ISSN : 0974 - 7435 Volume 10 Issue 21

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(21), 2014 [13119-13125]

Discussion of internal laws and directions of the common development of urbanization and new rural construction

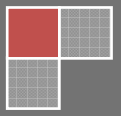
Lizhong Wang, Qiuyue Tian
School of Architecture and Art, Hebei University of Architecture, Zhangjiakou, 075000, (CHINA)

ABSTRACT

Considering from the aspect of ecological society and harmonious development, the coordinated development of urbanization and new rural construction is the main trend of the rapid development of the society, which can clearly guide the direction of development. This present paper first determines ecological environmental subsystem index of coordinated development of new rural construction and urbanization to lay a solid foundation for the form of the index system. The second part is to make evaluation on the importance of various index factors through the constructing process of the evaluative index system of coordinated development of new rural construction and urbanization. And the research mainly focuses on two aspects: factor analysis of the cumulative contribution rate and of the concrete composition of the evaluative index system of coordination development of new rural construction. Then based on experts' judgment, the paper makes comprehensive calculation of the matrix input and index weight to carry out a specific research on the importance of each indicator towards the urbanization and new rural construction. And make further analysis on the output of the index weight to calculate the weight value of the various indicators in each index layer. Finally analyze the whole factors in the relative level of the coordinated development of the new rural construction and urbanization, mainly combining the characteristic value of the factor, the calculation of the contribution rate and the cumulative contribution rate, Component Matrix and extraction and interpretation of the common factor, comprehensive score of weighted factors in the city, clustering analysis of the coordinated development of the new rural construction on the relative level as well as the construction of the hierarchical diagram of the comprehensive score on the relative level of coordinated development. This is the main idea of the paper, from which the fundamental purpose and main contents of the study can be seen.

KEYWORDS

Urbanization; New rural construction; Coordinated development; System index; Factor analysis.



INSTRUCTION

The coordinated development of urbanization and new rural construction is the key factor to the formation of environment-friendly society and plays an important role for the formation of the benign developing cycle between society and ecological environment. The paper carries out research combining the determination of ecological environmental subsystem index of coordinated development of new rural construction and urbanization, the construction of evaluative index system of coordinated development of new rural construction and urbanization, the expert s' judgments on matrix of the input and the calculation of index weight, the output of the index weight and factor analysis of new rural construction and urbanization on the relative level and ultimately lays solid the theatrical and data base for the high degree of accuracy of the developing direction of urbanization and new rural construction. In this way, the scientific quality and rationality of the research process have been reflected.

THE DETERMINATION OF ECOLOGICAL ENVIRONMENTAL SUBSYSTEM INDEX OF COORDINATED DEVELOPMENT OF NEW RURAL CONSTRUCTION AND URBANIZATION

From the perspective of social development, eco-friendly city has become the inevitable trend of social development. However, with the rapid development of the industrial age, the acceleration of the developing of industrialization and urbanization has made a certain degree of damage to ecological environment of the cities. These are mainly embodied in the aggravation of smoke and haze in towns, industrial wastewater, deteriorating urban water quality and noise pollution[1]. Along with the urban ecological environment being destroyed, the involved scope has spread to the rural areas gradually, which threatens the rural ecological environment. But the ecological environment between urban and rural is in a vicious cycle which will lead to the Matthew effect that is apparently inconsistent with the ecological development. Therefore, the construction of ecological environmental subsystem index of coordinated development of new rural construction and urbanization shows its importance. In the choice of the indexes, TABLE 1 can clearly show the specifically selected descriptive index.

TABLE 1 : Descriptive index of coordinated development of new rural construction and urbanization

Secondary indexes	Third-level indexes
Land	Urban and rural ratio of per capita green land
	Urban and rural ratio of built-up district area proportion
	Urban and rural ratio of per capita land
Water	Urban and rural the standard rate of centralized drinking water source
	Urban and rural industrial wastewater treatment rate
Air	Urban and rural ratio of air pollution index
	Urban and rural ratio of industrial waste gas emissions of per square kilometers
	Urban and rural ratio of pollutants removal ratio in industrial waste gas
Noise	Urban and rural ratio of environmental noise average
	Urban and rural ratio of traffic noise average
	Urban and rural ratio of coverage rate of noise compliance area
Environment protection	Urban and rural ratio of comprehensive utilization rate of industrial solid waste
	Urban and rural ratio of life garbage treatment rate
	Urban and rural ratio of green rate

