Measurement and Analysis on Influence of Land Expropriation on Peasants' Welfare*

Based on Investigations on Shenyang Suburbs

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Abstract—**This paper researches the effect and function of welfare because of government's land expropriation from the perspective of land-lost peasants' welfare. Based on the investigations on land-lost peasants and Amartya Sen's capability theory of building land-lost peasants' welfare indicator system, this paper measures welfare condition of land-lost peasants from the following five functional activities: economic status, social security, living conditions, social environment and natural environment, thus obtains measurement outcomes of welfare changes.**

Keywords—land expropriation; land-lost peasants; welfare

I. INTRODUCTION

In the process of China's urbanization and industrialization, a large part of urban housing construction land, public infrastructure construction land, industrial production plant land and so on come from rural land expropriation. Expropriation of plenty of land on which peasants survive will have great influence on land-lost peasants' life, economy and welfare in various aspects. Therefore, it is an important task in construction of socialism and harmonious society to truly consider land-lost peasants' benefit and provide appropriate placement for them in production and in life. This paper applies Amartya Sen's capability theory on building a welfare level evaluation system for land-lost peasants and measures and evaluates welfare condition before and after peasants lost their land according to field research data.

II. THEORETICAL ANALYSIS ON LAND-LOST PEASANTS' WELFARE STRUCTURE

A. Sen's Capability Theory

The concept of "capability" is proposed by Amartya Sen, an economist. In his point of view, "capability" refers to "the combination of various kinds of functional activities which can be realized by a man", and an individual's welfare level depends on the person's capability. Since capability can't be observed directly, measure of welfare is generally conducted on the basis of evaluating functional activities. Sen investigates five kinds of instrumental freedom: political freedom, economic conditions, social opportunities, transparency insurance and protective insurance. However, he just puts forward a kind of thinking or method for welfare measure. As to what specific functional activities should be considered in welfare measure and weight of different functional activities in overall welfare, he provides no conformance requirements and leaves them to researchers to decide. Seeing from current research results, many scholars conduct analyses on welfare condition according to Sen's capability theory. But there is no conformance among various scholars' research perspectives and choosing of welfare indicator.

B. Composition of Land-Lost Peasants' Welfare

This paper takes land-lost peasants experiencing integral moving resettlement after government's expropriation as research objects. According to Sen's capability theory, this paper uses economic condition to display the functional activity of economic conditions, uses social security to display transparency insurance in welfare measure, and uses living conditions, social environment and natural environment to display protective insurance in welfare measure. In the end, this paper chooses five indicators, namely economic status, social insurance, living conditions, social environment and natural environment, to evaluate functional activities of land-lost peasants' welfare and discuss the influence of land loss on peasants' welfare.

1) *Economic status:* Due to government's land expropriation, land-lost peasants' income decreases and their living cost obviously increases. This paper chooses two groups of indicators to measure: One group directly measures changes in land-lost peasants' economic status, namely influence on their family's economic status (X_{11}); the other group is land-lost peasants' subjective feeling about their economic status, namely their feeling about occupational stability(X_{12}). Virtual qualitative variables are used here.

2) *Social security*: After land expropriation, land's appendant security functions disappear. This paper measures

whether to set up peasants' old-age insurance(X_{21}) and medical insurance(X_{22}). Virtual dichotomous variables are used here.

3) Living conditions: The quality of housing also has important and long influence on occupants' health. This paper chooses living conditions(X_{31}) as the indicator to measure living conditions. Virtual qualitative variables are used here.

4) Social environment: Due to changes in living environment, peasants' surrounding social environment changes correspondingly. This paper chooses transportation conditions(X_{41}), communication conditions(X_{42}) and medical conditions(X_{43}) as indicators to measure social environment. Virtual qualitative variables are used here.

5) Natural environment: After non-agriculturalization, agricultural land gets transformed into roads, factories, residential districts and so on, losing its original ecological value and possibly producing a series of problems which influence peasants' life, like louder noise, deterioration of air quality, increase of solid waste, deterioration of afforestation and so on. This paper chooses environmental tranquility(X_{51}), air quality(X_{52}), water quality(X_{53}) and surrounding landscape(X_{54}) as indicators to measure functions of natural environment. Virtual qualitative variables are used here.

III. WELFARE EFFECT MEASURE METHOD

Since most evaluations on welfare are subjective well-being, most of the indicators chosen in measure of land-lost peasants' welfare change process are subjective evaluation indicators. Due to ambiguity of evaluation, fuzzy evaluation method is adopted in welfare effect test.

A. Welfare Ambiguity Function

We arrange X as the fuzzy set of peasants' welfare condition and W as the possibly changed part of welfare content before and after government's expropriation. W is a subset of X . Then the n th peasant's welfare function can be expressed as:

$$W^{(n)} = \{x, \mu(x)\}$$

（Formula 1）

In Formula 1, $\mu(x)$ is degree of membership of x to W and its value is between 0 and 1 and $x \in X$. The general idea is that the larger the degree of membership is, the better peasants' welfare is. Namely, when the degree of membership is 1, peasants' welfare status is the best; when it is 0, welfare status is the worst; when it is 0.5, welfare status is fuzzy, neither too bad nor too good.

