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The research on the evaluation index system of livable rural areas in China—by the case of rural areas in Henan Province

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Abstract

In this paper the evaluation index system of livable rural areas was established from five aspects, involving material standard, rural education situation, living condition, medical service and health status and social security in rural areas. Ten counties' livability level of Henan Province in 2008 were evaluated, ranked and analyzed. The result shows this evaluation index system has good reliability.

Keywords: rural areas; livability; evaluation index system; actor analysis

1. Introduction

The rural region in China, with an extensive land area and large population enjoys a huge potential for development. In China farmers still accounted for about 57 percent of whole population in according to the nationwide census in 2006. [1]There are many advantages in rural region like cheap land, materials and low-paid labours. Because of the weak knowledge, technology and population quality, it may be disharmonious with nature and ecology in the process of development of establishing socialistic new rural areas. The problems of villagers, countryside and agriculture are arising widespread concerns in the whole society. Therefore, solving the problems of rural region and constructing new livable countryside are far-reaching significant for China.

The evaluation of livability in rural areas needs to not only reflect the villagers' economic conditions but also the degree of satisfaction with mental demand, educational level and social security etc. The current academic studies on the livability mostly focused on large cities and less on rural areas. The main reason is due to the difficulty of collecting useful information and data. Constructing the livable countryside has meaningful guidance for the construction of a New Socialism Rural Area and realization of the "rural well-off society". How to build livable rural areas and what are the criteria to evaluate the livability in rural areas are important academic problems

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needed to discuss. In this paper, the evaluation of rural livability adopted a set of index system, using factor analysis method to rank the 10 counties in Henan province and furthermore analyzed the final results.

2. The construction of livable index system in rural areas

The establishment of livable index system should include many aspects, like material, entertainment, education, happiness and so on, but for rural areas livable index system is slightly different. Zhangmao[2] discussed the rural livable indexes should divided into five categories. The following is the explanation of how to construct a livable index system in rural areas from five types. The first type index is material. The material is a main index to measure people's living standards. The material affluence can bring good living conditions for villagers and make them invigoration. So here we collected the farmers' average per capita income and average per capita savings deposits, etc as index. The second type of index is education index. Education is a measure of educational level in a region and manifestation of villager's quality. The third type of index is to measure the living conditions, mainly including the facilities reflect villagers' living standards. The fourth type of index is to measure medical service and health status in rural areas, mainly reflecting the ease of medical treatment and medical facilities level, etc. Because of the difficulty of collecting the related data, we only select the index of the average number of medical technical personnel per thousand villagers. The fifth type of index is to measure the status of the social security in rural areas. The social security of a region is so important that it is a good supplement to the regional economic development, culture, and education and meanwhile, it can dispels villagers' misgivings especially the traditional thinking of raising children to provide for old age.

The rural livable quality is a complex concept. In order to evaluate the rural livable quality comprehensively the selection of specific evaluation index is a key issue. The author selected 15 indexes specifically according to the above five types, adhering to principle of the comparability, measurability, and dynamic of the indexes suggested by Xu Xuerong [4]and finally established the index system of livable rural areas. Such as Table 1.

Table 1 Index System of Livable Rural Areas

The name of index	The name of index
X_1 Per capita GDP	X_9 Percentage of forest cover
X_2 Per capita net income of urban residents	X_{10} Percentage of junior enrollment consolidated
X_3 Per capita retail sales of consumer goods	X_{11} Per capita financial revenue of education
X_4 Per capita investment in fixed assets	X_{12} Percentage of urbanization
X_5 Per capita tertiary industry gross domestic products	X_{13} Average number of medical technical personnel per thousand villagers
X_6 Per capita savings deposit of rural and urban residents	X_{14} Percentage of persons participated in basic pension insurance
X_7 Per capita agricultural machinery power	X_{15} Percentage of persons participated in the new rural cooperative medical
X_8 Per capita sown area	

(Date From: *Henan Statistical Yearbook 2009*)

3. Empirical analysis on livability of rural areas in Henan Province

This study was conducted in a random sample of 10 counties in Henan Province. They were Gushi, Huaxian, Xihua, Luanchuan, Changyuan, Yuanyang, Zhongmu, Lankao, Baofeng, and Xixia. The raw data of 15 specific indexes which were from 2009 Henan Statistical Yearbook of 10 counties were as samples for empirical analysis. In order to find the inner link between the 15indexes and furthermore reduce these indexes into the few that could represent the majority of the original information, the Factor Analysis would be adopted.