THE CONSTRUCTION OF EVALUATIVE INDEX SYSTEM OF COORDINATED DEVELOPMENT OF NEW RURAL CONSTRUCTION AND URBANIZATION

Methodology of constructing evaluative index system: factor analysis of the accumulative contribution rate

From the above construction process, it can be seen that in the construction of evaluative index system of coordinated development of new rural construction and urbanization, the existence of some indexes take prominent position, weighting a lot, while some other index factors do not have so much importance, weighting less. According to this characteristic, the indexes that weight less needs to be effectively removed and it is at this aspect that many index system designers cannot effectively select. Aiming at this situation, some mathematicians use the method of determining the principal factors in multivariate statistical analysis method to delete some factors, thus improving the validity and accuracy of indicator selection for the designers. And on this basis, communicate with related experts further adjusting the construction of index system. And the whole evaluative system is shown in Figure 1.

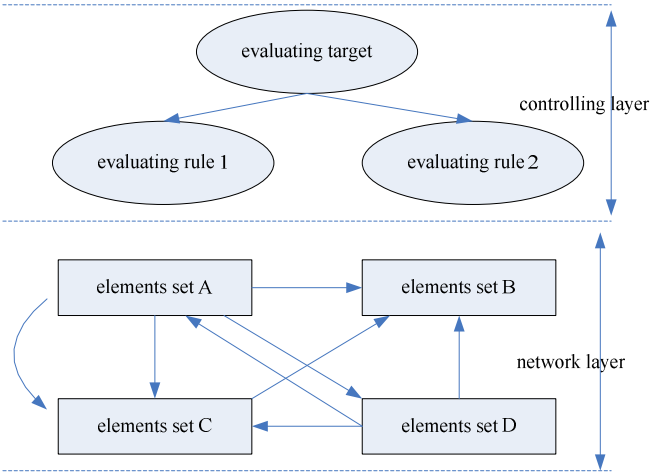


Figure 1 : Network structural figure of constructing the index system

The specific constitution of evaluative index system of coordinated development of new rural construction and urbanization

From the thoughts of constructing evaluative index system of coordinated development of new rural construction and urbanization, the construction of the system is composed of the target layer, criterion layer and index layer which reflects recursive form of the layers. The target layer is mainly the coordination degree between the coordinated development of new rural construction and urbanization, and the higher evaluation effectively illustrates the better degree of the coordinative development of new rural construction and urbanization. On the contrary, lower evaluation will reflect worse degree. And the criterion layer mainly is to effectively evaluate the coordinated degree of the coordinated development of the new rural construction and urbanization, and these indexes mainly cover four aspects: coordinated degree of the economic development, coordinated degree of social development, coordinated degree of ecological development and coordinated degree of life[2]. These four aspects provide powerful indexes to evaluate coordinated level of the coordinated development of the new rural construction and urbanization from different angles. However, the index layer is restricted by the criterion layer, and usually used for describing the concrete value of research objects in one aspect of the criterion layer. And the former discussion of constructing the index system has mentioned that criterions in each criterion layer have many specific index factors, and the effective screening of these index factors can be carried out through the factor analysis of cumulative contribution rate.

In the process of constructing index system, first, experts scores on the specific indexes of the index layer. And through TABLE 2, it can be seen that the urban and rural per capita GDP is represented by X1, and the urban and rural per ratio of capita income is represented by X2. While the urban and rural ratio of per capita retail sales of social consuming goods is represented by X3,indexes from X4 to X11 respectively represents the ratio of fiscal expenditure on supporting agriculture in the general budgetary financial expenditure, ratio of urban and rural ratio of the third industrial added value in GDP, rural non agriculture industry output value ratio in the total rural social production value, urban and rural ratio of dual labor productivity, urban and rural ratio of primary industry jobholders proportion, urban and rural ratio of GDP growth rate, urban and rural ratio of providing tax rate per 100 Yuan by industrial enterprises and concrete urban and rural ratio of GDP energy consumption.

