

Performance Evaluation of Multidimensional Poverty Alleviation In Guizhou

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Abstract: The single currency dimension anti-poverty measures are no longer applicable to the present, and multi-dimensional poverty alleviation is an inevitable choice of history. Based on the time series data of Guizhou Province from 2015 to 2019, the performance evaluation index system of poverty alleviation is constructed based on the four dimensions of economic development level, social development level, production and life development level and ecological environment level in Guizhou Province. The entropy weight-topsis model is used to calculate the entropy value and difference coefficient, and the corresponding weight is obtained. The topsis method is used to calculate the score to obtain the evaluation of Guizhou 's multi-dimensional poverty alleviation performance. The study found that Guizhou 's multidimensional poverty alleviation has experienced a process of slowing down first, then intensifying and then slowing down. Based on this, an innovative poverty alleviation model is proposed to improve poverty alleviation performance ; improve public services and enhance the level of social development ; strengthen environmental awareness and promote the construction of ecological poverty alleviation ; strengthen environmental awareness, promote ecological poverty alleviation and other measures.

Keywords: Multidimensional Poverty Alleviation, Entropy Weight-topsis Model, Poverty Alleviation Performance.

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1 Introduction

Poverty not only hinders economic development, but also is the root of many social problems. China 's anti-poverty work has achieved remarkable results and made great contributions to the world 's human anti-poverty. At the same time, the growth rate of per capita disposable income of farmers in poor areas is higher than the national average, and the main regional indicators of basic public services need to be the same as the national average. With the efforts of the Party and the people of all ethnic groups in the country, all the last nine poverty-stricken counties in Guizhou Province were lifted out of poverty in November 2020. Although the current poverty alleviation effect is remarkable, we should realize that the poverty alleviation work is far from over, and the performance evaluation of poverty alleviation should also be carried out along with the comprehensive promotion of the rural revitalization strategy. The performance evaluation of poverty alleviation can test the implementation effect of poverty alleviation policies, so as to provide a basis for the government to continue to implement, adjust or re-formulate poverty alleviation policies. Guizhou has always been the focus of China 's poverty alleviation, the focus of scholars ' research, and the difficulty of studying poverty.

Taking Guizhou Province as the research object, this paper selects the relevant data indicators of multidimensional poverty in Guizhou from 2015 to 2019,

and uses the entropy weight-topsis model to measure and evaluate the effect of multidimensional poverty alleviation in Guizhou, so as to provide theoretical and practical basis for comprehensively promoting the rural revitalization strategy.

2 The practice and effect of multidimensional poverty alleviation in Guizhou

China is now mainly through the income level to identify the poor population and choose the object of poverty alleviation. The income level is measured by the per capita income level of the family, and the household income level is compared with the minimum poverty standard to measure poverty. Therefore, although the poverty alleviation policy based on the income dimension has successfully lifted China 's rural areas out of absolute poverty in an all-round way, the poverty alleviation method that only takes the economic dimension as the starting point and the foothold ignores the poverty of other dimensions in rural areas except economic difficulties, and the poverty alleviation effect from the income dimension alone is only the starting point rather than the end point in the rural assistance work. In the future work process, the dimensions of health, education and living conditions should also be added to the consideration of assistance, so as to move towards rural revitalization.

Guizhou Province is the province with the most serious poverty problem in the country. However, with the help of national policies, from 2012 to 2020, the province has completed all the dynamic clearing of 9.23 million poor people, and the results of poverty alleviation are remarkable. The province's poverty alleviation relocation of 1.92 million people has become the province with the largest number of poverty alleviation relocations in the country. According to relevant data, from 2016 to 2020, the annual per capita disposable income of the poor in Guizhou Province increased from 3509.77 yuan to 9895.99 yuan, an average annual increase of 36.39 %, and the growth rate is higher than the national average. In the first three quarters of 2020, the added value of the primary industry increased by 6.1 %, ranking first in the country. In 2019, the " group connection " hardening road in rural areas of Guizhou Province has been realized, and the problem of inconvenient travel of 12 million farmers along the route has been solved. The realization of " to get rich, first build roads, " Guizhou's " county-county expressway, group-through hardened road " has greatly promoted the development of Guizhou's rural economy and improved the living conditions of farmers.

Guizhou's total GDP from 460.279 billion yuan in 2010, nearly a decade of rapid growth, to 2020 has reached 1782.656 billion yuan, economic growth for 10 consecutive years ranked the top three in the country. With the support of the state, Guizhou has become a province of ten thousand bridges. From 2016 to 2019, Guizhou's total tourism income has achieved a ' blowout ' growth rate of more than 30 % in a row. The three strategies of big poverty alleviation, big data and big ecology go hand in hand.

