

# Research on How Public Facilities' Integrity Effects Farmers' Intention of Living in Centralized Communities

—Based on a Study of Six Counties in Shaanxi Province of China

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**Abstract**— The lack of public facilities constrained farmers to new communities to live together, the construction of public facilities has been producing a significant influence of farmers' intention of living in centralized communities. In this article, based on date of 1800 questionnaires, we use gray relational analysis to reveal influence of the construction of public facilities on the intention of farmer centralized residence. Finally, we will draw conclusions about the planning and public finance investment of infrastructure in advance, and so on.

**Keywords**- rural communities; infrastructure; gray correlation model

## I. INTRODUCTION

To put it simply, farmer centralized residence means to collect farmer scattered in villages to building areas or center village to live<sup>[1]</sup>. Farmer centralized residence is the inevitable trend to achieve industrialization, information technology, agricultural modernization and urbanization. Timely and reasonable manner to promote farmer centralized residence can help to ease the conflict of land supply and demand, change the long-standing existence of various points and wide range of rural housing and other conditions and save a lot of land to be used for arable land or construction. Moreover, it can pull the rural economy, directly expand demand for investment on the rural public facilities and demand for housing consuming and drive iron and steel, cement, electricity, transportation and other industries, thus stimulating rural economic growth. In addition, it can save investment, reduce investment on the transformation of rural roads, water supply, electricity,

the Government to strengthen the construction of rural public facilities and the force that must be united to achieve the Chinese dream. Chinese dream is actually the people's dream which must be achieved by closely relying on the people. Therefore, in the process of strengthening rural public facilities construction, we must focus on farmer' intention to live together to provide a reasonable basis for the development of relevant policies for the government.

Scholars abroad have studied on personal intention for a long time. In the framework of neoclassical economic theory, John Stuart Mill and Francis Ysidro Edgeworth assumed that people's preferences are a subjective thing. Vilfredo Pareto first doubted the measurability of effectiveness. Eugen Slutsky first deducted demand theory without measurable effectiveness. Gerard Debreu completed derivation of standard consumer theory and the concept of utility he used depends only on preference relations<sup>[2]</sup>.

Public economics theory considers that to provide the appropriate number of public facilities is not something the government can easily do and the optimal number of public facilities depends on people's preferences in the society<sup>[3]</sup>. Paul Anthony Samuelson considers that the optimal number of public goods is the number provided when the marginal interest rate of substitution and the marginal rate of substitution are equal<sup>[4]</sup>. Edward H. Clarke<sup>[5]</sup> and Martin Loeb<sup>[6]</sup> describe a mechanism to solve the government problem. That is, use the real situation of the report of everyone in the economy about his preference to the government's public facilities to determine the optimal number of public facilities. Leif Johansen deems that there is no clear evidence to prove the number of public facilities provided has a relationship with the optimal number<sup>[7]</sup>.

Chinese scholars make analysis on the intention of farmer centralized residence and its influencing factors from the farmer's individual characteristics, the basic situation of the family, the existing living environment, government policy and other aspects. According to survey data of farmer in

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communication facilities and other fixed assets. Farmer are the participation subjects of centralized residence, serving object of

Tianjin, Wu Yun-Qing uses Logistic regression model to make the empirical analysis on the intention of farmer centralized residence and its influencing factors and considers that the farmer's living size, age, native land knot, present living environment and public facilities construction has a significant negative correlation with intention of farmer centralized residence<sup>[8]</sup>. Li Peng groups various factors to affect farmer's intention to live together into 25 areas, uses Logistic regression model for the analysis of the results and considers that the transportation, medical care, etc. have a significant impact on farmer centralized residence<sup>[9]</sup>. Zhang Jin-Ming considers that with efforts to increase policy support, the intention of farmer to live together will be greater<sup>[10]</sup>. Yu Jian-Hua considers that to promote farmer centralized residence, it should step up publicity efforts to actively seek the understanding and support of farmer and protect their building emotions<sup>[11]</sup>.