TABLE 2 : Scores given by the experts

Index	1	2	3	4	5	6	7	8	9	10	Multiplicity of the scores	Rank of the scores (from big to small)	Corresponding index
X1	5	4	5	5	4	5	5	4	4	5	5	5	X1
X2	4	5	4	5	5	5	5	4	5	5	5	5	X2
X3	4	5	5	5	4	5	4	5	5	5	5	5	X3
X4	4	5	5	5	5	4	4	5	5	5	5	5	X4
X5	5	4	4	4	4	5	4	4	4	3	4	5	X6
X6	5	4	4	5	4	5	3	5	5	4	5	4	X5
X7	3	2	2	3	3	4	2	3	3	3	3	4	X10
X8	2	3	2	2	2	2	2	3	1	2	2	3	X7
X9	2	2	2	2	3	3	2	2	2	3	2	2	X8
X10	4	5	4	4	3	4	4	5	4	4	4	2	X9
X11	2	2	3	2	2	2	2	1	2	3	2	2	X11

TABLE 3 : Experts' judgments matrix of the importance of each index to coordination of new rural construction and urbanization

Experts	Index	Economic coordination degree E	Social coordination degree S	Life coordination degree L	Ecological environmental coordination degree V
Expert 1	Economic coordination degree E	1	2	1	3
	Social coordination degree S	1/2	1	2	2
	Life coordination degree L	1	1/2	1	1
	Ecological environmental coordination degree V	1/3	1/2	1	1
Expert 2	Economic coordination degree E	1	2	2	2
	Social coordination degree S	1/2	1	2	2
	Life coordination degree L	1/2	1/2	1	1/2
	Ecological environmental coordination degree V	1/2	1/2	2	1
Expert 3	Economic coordination degree E	1	1/2	1/2	2
	Social coordination degree S	2	1	1	4
	Life coordination degree L	2	1	1	3
	Ecological environmental coordination degree V	1/2	1/4	1/3	1
Expert 4	Economic coordination degree E	1	2	2	3
	Social coordination degree S	1/2	1	1	2
	Life coordination degree L	1/2	1	1	3
	Ecological environmental coordination degree V	1/3	1/2	1/3	1
Expert 5	Economic coordination degree E	1	2	3	1
	Social coordination degree S	1/2	1	2	1/2
	Life coordination degree L	1/3	1/2	1	1/4
	Ecological environmental coordination degree V	1	2	4	1
Expert 6	Economic coordination degree E	1	1	2	2
	Social coordination degree S	1	1	3	2
	Life coordination degree L	1/2	1/3	1	1
	Ecological environmental coordination degree V	1/2	1/2	1	1
Average value	Economic coordination degree E	1	19/12	7/4	13/6
	Social coordination degree S	12/19	1	11/6	25/12
	Life coordination degree L	4/7	6/11	1	35/24
	Ecological environmental coordination degree V	6/13	12/25	24/35	1

EXPERTS' JUDGMENTS ON THE INPUT OF THE MATRIX AND THE CALCULATION OF THE INDEX WEIGHTS

The research of the article makes an effectively calculation of the importance function of mentioned criterion layer for the target layer. And during the process, 6 experts scored on the indexes of the criterion layer through questionnaires or telephone interviews[3]. And the main steps are as the followings:

The first step is to divide the importance of each criterion layer to the general evaluation target into nine levels and then six experts scored on the importance with the specific scoring results shown in TABLE 3. In order to make a scientific judging result, re-elect the scores made by the experts for importance of the general evaluation target, then get the concrete evaluation value through the corresponding evaluation among the experts.

For example, on the importance of the economic and social coordination for coordination degree of new rural construction and urbanization (general target), six experts made scores as follows: 2, 2, 0.5, 2, 2, 1, and take the average value (9.5/6=1.58) as the comprehensive evaluation value of the importance of "economic coordination" and "social coordination" for the " coordination degree of new rural construction and urbanization (general target)". It indicates that the importance of " economic coordination degree " to " coordination degree of new rural construction and urbanization (general target)", in the average sense, are 1.58 times of the importance of "social coordination" to "coordination degree of new rural construction and urbanization (general target)". The experts' comprehensive evaluative average value of importance of other indexes to "coordination degree of new rural construction and urbanization (general target)" can be got by the same way(seeing TABLE 3).

