

Research on poverty alleviation performance evaluation method based on Spearman correlation coefficient and entropy weight method

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Abstract: From 2015 to 2020, each supporting unit will carry out accurate poverty alleviation from village to village, but the performance of each poverty alleviation unit is different. If the performance evaluation of each poverty alleviation unit is not reasonable, the enthusiasm and efficiency of poverty alleviation will be affected. In this paper, a new evaluation model is proposed to evaluate each supporting unit, so as to better encourage each supporting unit to improve the efficiency of poverty alleviation, help the poor and help the poor. Firstly, Spearman correlation coefficient is used to measure the relationship between SR, CY, HJ, WJ and SS scores in 2015 and SR, CY, HJ, WJ and SS scores in 2020. Next, in order to evaluate the performance correctly, this paper gives weight to the changes of village indexes in the past five years by entropy method, and comprehensively evaluates the scores after weighted average, and finally obtains a scientific poverty alleviation performance evaluation method.

1. Introduction

Eliminating poverty, improving people's livelihood and gradually realizing common prosperity are the essential requirements of socialism and the important mission of our party. Since the 18th National Congress of the Communist Party of China, the state has put poverty alleviation and development work into the "four comprehensive" strategic layout, as the key work to achieve the goal of the first century, and placed it in a more prominent position. In order to better motivate the supporting units to improve the efficiency of poverty alleviation, help the poor and really help the poor. Five years ago, the state started the performance evaluation mechanism of poverty alleviation.

2. Five-year development correlation model

In order to explore the correlation degree of each index data in 2015 and 2020, and give the

practical reasons, this paper considers to use Spearman correlation coefficient [1], selects the two-year scores of SR, CY, HJ, WJ and SS in 2015 and 2020, and obtains relatively reliable results through quantitative analysis.

Because the total sample size is too large, before using Spearman correlation coefficient [2], it is necessary to make linear judgment on each index data itself, and draw the matrix scatter diagram of index data with SPSS software, and get the results as follows:

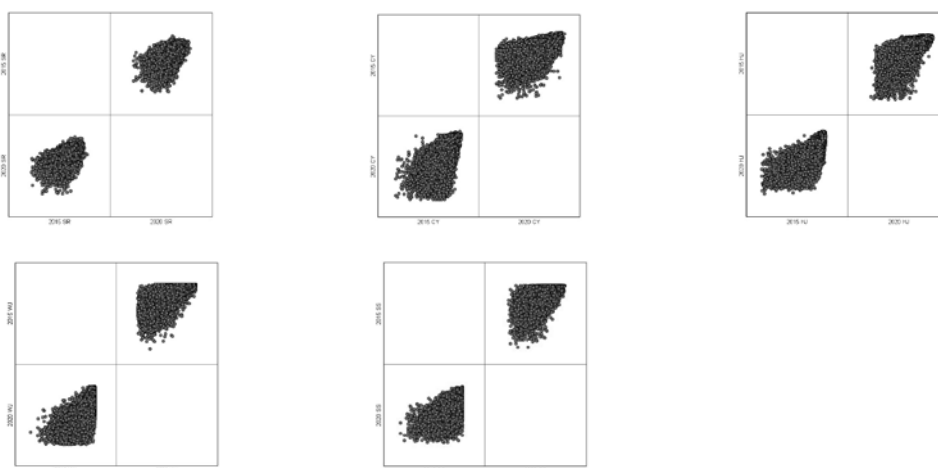


Figure 1: Scatter diagram of index matrix

It can be seen from the figure that the data matrix scatter points of the five indicators in 2015 and 2020 can fit a straight line passing through the centers of the two data scatter points, so it can be considered that the above five indicators themselves conform to the linear relationship, and Spearman correlation coefficient can be used for correlation analysis.

After calculation, we can get:

Then the correlation of residents' income in 2015 is weaker than that in 2020, but there may be a certain relationship. There is a positive correlation, and it is in the middle correlation interval of $[0.4, 0.8]$, the correlation degree is still low compared with the other four indicators. Therefore, in this paper, the correlation degree interval is moderately increased, and $[0.4, 0.6]$ is set as the low correlation interval in this question, and $[0.6, 0.8]$ is set as the middle correlation interval.

