

# The Application of AHP in Comprehensive Evaluation of Social Equity in Tibetan Areas of Qinghai

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**Abstract**—There are always an income inequality problem in the Tibetan area of Qinghai province. The widening income gap is severely threatening social equity and stability of the area, which has always been the key focus of the governance and research of the Qinghai government. In 2018, the public attention towards social equality has reached an unprecedented height; therefore it is necessary and urgent to intensify the construction of social equality in the Tibetan area. This paper, on the basis of the six fundamental principles, selected a total of 20 indicators from five dimensions: economic life, social security, public services, political advancement and living condition, to give a comprehensive evaluation to the lever of social equality in the Qinghai Tibetan area. It used the method of AHP to determine the weight of each index, and revealed the issue of inequality in the Qinghai Tibetan area, then provided new thoughts for social equality reform of Qinghai.

**Keywords**—*Qinghai Tibetan area; Income gap; Social equality; AHP*

## I. INTRODUCTION

Qinghai province is a typical western backward region with lagging economic development and a widening gap between urban and rural per capita income. The most important aspect of social equality is the economic equality, and income equality is an indispensable indicator to measure social equality. The widening of income distribution gap will further affect income equality, therefore affect the equality of the whole society. Thus, evaluating the income distribution gap will play an important role in increasing residents' income, improving of residents' income distribution, and promoting social equality in the whole Tibetan area.

The possible contributions of this paper are as follows: first, based on the original research results, it summarizes a new set of social equity evaluation index system, providing new ideas to other scholars for the study of social equity in remote ethnic minority areas.

Secondly, there are relatively few studies on social equity in remote ethnic minority areas in China at present. In this paper, AHP is applied to the comprehensive evaluation of social equity in Tibetan areas of Qinghai province, providing a

new method for other scholars to study social equity in remote ethnic minority areas.

Finally, through the analysis of the collected data, this paper has found the key factors affecting the social equity in Tibetan areas of Qinghai, which is of guiding significance for the social equity reform in those areas.

## II. THE ESTABLISHMENT OF SOCIAL EQUALITY INDEX SYSTEM IN QINGHAI TIBETAN AREA

Since the 4th Plenum of the 16th CPC Central Committee, constructing the social equality index system has become a hot academic topic. Many scholars have done a lot of research on this basis, establishing first-level, second-level and third-level indexes from different perspectives.

First, in the year 2005, China released the evaluation index system of social governance, namely the study on the statistical monitoring index system of harmonious society. It divided the index of harmonious society into 6 sub-target layers (including equality and justice), each consists of 6 indexes [1].

Second, the Central Compilation and Translation Bureau and Tsinghua university jointly issued the "evaluation index system of Chinese social governance" in Beijing in 2012, it has social equality index in the second-lever indexes [1].

Lastly is the evaluation index system of social governance and the measurement of gender equity published in 2012. The former also has six second-level indexes and 35 third-level indexes under the first-level index. The latter has 16 indexes under a 3-level 4-dimensional structure [1].

Based on the research of many former scholars, this paper summarizes a set of new index system to comprehensively evaluate the social equality degree of Qinghai Tibetan region. The specific evaluation indexes are as follows:

TABLE I SOCIAL EQUALITY INDEX SYSTEM OF QINGHAI TIBETAN AREA

Index dimension(A)	First-level index(B)	Second-level index(C)
Economic life(A1)	Comprehensive index of resident income(B1)	Gini coefficient(C1)、Income ratio of urban and rural farmers and herdsmen in Tibetan areas (C2)、Differential coefficient of economic development in Tibetan areas(C3)、Proportion of impoverished population in Tibetan area(C4)、The proportion of cordyceps sinensis and working income to total income (C5)、degree of Income satisfaction of farmers and herdsmen(C6)、The ratio of Tibetan income to national income(C7)
	Comprehensive index of household consumption(B2)	The consumption ratio of urban and rural farmers and herdsmen in Tibetan areas(C8)
	Comprehensive index of education(B3)	Middle school completion rate(C9) Number ratio of ordinary institutions of higher learning in Tibetan areas to that in the whole province (C10)
Social security(A2)	Comprehensive index of residents' social security(B4)	The proportion of the population receiving the subsistence allowance to the total population(C11) The proportion of the population receiving the subsistence allowance to the population living below minimum wage.(C12)
Public service(A3)	Comprehensive index of public input(B5)	Satisfaction of farmers and herdsmen with public service investment.(C13)
political advancement (A4)	Comprehensive index of administrative construction(B6)	Satisfaction degree of public service(C14)
	Comprehensive index of political participation(B7)	The level of enfranchisement of ethnic minorities in Tibetan areas (C15) Women suffrage ratio(C16)
Living condition(A5)	Degree of satisfaction with natural environment (B8)	Living(C17) production(C18) sustainable development(C19)
	Satisfaction with public security (B9)	Local residents' satisfaction degree of public security (C20)

Source of information: TIAN Fu-jun; ZHENG Yi-fang *Research on the Construction of Social Equity Evaluation Index System* [1].

**A. Gini coefficient (GC)**

The Gini coefficient was put forward by the Italian economist Corrado Gini in the early 20th century. It is an indicator of the income distribution inequality derived from the Lorentz curve. It actually quantifies the income gap represented by Lorentz curve, and serve as an important internationally recognized indicator of income inequality.

Its general function is as follows:

$$G = P_u^2 \times \left(\frac{U_u}{U}\right) G_u + P_r^2 \times \left(\frac{U_r}{U}\right) G_r + P_u \times P_r \times \frac{U_u - U_r}{U}$$

where  $G_u$  represents the Gini coefficient of income distribution of urban residents,  $G_r$  represents the Gini coefficient of rural income distribution,  $P_u$  represents the proportion of urban residents in the total population,  $P_r$  represents the proportion of rural residents in the total population,  $U_u$  represents the per capita income of urban residents,  $U_r$  represents the per capita income of rural residents,  $U$  represents per capita income of all

residents,  $G$  represents the Gini coefficient of income distribution for all residents.

By the standard of the relevant agencies of the UN, the levers of income inequality represented by the Gini coefficient are as shown below.

TABLE II GINI COEFFICIENT THRESHOLD

the Gini coefficient	level of inequality
below 0.2	Absolute income equality
0.2-0.3	Relative income equality
0.3-0.4	Reasonable income inequality
0.4-0.5	Relatively large income gap
above 0.5	Wide income gap

**B. Regional economic development difference coefficient**

Regional economic development difference coefficient refers to the differences in the economic development of different regions (per capita gross domestic product).

Its function is as follows:

$$CV_{GDP} = \sqrt{\frac{\sum_{i=1}^n (GDP_i - \overline{GDP})^2}{n}} / \overline{GDP}$$

where n represents the number of districts within the jurisdiction,  $\overline{GDP}$  represents GDP per capita, which means the average GDP per capita in n regions. Bigger Regional economic development difference coefficient represents bigger Regional economic development gap.

III. COMPREHENSIVE EVALUATION OF SOCIAL EQUITY

**A. The choosing of social equity index weight**

The weight of the social equality index reflect the importance of the index, and how much influence the index have on social equity. Generally speaking, the weight of the index with greater attention is also relatively higher. There are two methods to process the weight value. The Simplest one is equalization, the other is non-equalization, by which the weight value is calculated by analytic hierarchy process(AHP). AHP is decision analysis method that combines qualitative analysis and quantitative analysis to solve complex multi-objective problems. It uses pairwise comparison to determine the judgment matrix, and takes the component of the feature vector corresponding to the maximum eigenvalue as the corresponding coefficient, and then calculates the weight of each index [4] comprehensively.