Input the average judgment values of each index into the professional data software to construct the experts' judgment matrix, and make the explanation of the specific figures later. The blue arrows represent the economic coordination degree to the new rural construction and urbanization. And the importance of the general target is represented by the social coordination degree, and the importance of this index to coordinated development of new rural construction and urbanization is 1.58 times of the former. While the red arrow is the specific degree of coordination development of the ecological environment, and the importance of the index is 1.6 times to coordination degree of coordinated development of new rural construction and urbanization. Input these values made by the experts into the professional data analysis software, and get the value of 0.0058 through checking the consistency of the data. And the value is within the control rage, so the consistency checking process has reached the standard.

OUTPUT OF THE INDEX WEIGHT

From the view of the relationship among the indexes, there are interdependent relationship between the internal indexes and external indexes. And input these data of expert judgment to node judging matrix of a professional data analyzing software and again check the consistency. The consistency of the judgment matrix in each node can be within 0.1, indicating that the consistency checking process achieves the proper standard[4]. Then through the specific calculation by software, effectively construct the super matrix, weighted matrix and the limiting super matrix. Use the priority instruction of the computer software to work out the normalized limit weight of each index. The details are shown in TABLE 4 and the results of the index weights are shown in Figure 2.

TABLE 4 : Index weights of the evaluative index system of coordinated development of new rural construction and urbanization

Index	Limiting (normalize the limit weight)	Index	Limiting (normalize the limit weight)	Index	Limiting (normalize the limit weight)	Index	Limiting (normalize the limit weight)
E1	0.056212	S1	0.051392	L1	0.057195	V1	0.012813
E2	0.046344	S2	0.035601	L2	0.051287	V2	0.039673
E3	0.04012	S3	0.021274	L3	0.049811	V3	0.041054
E4	0.07060	S4	0.028077	L4	0.011179	V4	0.045779
E5	0.051265	S5	0.027043	L5	0.021532	V5	0.033481
E6	0.026929	S6	0.029907	L6	0.027717	V6	0.040426
E7	0.034862	S7	0.048437				

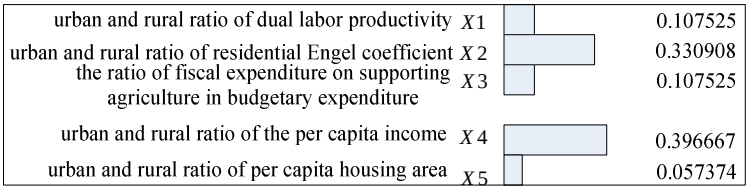


Figure 2 : Results of the index weights

FACTOR ANALYSIS OF THE COORDINATED DEVELOPMENT OF NEW RURAL CONSTRUCTION AND URBANIZATION ON THE RELATIVE LEVEL

Calculation of the factor characteristic value, contribution rate and cumulative contribution rate

In the calculation of factor characteristic value, first make specific analysis of the above data through the corresponding data analysis software. And select five common factors and work out the cumulative contribution rate of their square deviation which is 85.137%. From this data, it can be seen that the five common factors can effectively represent the original data and fully reflect the original data information. The explanation of the total variance is shown in TABLE 5.

TABLE 5 : The explanation of the total variance

Principal component	Initial characteristic values			Total load of the rotated square		
	characteristic values	contribution rate of the variance	cumulative contribution rate	characteristic values	contribution rate of the variance	cumulative contribution rate
1	11.885	45.713	45.713	10.922	42.007	42.007
2	4.323	16.628	62.341	4.022	15.471	57.478
3	2.735	10.518	72.859	2.974	11.440	68.917
4	1.862	7.163	80.021	2.311	8.890	77.807
5	1.330	5.115	85.137	1.906	7.329	85.137

Selecting meted: principal component analysis

Factor loading matrix and extraction and interpretation of the common factor

The degree of correlation between the common factor and the initial index variable is the so-called factor loading, and the greater the absolute value of correlation is, the more related between the two factors are. And it means that factor can well explain the index variables[5]. However, in order to explain the goal of index variables better, rotate the factors in the matrix in its constructing process. The paper uses the method of rotating the variance maximally in positive angle and gets the factor loading matrix after rotation.