This domestic and international research provides us with a good inspiration, but the present research is still inadequate. In the process of promoting the farmer centralized residence, there's no specific research about how these public infrastructure including running water at the homes of farmer and near them, drainage and sewerage facilities, the hardening road near homes, transforming of telephone, Internet and circuit, being close to roads, schools, hospitals affect the intention of farmer living. In view of this, based on 1800 questionnaires in Hanbin District, Chenggu County, Ningqiang County, Bin County, Linyou County and Shiquan County in the Shaanxi Province, the author draws on existing research to establish gray relational model and makes empirical analysis of effects of public infrastructure on farmer centralized residence intention.

## II. SURVEY OF THE BASIC CONDITION

Form June to August in 2012, the task group conducted field research by going to the six counties (district) of Shaanxi Province to interview 1800 rural families and carry on questionnaires and obtained a wealth of first-hand materials and 1800 questionnaires, among which 1708 are valid questionnaires, accounting for 95%. According to the statistical processing of 1708 valid questionnaires, the basic situation of the survey areas is as follows:

### A. There's a malformed age distribution with high aging degree

Among 1708 survey objects in six counties (district), the persons aged below 30 are 99, accounting 5.8% of the total number. The number of persons aged from 31 to 40 years old is 327, accounting 19.1% of the total number. The number of persons aged from 41 to 50 is 475, accounting 27.8% of the total number. The number of persons aged from 51 to 60 years old is 421, accounting 24.6% of the total number. The number of people aged over 60 is 386 with the proportion in the total number up to 22.6%. The average age of 1708 survey objects is as high as 49.7 years old.

### B. There's an uneven distribution of ownership of public facilities and six counties (district) have many debts in public infrastructure investment

Among 1708 survey objects of rural households in six counties (district), 1133 residential households and their nearby places have running water (accounting for 66.3%); 414 residential households have drainage and sewerage facilities (accounting for 24.1%); 1069 households have hardening roads beside their houses (accounting for 62.6%); 1355 households have telephones (accounting for 79.3%); 308 households have the network (accounting for 18%); the circuit of 1163 households has been modified (accounting for 68.1%); 839 households are close to the roads (accounting for 49.1%); 193 households have shops, hospitals, nurseries and schools (accounting for 11.3%).

TABLE I. BASIC SITUATION OF PUBLIC FACILITIES UNIT: %

	Hanbin	Chenggu	Ningqiang	Bin	Linyou	Shiquan
tap water	54.73	64.43	75.88	95.56	70.59	39.01
drainage facilities	13.51	42.95	22.57	31.48	18.95	15.25
hardening roads	67.91	67.79	63.81	66.67	59.15	50.00
Telephone	77.70	81.88	87.55	64.81	86.93	76.24
Internet	7.43	20.81	12.06	25.19	27.45	14.54
circuit transformation	76.35	80.87	60.31	68.15	69.28	51.42
near roads	58.45	40.27	68.87	42.96	42.16	43.97
schools, hospitals, etc	26.69	22.48	2.72	7.04	1.63	5.67

Annotation: results are calculated by the questionnaires

As for public facilities construction of six counties (district), take whether rural villages or nearby places have shops, hospitals, nurseries, schools and other integrated public service facilities as an example; Hanbin and Chenggu have a relatively high proportion, respectively accounting for only 26.69% and 22.48%, while the other four counties are below 10%; Ningqiang and Linyou almost have no them, respectively accounting to only 2.72% and 1.63% (see Table 1), through which we can get a glimpse the history and reality that rural areas have debts in investment on public facilities.

### C. The intention of farmer to live together is generally high, but there's significantly different age group intention

Among 1708 questionnaires in six counties, persons willing to live in the buildings with modern public facilities and the same service organizations as the towns account for 84.3%. Persons not willing to live in the buildings account for 7.4%; persons who do not matter to live in it account for 8.4%; persons not willing to living together are totaled 15.7%. In

terms of the age composition of farmer who do not want to live together, persons below the age of 30 account for 5.6%; persons from 31 to 40 years old account for 13.5%; persons from 41 to 50 account for 26.2%; persons aged from 51 to 60 are 27.8%; persons under the age of 60 years old are above up to 27 %; persons aged 51 and above account for 54.8% of the total, showing that the older farmer are more content with the status quo of living; however, in terms that persons holding "indifferent" attitude account for 62.1% and the wait and see mentality of persons over 51 years old to live together is strong; if induction is applied to change their mentality, it can correct farmer' centralized residence expectation (see Table 2).