B. Welfare Membership Function

Variables include virtual dichotomous variables, virtual qualitative variables and consecutive variables, three types in total. Different types of variables have different membership functions. This paper only involves two types: virtual dichotomous variables and virtual qualitative variables. Membership function of virtual dichotomous variables is:

$$\mu(x_{ij}) = \begin{cases} 0.5 & x_{ij} = 0 \\ 1 & x_{ij} = 1 \end{cases}$$

（Formula 2）

For example, as to variable X_{21} (whether to set up peasants' old-age insurance), if peasants have old-age insurance, x_{ij} will be 1 and this indicator's degree of membership $\mu_W(x)$ to the i th functional subset will be 1; if peasants have no old-age insurance, x_{ij} will be 0. When this indicator's degree of membership $\mu(x)$ to the i th functional subset is 0.5, there is no change before and after land expropriation.

Virtual qualitative variable can only be described through language. Suppose there are m kinds of status in a research, generally isometric assignment will be conducted to these m kinds of status, namely $x_{ij} = \{x_{ij}^{(1)}, \cdots, x_{ij}^{m}\}$. The larger the value is, the better the welfare status is. Membership function of virtual qualitative variable is:

$$\mu(x_{ij}) = \begin{cases} 0 & 0 \le x_{ij} \le x_{ij}^{\min} \\ \dfrac{x_{ij} - x_{ij}^{\min}}{x_{ij}^{\max} - x_{ij}^{\min}} & x_{ij}^{\min} < x_{ij} < x_{ij}^{\max} \\ 1 & x_{ij} \ge x_{ij}^{\max} \end{cases}$$

（Formula 3）

In Formula 3, $x_{ij}^{\min}$ and $x_{ij}^{\max}$ respectively refer to lower limit and upper limit of x_{ij} . When x_{ij} is lower than the lower limit, the status is the worst. When x_{ij} is higher then the upper limit, the status is the best. The bigger the value of $\mu(x_{ij})$ is, the better welfare status is.

C. Determination of Membership Function Indicator Weight

After obtaining primary indicator membership degree, we need to give every indicator a weight and gather degree of membership to make an aggregative indicator. This paper plans to take Formula 4 as weight function:

$$\omega_{ij} = \mu(x_{ij})^{-0.5}$$

（Formula 4）

We choose membership function to calculate degree of membership according to nature of indicator. In the end, according to weight function, we get the overall welfare function of land-lost peasants as follows:

$$W = \frac{\sum_{i=1}^{I}[\mu(x_{ij})\omega_{ij}]}{\sum_{i=1}^{I}\omega_{ij}}$$

（Formula 5）

In the above Formula 2 to 5, i, j and I respectively represent functional set, primary indicator and the number of functional activities to measure welfare.

D. Date Processing

Virtual dichotomous variable has two values. For example, if the government pays pension insurance(X_{21}) for land-lost peasants, degree of membership will be 1; if the government doesn't pay for them, degree of membership will be 0.5, indicating that there is no change before and after land expropriation. Indicators with the same variable assignment include "whether to set up medical insurance(X_{22})".

Generally, assignment of virtual qualitative variable is conducted based on several situations, including influence(X_{11}) of land expropriation on family's economic status, working stability(X_{12}), living conditions(X_{31}), transportation conditions(X_{41}), communication conditions(X_{42}), medical conditions(X_{43}), environmental tranquility(X_{51}), air quality(X_{52}), water quality(X_{53}), surrounding landscape(X_{54}). Based on questionnaire options of "greatly improved, partly improved, no influence, ordinary damage and serious damage", the assignment successively is 5, 4, 3, 2 and 1. The assignment for no influence is 3(degree of membership is 0.5), the assignment for greatly improved is 5(degree of membership is 1), and the assignment for serious damage is 1 with degree of membership as 0.0001(Here 0.0001 is used to replace 0 for the sake of convenient calculation), namely neither too good nor too bad status.

IV. EMPIRICAL ANALYSIS

A. Data Source

Data in this paper comes from home-entry researches on land-lost peasants from three large villages, namely Daqing Village, Xiaozhu Village and Xiaoqing Village, in Tiexi New District of Shenyang City in April 2016. During the research process, 70 questionnaires are issued, among which there are 60 effective questionnaires. Sample effective rate is 85.71%. Sample characteristics are as follows in "Table I".

TABLE I. SAMPLE CHARACTERISTICS ANALYSIS

Basic information	Grouping	Number of people	Percentage(%)
Age structure	Less than 29	7	11.67
	Between 30 and 39	7	11.67
	Between 40 and 49	10	16.67
	Between 50 and 59	14	23.33
	Between 60 and 69	9	15.00
	70 and more than 70	13	21.67
Gender	Male	40	66.67
	Female	20	33.33

B. Measure Results of Welfare Changes

According to assignment rule of variables and calculation method of membership degree and welfare change percentage, we measure and calculate results concerning welfare changes of land-lost peasants. "Table II" displays each functional indicator's weight, membership degree and change percentage.

