNR in 13 areas in 3 provinces of China's northeast region shows that employee's family livelihood vulnerability in areas numbering 4,6,8 and 10, namely, Youhao, Ta River, Urqi Khan and Keyi River are higher than that of other areas numbering 1,2,3,5,7,9,11 and 12 as the later areas are relatively low.

Area	Vulnerability	CLU2_2
1	.2528	1
2	.1294	1
3	.1691	1
4	.5071	2
5	.0013	1
6	.5791	2
7	.1003	1
8	.5886	2
9	.3641	1
10	.7974	2
11	.0002	1
12	.2804	1
13	.0001	1

Fig.3-1 Cluster Analysis Graphics

Results of vulnerability study show that the cause for the formation of higher vulnerability in some areas is their serious lack of natural capital, social capital and finance capital. Moreover, restricted by the geographic location, regional autonomy policy and the ethnic culture, the economic development of forest areas is relatively slow, and employees there are stuck by their backward ideas of production and livelihood. As a result, the old concepts are getting more solidified while the new ones could not getting in as concepts and ideas of "a bit of wealth is perfect and lack of wealth not imperfect" are suffusing with the whole forest areas. Areas with relatively low vulnerability are due to the restructuring of stated-owned forest enterprises and employees enjoy a relative advanced ideas and culture for their quick acceptance and utilization of new technologies and model of production. In addition, the natural condition endows the area with warmth and little disaster. Thus, employees in this forest area have relative abundant natural endowment in terms of their family livelihood capital.

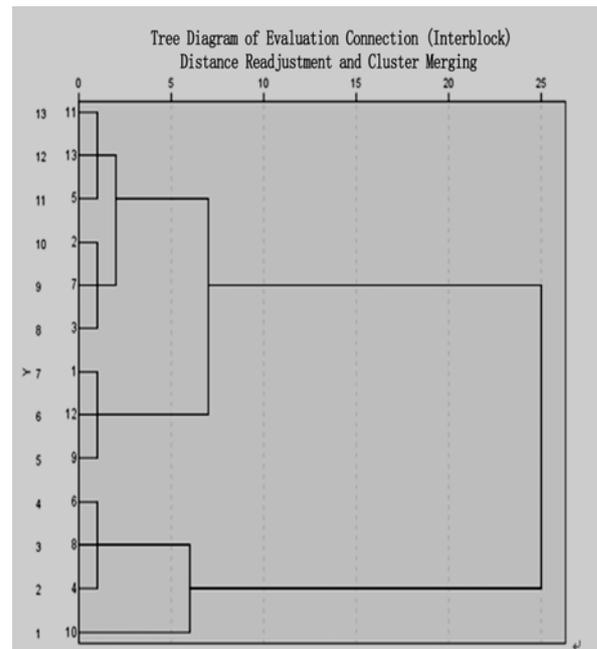


Fig.3-2 Cluster Tree Diagram

IV. CONCLUSION

A Areas with vulnerability of higher than 0.5 in the state-owned forest areas in China's northeast region are Keyi River, Urqi Khan, Ta River and Youhao.

B Livelihood capital theory and the empirical study results of the state-owned forest areas in China's northeast region indicates an insolation between the two as areas in lower livelihood capital with higher vulnerability of more than 0.3, and vice versa. Specifically, Quanyang Forestry Bureau has the highest livelihood capital, whose vulnerability, however, is 0.28.

C Comparing the degree of the family livelihood vulnerability of employee at the state-owned forest area in the 3 province, Inner Mongolia has the highest vulnerability, while Jilin the lowest. Therefore, the government should, act according to circumstances, strengthen the building of public functions and service system to drive the effective establishment of the multiple local residents family livelihood modal, and to promote the economic development in line with the local characteristics. It is also suggested that the governments of other two provinces should learn from the practices and policies of Jilin province that enjoy lower vulnerability to improve the high vulnerable livelihood of residents in Inner Mongolia.

D It is necessary to establish the analytical system and monitoring indicator system for the family livelihood vulnerability of employee at the state-owned forest area to correctly measure and predict the future vulnerable tendency of the family livelihood of employee at the state-owned forest area so that the government and its functional departments could be provided with proper livelihood intervention and security policies for employees at the state-owned forest area for the purpose of lowering the FLVESFACNR as much as possible and improving the

people's livelihood for the employees at the state-owned forest area in the transitional period of China's forestry economy.

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