TABLE II. FARMER' AGE GROUP OF CENTRALIZED RESIDENCE INTENTION UNIT: %

	Willing	Unwilling	Whatever
Aged 30 and below	6.3	5.6	1.4
31 to 40 years old	20.1	13.4	14.1
41 to 50 years old	28.3	26.2	23.2
51 to 60 years of age	24.0	27.8	28.2
Above 60 years old	21.3	27.0	33.9
Total	100	100	100

Annotation: results are calculated by the questionnaires

### III. MODEL SELECTION AND EMPIRICAL ANALYSIS

#### A. The model selection

Gray system theory is a new discipline first proposed created by Professor Deng Ju-Long in the Huazhong University of Science and Technology in the 1980s. Mainly through the generated and developed known "partial" information, it extracts valuable information to realize correct description and effective monitoring of the system running behavior and evolution rules. The basic idea of association analysis of gray system theory is to determine whether its contact is tight based on similarity of geometric shape of sequence curve. The closer the curve, the greater degree of association between sequences; otherwise, the association degree is smaller<sup>[12]</sup>. Liu Si-Feng considers the gray relational model should be treated separately under specific circumstances<sup>[13]</sup>. Grey relational analysis method applies equally to the amount of samples and the rules of samples, which has small amount of calculation and is very convenient; there're no cases that the quantitative results will be against qualitative analysis, so in reality studies, gray correlation analysis has a very broad application.

#### B. The calculation steps of gray correlation degree

$$X'_i = X_i / x_i(1) = (x'_i(1), x'_i(2), \dots, x'_i(n)), i = 0, 1, 2, \dots, m \quad (1)$$

$$\Delta_i(k) = |x'_0(k) - x'_i(k)|, \Delta_i = (\Delta_i(1), \Delta_i(2), \dots, \Delta_i(n)), i = 1, 2, \dots, m \quad (2)$$

$$M = \max_i \max_k \Delta_i(k), m = \min_i \min_k \Delta_i(k) \quad (3)$$

$$\gamma_{0i}(k) = \frac{m + \xi M}{\Delta_i(k) + \xi M}, \xi \in (0, 1), k = 1, 2, \dots, n; i = 1, 2, \dots, m \quad (4)$$

$$\gamma_{0i} = \frac{1}{n} \sum_{k=1}^n \gamma_{0i}(k), i = 1, 2, \dots, m \quad (5)$$

#### C. Empirical analysis on effects of construction of public facilities on intention of farmer centralized residence

As for empirical analysis on effects of construction of public facilities on farmer centralized residence intention, according to 1708 valid questionnaires in six counties (district) in Shaanxi, we divide farmer living intention into two willing characteristic sequence systems of being unwilling Y1 and being willing Y2 and group the farmer' houses having running water, drainage and sewerage facilities, hardening roads, transformed telephone, Internet and circuit, being near to the highway, being near to schools, hospitals, nurseries and other public facilities into related factors act sequences of X1, X2, X3, X4, X5, X6, X7 and X8. As between construction of public facilities and the intention to live together, there's a significant negative correlation relationship<sup>[8]</sup>, in the case that the possession of public facilities affects farmer' unintention to live together, we adopt general Deng's gray relational analysis method. While in the case that the possession of public facilities affects farmer' intention to live together, we first make inverse operator processing for the relevant factors action sequence and then take Deng's gray relational analysis. Thus, the results obtained will be more accurate.

- Empirical analysis on effects of construction of public facilities on farmer don't want to live together

$$\begin{aligned} Y'_1 &= (1.0000 \ 2.5000 \ 0.9444 \ 0.2778 \ 1.1111 \ 1.1667) \\ X'_1 &= (1.0000 \ 3.0000 \ 2.1250 \ 0.1250 \ 1.8750 \ 2.2500) \\ X'_2 &= (1.0000 \ 7.0000 \ 2.0000 \ 0.3333 \ 0.3333 \ 3.3333) \\ X'_3 &= (1.0000 \ 2.1429 \ 0.7143 \ 0.1429 \ 0.5000 \ 1.2143) \\ X'_4 &= (1.0000 \ 3.2000 \ 0.9000 \ 0.3000 \ 1.6000 \ 1.6000) \\ X'_5 &= (1.0000 \ 3.5000 \ 0.5000 \ 0.0000 \ 3.0000 \ 0.5000) \\ X'_6 &= (1.0000 \ 2.1875 \ 0.7500 \ 0.0000 \ 1.2500 \ 0.7500) \\ X'_7 &= (1.0000 \ 1.2500 \ 0.2500 \ 0.0833 \ 1.0000 \ 1.5000) \\ X'_8 &= (1.0000 \ 1.5714 \ 0.0000 \ 0.0000 \ 0.1429 \ 0.1429) \end{aligned} \quad (1)$$