3 Establishment of Measurement Model

3.1 Index system construction and data description

3.1.1 Construction of index system

With people's research on poverty, poverty has been given a deeper connotation. The index of material income can no longer represent the development level of the whole region or even the whole society. Poverty alleviation work

involves not only the economic field but also other fields^[1], Therefore, the evaluation of poverty alleviation performance should not only be measured from the economic dimension but also involve other dimensions. Based on theoretical research, this paper finally selects the four dimensions of economic development level, social development level, production and living development level and ecological environment level to carry out the research of this paper. A total of 15 indicators were selected to construct a multi-dimensional poverty alleviation performance evaluation system in Guizhou Province.

3.1.2 Data source and processing

Considering the availability of data and research needs, the data selected in this paper are mainly derived from the macro-economic database of Guizhou Province, and some data are derived from China Rural Poverty Monitoring Report, Guizhou Statistical Yearbook, China Rural Statistical Yearbook and some government work reports over the years.

Among the 15 variables, according to the attributes of the variable itself, it is classified into four first-level indicators, namely, the level of economic development, the level of social development, the level of ecological environment, and the level of production and living. The level of economic development (first-level indicators) includes per capita GDP, per capita local fiscal revenue, per capita disposable income of rural households, the completion of fixed asset investment of rural households, and the total output value of agriculture, forestry, animal husbandry and fishery. These four variables (secondary indicators); the level of social development (first-level indicators) includes three variables : the incidence of poverty, the number of hospitals per thousand people, the number of beds in health centers, and the number of ordinary middle school students per 10,000 people (second-level indicators); the ecological environment level (first-level index) includes two variables : artificial afforestation area and waterlogging area (second-level index); the production and living standards (first-level indicators) include three variables : per capita grain production, telephone penetration rate, and effective irrigation area (second-level indicators).

Table 4-1 Guizhou province multidimensional performance evaluation index system table

first-level index	second-level indicators	indicators
	per capita GDP	+
	capita local fiscal revenue	+
the level of economic development	per capita disposable income of rural households	+
	the completion of fixed asset investment of rural households	+
the level of social development	the total output value of agriculture, forestry, animal husbandry and fishery	+
	the incidence of poverty	-

the ecological environment level	the number of hospitals per thousand people, the	
	number of beds in health centers	+
	the number of ordinary middle school students per 10,000 people	+
the production and living standards	artificial afforestation area	+
	waterlogging area	+
	per capita grain production	+
	telephone penetration rate	+
	effective irrigation area	+

3.2 The establishment of measurement model

3.2.1 Principle of TOPSIS method

The TOPSIS method was first proposed by C.L.Hwang and K.Yoon in 1981. The TOPSIS method is based on the proximity of a limited number of evaluation objects to the idealized target. The method of sorting is to evaluate the relative advantages and disadvantages among existing objects. Its basic principle is to sort by detecting the distance between the evaluation object and the optimal solution and the worst solution. If the evaluation object is closest to the optimal solution and farthest from the worst solution, it is the best. It is not optimal otherwise^{[2] [3]}. This paper attempts to use the time series data and the topsis method to obtain the poverty alleviation effect of the best year and the worst year through vertical comparative analysis. From the perspective of vertical time, we can see the performance trend of poverty alleviation in Guizhou, so as to find the law of poverty alleviation in time.

3.2.2 model construction

The positive and standardized treatment of the logarithmic index is carried out, and the positive formula (for the intermediate index) is as follows :

$$X_{ij} = 1 - \frac{|x_{ij} - x_{best}|}{\max\{|x_{ij} - x_{best}|\}}$$

xbest represents the best value, that is, if the index is a positive index, it is the lower limit of the original index in the system ; if the index is negative, it is the upper limit of the original index in the system.

$$Y_{ij} = x_{ij} / \sqrt{\sum_{i=1}^n X_{ij}^2}$$

Then, the entropy weight method is used to determine the weight :

$$e_j = -\frac{1}{\ln n} \sum_{i=1}^n p_{ij} \ln p_{ij}$$

$$W_j = \frac{1 - e_j}{\sum_{i=1}^m (1 - e_j)}$$

$$J=1,2,3 \cdots m$$

4 Empirical analysis of poverty alleviation performance evaluation in Guizhou Province

4.1 Single dimension poverty alleviation analysis

From Figure 1, it can be seen that the per capita disposable income of rural households in Guizhou Province is increasing year by year, from 7386.9 yuan in 2015 to 10756.3 yuan in 2019, reflecting that the average income of rural residents in Guizhou Province is getting higher and higher. It can be seen that the effect of poverty alleviation is better and great progress has been made in the income dimension.