3.1. Factor Analysis

After standardizing the raw data, the no dimensional data were inputted SPSS14.0 software. The Principal Components Analysis with a Varimax rotation was used with a predetermined cut-off Eigenvalue of one. Four factors were found with Eigenvalues ⩾ 1, and they accounted for 85.899% of the total variance. The Rotated Component Matrix was shown as Table 2.

Table 2 Rotated Component Matrixes

	Component			
	1	2	3	4
X_1	0.459	0.811	0.245	-0.201
X_2	0.891	-0.111	-0.074	0.292
X_3	0.639	0.615	0.169	0.003
X_4	0.887	0.371	-0.046	0.081
X_5	0.841	0.139	0.083	-0.311
X_6	0.172	0.840	0.249	0.012
X_7	-0.123	-0.085	-0.951	0.120
X_8	-0.001	-0.509	-0.766	0.303
X_9	-0.111	0.695	0.623	-0.109
X_{10}	0.040	0.572	0.257	-0.151
X_{11}	0.017	0.982	0.148	-0.039
X_{12}	0.543	0.115	0.803	-0.129
X_{13}	0.505	0.074	0.140	0.761
X_{14}	-0.025	0.349	0.762	-0.021
X_{15}	0.167	-0.059	-0.172	0.932

3.2. Naming the factors

The first factor was named rural industry development, containing X_2, X_3, X_4, X_5 four indexes which reflected the consuming and the industry status. The second factor was named rural economic and population quality, containing X_1, X_6, X_{10}, X_{11}. The third factor was named rural environment having high loading in the X_9 X_{12} X_{14}.The fourth factor was labelled as rural society improvement with four indexes of X_7 X_8 X_{13} X_{15}. Such as Table 3.

Table 3 Rural livable factors naming

Factor	Raw Index	Cumulative Contribution (%)	Variance Rate	Eigenvalue	Name of Factor
F_1	X_2 X_3 X_4 X_5	25.811		3.872	industry development
F_2	X_1 X_6 X_{10} X_{11}	50.937		3.769	Rural economic and population quality
F_3	X_9 X_{12} X_{14}	73.653		3.407	rural environment
F_4	X_7 X_8 X_{13} X_{15}	85.899		1.837	rural society improvement

3.3. Factor scores

The factor score coefficients were obtained with the regression algorithm and shown in the factor score matrix. The factor score function as follow:

$$\begin{cases} F1 = 0.054X1 + 0.282X2 + \ldots + 0.082X15 \\ F2 = 0.235X1 - 0.106X2 + \ldots + 0.006X15 \\ F3 = -0.096X1 + 0.02X2 + \ldots + 0.082X15 \\ F4 = -0.068X1 + 0.196X2 + \ldots + 0.57X15 \end{cases} \quad (1)$$

After calculation, the rural livable factor scores of 10 counties in Henan Province were obtained. The comprehensive sore of livable level of each county was obtained through weighted each factor and the weight was the variance contribution rate of each factor. The comprehensive score function as follow:

$$F = 0.258F_1 + 0.251F_2 + 0.227F_3 + 0.122F_4 \quad (2)$$

The factor score, comprehensive sore and rank of each county are shown in Table 4.