**B. Calculation method of the social equity evaluation index**

According to the index system in table 1, Social equity index is as follows[5]:

$$I = \sum_{n=1}^5 I_n \times W_n \quad (1)$$

where  $I_n$  is the score of the nth index,  $W_n$  is the weight of the nth index.

$$I_n = \sum_{m=1}^j I_{nm} \times W_{nm} \quad (2)$$

Where  $I_{nm}$  is the mth first-level index score of the nth index deminsion,  $W_{nm}$  is the weight of the first-level index.

$$I_{nm} = \sum_{l=1}^j I_{nml} \times W_{nml} \quad (3)$$

Where  $I_{nml}$  is the lth second-level index score of the mth first level of the nth index dimensions,  $W_{nml}$  is the sub-weight of the second-level index.

After combining function (1),(2),(3), the social equality index can be expressed as follows

$$I = \sum_{n=1}^5 \left\{ \sum_{m=1}^j \left[ \left( \sum_{l=1}^j I_{nml} \times W_{nml} \right) \times W_{nm} \right] \right\} \times W_n \quad (4)$$

**C. Result:**

After processing the collected data with the function (4) using SPSS, the results are as follows.

TABLE III RESULT

Index dimension	Weight	Score
	non-equalization	
Economic life	0.424	0.343
Social security	0.078	0.002
Public service	0.064	0.001
Political advancement	0.170	0.051
Living condition	0.264	0.115
Sum	1.00	0.512

Source of information: TIAN Fu-jun; ZHENG Yi-fang *Research on the Construction of Social Equity Evaluation Index System*[1].

#### D. Analysis results of social equity in Tibetan area of Qinghai

Through the analytic hierarchy process of each index, the conclusion is as follows: if we want to prove the equality degree of a region, we need to choose a benchmarking city to compare with it. However, since many indexes do not have a standard, they are only indexes of equality and results of measurement. It can be seen from the table that the development of Qinghai society is relatively inequal.

In the table, the score of economic life is relatively higher, followed by living environment and political advancement. In other words, residents with poorer family conditions or less developed economy tend to pay more attention to the development of the economy. Because of the unique living habit and the concept of non-killing of the Tibetan people, they tend to have a higher sense of equality of equality in their living conditions. In regions where there are relatively more ethnic minorities, there are also higher concerns about political participation, the government also provides more support and help, which makes the farmers and herdsman have a higher sense of equality about the political environment. There is also a certain demand for social security and social public services, but compared with other aspects, these two aspects have lower scores and lower sense of equality.

Generally speaking, the Tibetan area of Qinghai province is still in a rather inequal state, and farmers and herdsman do not have a high sense of equality about the whole society. In addition, the specific situation should also be taken into account when drawing the results, so as to conduct comprehensive consideration.

#### IV. CONCLUSION

The research in this paper enriches related studies on social equality, deepens the understanding of the impact of regional difference on social equity, and also helps to ease of social inequality status of backward ethnic minority gathering places. The deficiency of this paper is that it only measures the social equity from the economic life ,social security, public service, political advancement and living condition without considering education background, wage level and other factors that may affect the empirical research of this paper. At the same time, this paper measures public service in a rather simple manner. Therefore, this paper will need further corrections from these two aspects to better provide reference value for other scholars.

#### REFERENCES

- [1] TIAN Fu-jun, ZHENG Yi-fang. Research on the Construction of Social Equity Evaluation Index System [J]. Agriculture and Forestry University(Philosophy and Social Sciences),2014,17(06):61-66.
- [2] Karl Marx and Frederick Engels(Volume 3)[M]. Beijing: People's Publishing House,1972:999.
- [3] Karl Marx and Frederick Engels(Volume 3)[M].Beijing: People's Publishing House,1972:10.
- [4] Mas Seti(T.L.Saaty).Analytic hierarchy process[EB/OL].Sogou Encyclopedia. 2012-12-26.
- [5] CHEN Yu-bin. Research on Comprehensive Evaluation of Index System of Harmonious Society in Fujian Province[D]. Xiamen University,2009.