Comprehensive scores of the factor weights in each city

Factor score refers to the reasonable estimated value of the called in the random variable existing in the factor that cannot be observed. Analyze the matrix to obtain the scores of the common factors of every city[6]. Then define the variance contribution rate among common factors as the weight, and effectively calculate the comprehensive score of weighting factors of each city. The specific calculation process is as follows:

$$Z_i = (42.007 \times F_{li} + 15.471 \times F_{2i} + 11.440 \times F_{3i} + 8.89 \times F_{4i} + 7.329 \times F_{5i}) / 85.137 \quad (1)$$

In this formulation, i represents the specific number of the cities.

Clustering analysis of the coordinated development of the new rural construction on the relative level

Clustering analysis method is to classify the analyzed data to effectively analyze the similarity. During this process, analyze the characteristics of the data to make automatic classification of original data[7]. In the usual data analysis, the method of system clustering analysis can be widely used. However, this study combines scores of the weighted factor as clustering variables of data, so that to make the corresponding clustering analysis of the coordinated development level of new rural construction and urbanization can obtain process.

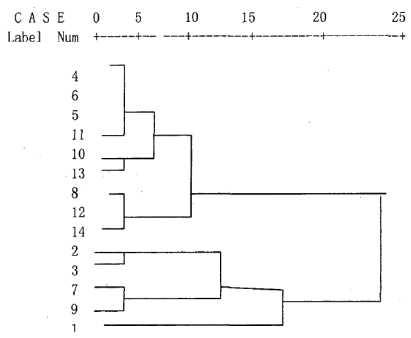


Figure 3 : The hierarchical diagram of the comprehensive score of coordinated development on the relative level

The hierarchical diagram of the comprehensive score of coordinated development on the relative level

On the basis of the analyzing each factor, make hierarchical clustering of the cities which needs to be calculated of the comprehensive level of coordinated development of new rural construction and urbanization and its principle is that make the clustering according to the score of the comprehensive level. The research and exploration is mainly completed through the clustering analysis of sample system, and the process is made by average connecting method among groups and the squared Euclidean distance algorithm. And the hierarchical diagram is shown in Figure 3.

CONCLUSION

The above content is the related researches and explorations on the internal laws and directions of the common development of urbanization and new rural construction of the paper. The article, through the construction of evaluative index system, evaluates the coordination of common development of urbanization and new rural construction. The construction of evaluative index system of coordinated development of urbanization and new rural construction, and factor analysis of coordinated development of urbanization and new rural construction on relative levels are focuses of the research. So that the rationality and the pertinence of the research process can be reflected, laying a solid foundation for maintaining the direction of the development of the new rural construction and urbanization.

ACKNOWLEDGEMENT

Project of subsidizing trial manufacture of new constructed products of the Construction Department of Hebei Province "Research on Green Sustainable Urbanization Pattern of Hebei Province"

REFERENCES

[1] Zhang Guo, Zeng Yongming; Research on the rural population developing mechanism in new urbanization and new rural construction — based on a survey of rural population developing model in sichuan[J], Journal of Sichuan Normal University (Social Sciences Edition), **41(5)**, 54-59 **(2014)**.

[2] Zhang Liping; Analysis of low carbon path of new rural construction under the background of new urbanization [J], Commercial Times, **(16)**, 44-45 **(2014)**.

[3] Cheng Chengming; The dialectical relationship between the new urbanization and new rural construction[J], Journal of Social Sciences, **(3)**, 48-52 **(2014)**.

[4] Li Jieyi, Zheng Wenzhe; Path and strategy of coordinated advancement of new urbanization and new rural—backgrond, satus and studying framework[J], Rural Economy, **(3)**, 41-43 **(2013)**.

[5] Zeng Fusheng, Wu Xiongzhou, Liu Hui; Realizes form on city and countryside overall plan development in china-urbanization and new rural reconstruction coordinated development [J], Research of Agricultural Modernization, **(1)**, 19-23 **(2010)**.

[6] Zong Kaibao; A study on the interactive relation of county-level area between urbanization and new rural reconstrution:based on the investigation of yiwu city in zhejiang province [J], Urban Studies, **18(5)**, I0013-I0016 **(2011)**.

[7] Liu Zhaozheng; Analysis of the influence of urbanization on new rural construction [J], Truth Seeking, **(9)**, 84-88 **(2013)**.