Table 4 Evaluation rural livability of 10 counties in Henan Province in 2008

County	F_1	F_2	F_3	F_4	Comprehensive sore F	Ranking
Gushi	-0.56969	-0.77716	1.52561	1.67966	0.21	4
Huaxian	-1.12561	-0.09821	-1.00209	0.84539	-0.44	7
Xihua	-.48651	-0.48414	-0.73335	-0.25852	-0.45	8
Luanchuan	-.53360	2.72955	0.23998	-0.00244	0.60	1
Changyuan	.58070	-0.25982	-0.15795	0.86175	0.15	5
Yuanyang	-.34533	-0.43616	-1.03019	-0.27389	-0.47	9
Zhongmu	2.17051	0.25617	-0.83510	0.59200	0.51	2
Lankao	-0.95459	-0.45566	0.05355	-1.33826	-0.51	10
Baofeng	0.69993	-0.40749	0.13147	-1.38545	-.006	6
Xixia	0.56418	-0.06709	1.80808	-0.72022	0.45	3

4. Conclusion

4.1. The analysis of comprehensive sore

As shown in Table 4, there are five counties' comprehensive sores showing negative scores, while the overall comprehensive sores are low, indicating that the current rural livable level in Henan Province is still in an early stage. In addition, the rural livable level and the economic and the population quality level in Henan Province are

positively correlated. The highest livable comprehensive sores are got by Luanchuan, followed by Zhongmu, Xixia, Gushi, Changyuan, Baofeng, Huaxian, Xihua, Yuanyang and Lankao. This result and the ranking of F_2 get a high degree of consensus. Therefore, the development of rural livable level needs to improve the regional economy and population quality first.

4.2. The analysis of each factor's score

The factor analysis results indicate that each county has different ranking in different factors. The Zhongmu County is in the first place in terms of the ranking of F_1, which is close to Zhengzhou, the capital city of Henan Province, connected the tourist city Kaifeng by Zhengbian freeway. The Zhongmu County is 28 kilometres south from Zhengzhou International Airport, 11 kilometres north from Lianhuo highway. Because of its superior location, it has been more opportunities for attracting investment and thus also contributed to the development of tertiary industry like restaurant and tourism. The Huaxian and Lankao County rank poorly and their fixed-asset investment, the tertiary industry, income and consuming are at a low level.

The Luanchuan, Zhongmu and Xixia are the top three counties according to the ranking of F_2, whose economic development, savings deposits and education expenditure are at a high level, mainly due to its geographical advantage and abundant resources.

The Xixia, Gushi and Luanchuan are the top three counties in terms of the ranking of F_3, whose forest cover and urbanization are at a high level, primarily due to their ecological resources advantage. Luanchuan is located in western Henan belonging to Funiu Mountains, whose forest and water resources are extremely rich. Gushi and Xixia are also famous for their forest and rich ecological resources. They are important tourist scenic spots in Henan. The Huaxian, Yuanyang, and Changyuan rank poorly in F_3, which belong to northern Henan plain and their ecological resource remain low.

The Gushi, Huaxian, and Changyuan are the top three counties according to the ranking of F_4, which are populous counties. Because of the heavy investment in health care by local government, villagers participated in the rural cooperative medical actively; in addition, because of the high level of agricultural machinery power the per capita sown area also had a higher level.

4.3. The comparison between factors' score and the comprehensive sore

The four main factors' score of each county shows the four aspects of rural livability level for each county are unbalance. For example, Luanchuan was in the first place according to the comprehensive score, but its score of F_1 only ranked seventh indicating that the industrial investment, generating revenue for villagers and encouraging consumption need to be improved.

4.4. The suggestion on the development of rural livability in Henan

First, the local government should on the one hand adjust the industrial structure according to their resource advantage, increase the villagers' income and improve the rural residents' living condition, on the other hand provide more public expenditure on health care, technology, education, etc.

Second, the local government should pay more attention to balanced development on the each aspect of rural livability. Only in this way can the rural livable level in each county be improved as a whole.

Third, based on the above analysis, when improving living standards and reducing the regional income gap, the local government should adopt different policies according to different regions. Only in this way can the regional disparities be reduced.

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