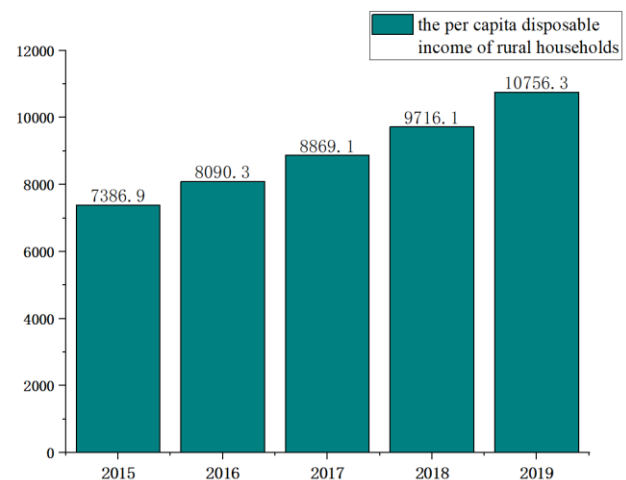


Fig 5-1 The trend chart of per capita disposable income of rural households in Guizhou Province from 2015 to 2019

It can be seen from the figure that the incidence of rural poverty in Guizhou Province shows a downward trend year by year. At the end of 2019, the incidence of rural poverty in Guizhou was 1.5 %, which was 3.5 percentage points lower than that at the end of the previous year. In 2020, the incidence of rural poverty in Guizhou was 0, and China achieved full poverty alleviation. So far, Guizhou Province has gradually moved from poverty alleviation to rural revitalization.

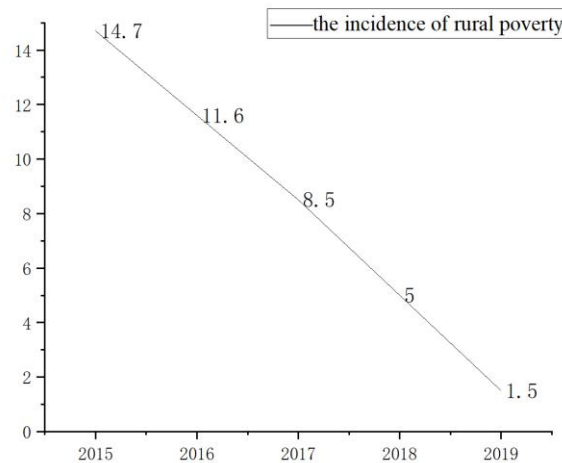


Fig 5-2 Trend chart of rural poverty incidence in Guizhou Province from 2015 to 2019

4.2 Multidimensional poverty alleviation performance analysis

In the multi-dimensional poverty alleviation performance analysis, in order to simplify the data of various indicators, it is necessary to logarithmically process the data to make the data unified and neat. According to the

attributes of the variable itself, it is classified into four first-level indicators. Then, the data is dimensionless, and the entropy value and difference coefficient are calculated. Finally, the weight is obtained, and the score is calculated by the topsis method.

Table 5-1 Evaluation index system table

index	w1	w2	w3	w4	w5	w6	w7
weight	0.14	0.16	0.16	0.15	0.16	0.11	0.12

Table 5-2 Weight Topsis score and ranking table

year	D+	D-	Ci	rank
2015	0.216984	0.214207	0.49678	2
2016	0.164568	0.154618	0.484413	4
2017	0.176341	0.160837	0.477009	5
2018	0.21417	0.217752	0.504146	1
2019	10.40736	10.17704	0.494405	3

From the above analysis, it can be seen that the Topsis score was the highest in 2018, which proved that the poverty alleviation effect in 2018 was the best. In 2018, it was just at the end of the 19 th National Congress of the Communist Party of China. The local governments in Guizhou responded most strongly to the party 's policies. The government partially increased the intensity and intensity of poverty alleviation. Poverty alleviation has become the top priority of all government departments in Guizhou. The upper level actively promotes, the lower level responds positively, and the interaction between the upper and lower

levels has achieved remarkable results.

The overall score of Topsis shows a trend of decreasing first, then increasing and then decreasing. The effect of poverty alleviation is to slow down first, then intensify and then slow down. It proves that poverty alleviation has just begun to be insufficient, with less financial, material and human input. There may be some weak aspects in some areas, which have not been paid attention to, resulting in the unsatisfactory effect of multi-dimensional poverty alleviation. Later, with the convening of the 19 th National Congress and the entry of poverty

alleviation into the decisive year of 2020, government departments at all levels began to pay attention to it and increased poverty alleviation. The effect of poverty alleviation has a qualitative leap in 2018, and then poverty alleviation has reached its peak, and the number of poor households has decreased significantly. Most poverty-stricken counties have collectively lifted out of poverty, poverty is facing difficulties, resistance is reduced, and poverty alleviation has begun to slow down in 2019.