TABLE II. EVALUATION RESULT AND CHANGE PERCENTAGE OF EACH FUNCTIONAL INDICATOR

Functional activity and indicator	Variable type	Degree of membership	Weight	Change percentage (%)
1.Economic status X1	-	0.4716	1.4562	-5.69
1.1 Influence on family's economic status X_{11}	Q	0.6792	1.2134	35.84
1.2 Working stability X_{12}	Q	0.3274	1.7477	-34.52
2. Social security X_2	-	0.9583	1.0215	91.66
2.1 Whether to set up pension insurance X_{21}	D	0.9583	1.0215	91.66
2.2 Whether to set up medical insurance X_{22}	D	0.9583	1.0215	91.66
3. Living conditions X_3	-	0.8042	1.1151	60.84
Living conditions X_{31}	Q	0.8042	1.1151	60.84
4. Social environment X_4	-	0.6555	1.2351	31.10
4.1 Transportation conditions X_{41}	Q	0.8458	1.0873	69.16
4.2 Transportation conditions X_{42}	Q	0.5917	1.3000	18.34
4.3 Medical conditions X_{43}	Q	0.5625	1.3333	12.50
5. Natural environment X_5	-	0.2253	2.1070	-54.95
5.1 Environmental tranquility X_{51}	Q	0.2542	1.9834	-49.16
5.2 Air quality X_{52}	Q	0.1209	2.8760	-75.82
5.3 Water quality X_{53}	Q	0.2500	2.0000	-50.00
5.4 Surrounding landscape X_{54}	Q	0.3375	1.7213	-32.50
Final fuzzy value of welfare	-	0.4918	-	-1.64

[a.] Note: In variable type, D represents virtual dichotomous variable and Q represents virtual qualitative variable.

V. CONCLUSION

Government's land expropriation drops the welfare level of land-lost peasants down to some degree. However, the decline is not obvious. Overall welfare level drops 0.79%. Based on analysis on relevant reasons, we find that although land-lost peasants' welfare level of three functional activities goes up to varying degrees, namely social security, living conditions and social environment, welfare level of these two functional activities: economic status and natural environment goes down to varying degrees. Among them, welfare level of natural environment drops greatly.

A. Economic Status

On the whole, government's land expropriation makes land-lost peasants' economic status worse. After land loss, this indicator's degree of membership is 0.4716, falling by 5.69%. Although government's land expropriation improves family's economic status (Degree of membership is 0.6792, rising by 35.84%), it damages working stability (Degree of membership is 0.3274, falling by 34.52%).

1) Social security: After land loss, welfare level of land-lost peasants' social security (as one kind of functional activity) gets improved greatly (Degree of membership is 0.9583, rising by 91.66%), indicating that peasants get pension insurance and medical insurance after land loss, their welfare level of social security gets improved greatly and their sense of security for the future gets enhanced.

2) Living conditions: Government's land expropriation improves land-lost peasants' living conditions to some degree. Its degree of membership is 0.8042, rising by 60.84%. Land-lost peasants move to neighborhoods under unified placement of government. There are unified heating facilities and tap water facilities in the neighborhood, making peasants' daily life convenient.

3) Social environment: Government's land expropriation improves land-lost peasants' social environment of life to some degree. Surrounding transportation becomes more convenient. Membership degree of this functional activity's indicator is 0.8458, rising by 69.16%. Improvement of communication conditions is not obvious. Its membership degree is 0.5917, rising by 18.34%. Medical conditions also get improved, whose membership degree is 0.5625, rising by 12.50%. On the whole, welfare level of social environment gets enhanced to some extent.

4) Natural environment: Welfare level of natural environment slides obviously. Government's land expropriation is a kind of damage to natural environment. Seeing from statistical result, air quality is influenced mostly with a membership degree of 0.1209, dropping by 75.82%. Environmental tranquility and water quality are relatively influenced with membership degree as 0.2542 and 0.2500 respectively, dropping by 49.16% and 50%. Next, it is surrounding landscape, whose membership degree is 0.3375, dropping by 32.5%. The reason is that expropriated land is built into factories, leading to water pollution, increase of air dust, deterioration in air quality and loud noise.

B. Suggestions on Countermeasures to Improve Land-lost Peasants' Welfare Level

1) Strengthen education and training and improve land-lost peasants' quality level: In order to improve land-lost peasants' re-employment, we should strengthen land-lost peasants' education and training and improve their quality level. At the same time, we can also actively encourage land-lost peasants to start entrepreneurship and support them to improve re-employment of land-lost peasants and improve their living standard.

2) Enhance harmonious development of economy and natural environment in land expropriation area: In land expropriation process, we should pay much attention to harmonious development of economy and natural environment in land expropriation area. While promoting rapid development of regional economy, we should ensure mutual coordination between rural economy and environmental protection at the same time, in order to promote stable and sustainable development of economy and environment in the area.

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