$$\begin{aligned} \Delta_{11} &= (0.0000 \ 0.5000 \ 1.1806 \ 0.1528 \ 0.7639 \ 1.0833) \\ \Delta_{12} &= (0.0000 \ 4.5000 \ 1.0556 \ 0.0556 \ 0.7778 \ 2.1667) \\ \Delta_{13} &= (0.0000 \ 0.3571 \ 0.2302 \ 0.1349 \ 0.6111 \ 0.0476) \\ \Delta_{14} &= (0.0000 \ 0.7000 \ 0.0444 \ 0.0222 \ 0.4889 \ 0.4333) \\ \Delta_{15} &= (0.0000 \ 1.0000 \ 0.4444 \ 0.2778 \ 1.8889 \ 0.6667) \\ \Delta_{16} &= (0.0000 \ 0.3125 \ 0.1944 \ 0.2778 \ 0.1389 \ 0.4167) \\ \Delta_{17} &= (0.0000 \ 1.2500 \ 0.6944 \ 0.1944 \ 0.1111 \ 0.3333) \\ \Delta_{18} &= (0.0000 \ 0.9286 \ 0.9444 \ 0.2778 \ 0.9683 \ 1.0238) \end{aligned} \quad (2)$$

$$\begin{aligned} M &= \max_i \max_k \Delta_i(k) = 4.50 \\ m &= \min_i \min_k \Delta_i(k) = 0 \end{aligned} \quad (3)$$

$$\gamma_{ii}(k) = \begin{pmatrix} 1.0000 & 0.8182 & 0.6559 & 0.9364 & 0.7465 & 0.6750 \\ 1.0000 & 0.3333 & 0.6807 & 0.9759 & 0.7431 & 0.5094 \\ 1.0000 & 0.8630 & 0.9072 & 0.9434 & 0.7864 & 0.9793 \\ 1.0000 & 0.7627 & 0.9806 & 0.9902 & 0.8215 & 0.8385 \\ 1.0000 & 0.6923 & 0.8351 & 0.8901 & 0.5436 & 0.7714 \\ 1.0000 & 0.8780 & 0.9205 & 0.8901 & 0.9419 & 0.8438 \\ 1.0000 & 0.6429 & 0.7642 & 0.9205 & 0.9529 & 0.8710 \\ 1.0000 & 0.7079 & 0.7043 & 0.8901 & 0.6991 & 0.6873 \end{pmatrix} \quad (4)$$

$$\begin{aligned} \gamma_{11} &= 0.8053, \gamma_{12} = 0.7071, \gamma_{13} = 0.9132, \gamma_{14} = 0.8989 \\ \gamma_{15} &= 0.7888, \gamma_{16} = 0.9124, \gamma_{17} = 0.8586, \gamma_{18} = 0.7815 \end{aligned} \quad (5)$$

- Empirical analysis on effects of construction of public facilities on farmer want to live together

Similarly, according to the above calculation, the results can be concluded that:

$$\begin{aligned} \gamma_{21} &= 0.6887, \gamma_{22} = 0.9167, \gamma_{23} = 0.8888, \gamma_{24} = 0.6407, \\ \gamma_{25} &= 0.9199, \gamma_{26} = 0.8172, \gamma_{27} = 0.6834, \gamma_{28} = 0.9166, \end{aligned} \quad (5)$$

- Empirical analysis shows that (summary)

According to the above empirical analysis, results of the grey correlation degree are shown in Table III:

TABLE III. RESULTS OF THE GREY CORRELATION DEGREE

Correlation Degree	0.9—1	0.8—0.9	0.7—0.8	0.6—0.7
Willing	Internet drainage facilities schools, hospitals, etc.	hardening roads  circuit transformation		tap water  near roads  telephone
Unwilling	hardening roads  circuit transformation.	Telephone near roads tap water	schools, hospitals, etc drainage facilities	