5 Research Conclusions and Suggestions

5.1 Research conclusions

Through the comprehensive evaluation of the overall multi-dimensional poverty alleviation performance of Guizhou Province from 2015 to 2019, the following conclusions can be drawn : Although China has completely shaken off the shackles of absolute poverty in 2020, the road to poverty alleviation is still very long, and relative poverty is still one of the obstacles to social progress and development. In the context of comprehensively promoting the strategy of rural revitalization, precise assistance may be one of the specific measures to stimulate rural vitality and improve farmers ' lives.

Guizhou has made great efforts in poverty alleviation, but it still needs to be constantly alert to the risk of returning to poverty, and poverty still cannot be taken lightly. For multi-dimensional poverty alleviation, Guizhou has experienced a situation of slowing down first, then intensifying, and then slowing down. The poverty situation in rural areas has been greatly improved, and the effect of targeted poverty alleviation has been reflected. It can be seen that achieving targeted poverty alleviation and adhering to the coordinated development of various dimensions is the fundamental strategy to solve the problem. The government should strengthen the construction of various dimensions, so as to achieve sustainable and high-quality poverty alleviation according to the fundamental driving force, and always achieve poverty alleviation in the true sense.

5.2 Suggestions

5.2.1 Improve public services and enhance the level of social development

As one of the important dimensions of poverty alleviation performance evaluation, the importance of public services is self-evident. Therefore, in order to improve the multi-dimensional poverty alleviation performance in Guizhou, it is necessary to continuously improve the public service system. It can be considered from the aspects of education and health. First, we should actively develop preschool education by improving the conditions of running schools at all stages, strengthening the teaching staff and improving the national scholarship and subsidy system, promote the steady development of compulsory education,

vocational education and higher education, and continuously improve the education level of residents in the region. Second, we should speed up the improvement of the social security system in medical care, pension and other aspects, realize the enhancement of medical and health service capacity in the region, accelerate the construction of medical security system and medical assistance system, improve the pension insurance and minimum living security system, gradually realize the full coverage of urban and rural pension insurance and minimum living security system, and gradually improve the level of regional social public services, so as to realize the continuous improvement of poverty alleviation performance in the dimension of social development.

5.2.2 Strengthen economic strength and improve the quality of life of residents

According to Maslow 's hierarchy of needs theory, people will pursue security needs, social needs, respect needs and self-realization after their physiological needs are met. While people are pursuing these, the quality of life will gradually improve, and the basis for meeting these needs is still the economy. Therefore, the government should take corresponding policies and measures to continuously strengthen its own economic strength, which can be achieved through the following aspects : First, give full play to the exemplary role of rural economic demonstration areas, and realize the development of regional economy by introducing projects into villages and other measures ; the second is to build local agricultural product brands, increase the supply of high-quality agricultural products, and promote farmers ' income ; the third is to strengthen policy support such as loans, optimize loan procedures, and solve the problem of difficult venture capital for entrepreneurs.

5.2.3 Strengthen the awareness of ecological protection and promote the construction of ecological poverty alleviation.

It is better to have green water and green mountains, not gold and silver mountains, and green water and green mountains are gold and silver mountains. Therefore, ecological construction is also an important aspect. We should not only continue to increase the artificial afforestation area and waterlogging area mentioned in this paper, but also pay attention to the problems of ecological livability. First, we should pay attention to the problem of rural domestic waste treatment, improve the rural waste treatment system, establish people 's awareness of waste classification, and guide the participation of all staff ; second, we should strengthen the construction of sewage treatment facilities and promote rural sewage treatment. The third is to promote toilet reform so that people can use clean toilets. Through the government 's measures to strengthen people 's awareness of ecological protection, promote the construction of ecological poverty alleviation, so as to achieve ecological revitalization.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Author Contributions

This study was independently completed by Wang Huguang.

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References

- [1] Xu Jie, Yang Xiaoqian, Wang Congcong. Research on Comprehensive Poverty Alleviation Performance

Evaluation Based on Time Series Principal Component Analysis [J]. Journal of Kunming University of Science and Technology (Natural Science Edition).2020,45(04):137-145.

- [2] Liu Zhi, Wang Shanping. Fuzzy comprehensive evaluation of poverty alleviation performance from a precise perspective-Taking Xiangxi Tujia and Miao Autonomous Prefecture as an example[J]. Journal of Yunnan University of Finance and Economics.2020,36(05):104-112.

- [3] Qian Li, Ni Xiufeng, Song Junxiu. Fuzzy evaluation of multi-dimensional performance of targeted poverty alleviation in contiguous destitute areas-Taking Dabie Mountain area in Anhui Province as an example [J]. Economic management in East China,2018,32(03):22-27.