Industrial development CY, cultural education WJ and infrastructure ss: the industrial development, cultural education and infrastructure scores in 2015 and 2020 are all positively correlated, and according to the previous situation, the correlation coefficients all fall within the middle correlation interval, so it can be considered that there is a middle correlation among industrial development, cultural education and infrastructure around five years ago.

Living environment HJ: Different from the previous four cases, the correlation coefficient of the corresponding living environment index scores in 2015 and 2020 falls within $[0.8, 1.0]$, so it can be considered that the living environment around five years is highly correlated.

3. Performance evaluation model

In practical application, it is often found that "only using the scores of villages in 2020 is obviously unable to truly and effectively reflect the efforts made by a helping unit in getting rid of poverty and

tackling difficulties and upgrading", and if indicators such as "attitude, goal, input and quality of helping cadres of helping units" are selected, the subjectivity of problem evaluation will be greatly enhanced, which is not conducive to reasonable evaluation. This paper argues that the data should be processed from the changes of five indicators in the past five years.

Entropy weight method, according to the basic principle of information theory, information is a measure of system order degree, and entropy is a measure of system disorder degree; According to the definition of information entropy, entropy value can be used to judge the dispersion degree of an index, The smaller the information entropy value, the greater the dispersion degree of the index, and the greater the influence (i.e, weight) of the index on comprehensive evaluation, If all the values of an index are equal, the index will not play a role in comprehensive evaluation. Therefore, information entropy can be used to calculate the weight of each index, which provides a basis for multi-index comprehensive evaluation. The calculation formulas of the information entropy e_j and entropy weight are:

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

$$W_j = d_i / \sum_{j=1}^5 d_i$$

In this paper, entropy weight method is used in MATLAB software to objectively weight each index, and the results are shown in table 1:

Table 1: Index Weight Table.

	Resident income SR	Industrial development CY	Living environment HJ	Cultural education WJ	Infrastructure SS
W_j	0.7177	0.0570	0.1090	0.0525	0.0638

Because the calculated weights need to conform to the actual problems, this paper makes an inquiry.

From the perspective of helping units, when giving full assistance to these five aspects, priority will be given to the areas where people have the strongest sense of acquisition, and priority or focused assistance will be given.

From the perspective of poor villagers, the real sense of gain in the short term is the improvement of their income level and living environment.

Finally, this paper will consider the changes of each index in 2015 and 2020, and divide the new scores into four grades by K-means clustering [3]: excellent, good, medium and poor. The clustering results in SPSS software are as follows:

Table 2: Clustering results.

	excellent	good	medium	discrepancy
Cluster center	1.0710	0.2571	-0.3883	-1.1701
Number of cluster members	4472	11521	11555	4607

In the actual research, it is found that there is a problem that the assistance ability of the assisting units does not match the current situation of the assisting objects. Therefore, this paper improves the model. Cancel the frequency system and rank it by finding the average score of each type of support unit to eliminate this problem, After improvement, the results are as follows:

Table 3: Helping Performance

Type of assistance unit	Scoring mean	Number of villages assisted
0	-0.1975	2484
one	-0.1191	12493
2	-0.0382	2132
three	-0.0218	11280
four	0.2849	30
five	0.0427	3742

This paper argues that the improved ranking can largely eliminate the problem that there is a mismatch between the ability of helping units and the current situation of helping objects, which can represent the final result.

4. Conclusion

After the above research, this paper gets the following results: (1) the income correlation of residents around five years is weak; Industrial development, cultural education and infrastructure are moderately related; The living environment has a strong correlation. It can be considered that the rule of "what was good five years ago will be good now" is highly in line with the living environment, moderately in line with industrial development, culture, education and infrastructure, and weakly in line with residents' income. Combined with the actual poverty alleviation situation, this paper makes a further exploration.

References

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