In terms of effects of construction of public facilities on farmer' unintention to centralized residence, there is the following order: X3> X6> X4> X7> X1> X5> X8> X2, i.e., the hardening roads is optimal, followed by the transformation of circuit, and drainage and sewerage facilities rank the last. It illustrates that the main reason farmer do not want to live together is: there have been hardening roads in front of the house and nearby places and the circuit has been transformed; the next reason is that there're telephone, roads and water facilities in the residential areas and nearby places; while the farmer do not want to live together Factors that have smaller influence are that there're networks, schools, hospitals, nurseries, drainage and sewerage facilities in residential and nearby places. The results are fit with our survey results and those who do not want to live together are mainly farmer aged over 51 years; older farmer, especially elderly farmer are unwilling to break the previous way of living and lifestyle, even there's no network and drainage and sewerage facilities at home, they are accustomed to it.

In terms of effects of construction of public facilities on farmer' intention to centralized residence, there is the following order: X5> X2> X8> X3> X6> X1> X7> X4. It can be seen after the inverse operator processing of behavior sequence, the biggest motivation the farmer are willing to live together is that there're no public facilities of network, drainage and sewerage, shops, hospitals, schools in and near the residential areas, so farmer have the urgent need to change the existing lagging environment through community centralized residence. The secondary factor making farmer willing to live together is that there're no hardening roads and circuit transformation in residential and nearby places. What has the minimal impact on centralized residence of farmer communities is that residential and nearby places have no such public facilities as running water, roads, telephone.

The foregoing analysis shows that in the process of building public facilities in rural areas in six counties (district) in Shaanxi, public facilities such as hardening roads, circuit transformation, water, roads and phones in residential and nearby places require more investment in the previous period; these areas have relatively fewer public facilities such as network, sewage and drainage facilities, shops, schools, nurseries and hospitals, and thus it has relatively larger impact on the intention of farmer to live together.

#### IV. CONCLUSION AND DISCUSSION

Many factors affect the intention of farmer to live together, among which the construction of public facilities has a significant impact on farmer centralized residence<sup>[9]</sup>. In this paper, with 1708 survey data in six counties (district) in Shaanxi as a sample, the author uses gray relational analysis to reveal influence of the construction of public facilities on the intention of farmer to live together. The results showed that: the vast majority of farmer are willing to live together in the new community with modern public facilities and public services to enjoy modern life; it fully illustrates that the conclusion that construction of public facilities significantly affect farmer centralized residence.

##### A. Conclusion

First, rural urbanization is an important part of urbanization in China; rural industrialization, agricultural modernization and community-based living of farmer are the indivisible organic union in the rural urbanization;

Second, the construction of public facilities in rural areas is a public project with huge investment; rural community construction planning, site selection and investment should first play the public service role and investment role of the government and should moderately guide social diversified investments, including farmer' own investment, which is an effective way to accelerate the construction of public facilities in rural new community;

Third, the factors affecting farmer communities are very complex, but planning the construction of public facilities within the community has a significant impact on farmer living together.

Fourth, the building of rural new communities is an induced demand in rural economic modernization, an effective way to fundamentally resolve the problem of the rural population and also an inevitable choice for the realization of person's urbanization of farmer.

Fifth, the living style change of farmer in underdeveloped areas from natural villages to new community is a long and complex systematic project and a prerequisite to respect the wishes of farmer, promote farmer' land capitalization and change identities of traditional farmer.

### B. Discussion

First, households as samples the paper selects are mostly in underdeveloped areas such as the mountains, semi-mountains.

Second, the county-level government in less developed areas has limited financial resources, and then where investment funds for construction of public facilities in new rural communities come from? As for issuance of government construction bonds, how to pay back the debt without the expected return? It may be an important option to increase the provincial fiscal transfer payment and walk in the road of both rural communities and rural industrial development.

Third, with a large number of rural migrant workers, rural areas have the strange phenomena of a declined population and increased rather than decreased residential places with "hollow village" everywhere, poor living quality, empty houses unoccupied and a lot of wasted arable land resources. Except that some farmer continue to transfer to the cities, the left-behind farmer transfer to rural communities or nearby places may be a helpless choice in the case of more people and fewer lands.

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