

Study on Sustainable Growth Level of the city

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Abstract: We have chosen three aspects to analyze the sustainable growth level of a city. There are economic status, social status and ecological environment. First, for the sustainable growth level, we have developed four levels: Excellent, Good, Moderate, Bad. And we establish a city sustainable development evaluation index system. Second, we use the index system to calculate the current sustainable growth level according to the city's current situation. Third, we analyze it and propose reasonable recommendations to get new urban development plan. Finally, we evaluate the new plan. In addition, we have a sensitivity analysis of our analysis model.

Keywords: Index System, Sustainable Growth Level, Sensitivity Analysis

1. Introduction

We need to establish a city sustainable development evaluation index system to measure the development tendency of the city. The indexes should reflect the state, process and strength of urban sustainable development, and the construction of city economy, environment, ecology and society. And use this system to analyze the current situation of the city, put forward the future development plan.

Apply the evaluation system to make recommendations on urban development. By plugging the data of each city into the evaluation system, we can analyze the current development of the city's misunderstanding, such as low land use ratio, less per capita housing area and so on.

We need to analyze the current sustainable growth level and propose reasonable recommendations to get new urban development plan. Finally, we evaluate the new plan. At the same time, use the evaluation system to test the scientific development of the rationality and applicability.

2. Construction of Index System(IS)

We can get the value of each city's economic status(EC), social status(SO) and ecological environment(EE). we define the index system's equation as follows:

$$IS = \alpha EC + \beta SO + \gamma EE$$

We refer to the statistical yearbook, bulletin and national and international indicators of the corresponding standards and norms to determine the threshold and upper and lower limits. Then we formulate four-level grading standards.[1]

Table 1: Four Levels

Grade	Value	Qualitative evaluation
I	>0.75	Excellent
II	0.50~0.75	Good
III	0.25~0.50	Moderate
IV	<0.25	Bad

We chose two very different cities for analysis. The one is Zurich(developed city), the other one is Beira(underdeveloped city).

3. City status of Zurich

Zurich is the largest city in Switzerland, one of the safest, wealthiest and the most livable cities in Europe. Zurich is located in the north of the Alps, northwest of Lake Zurich, the mouth of the Limmat River and Lake Zurich. Urban population is 380,000. Zurich has been named one of the most livable cities in the world for many years.

Economy In Zurich, most people are engaged in secondary and tertiary sector of the economy. There are 120 banks and 70% of the Western European stock exchanges. The employment rate is as high as 89%, resulting in a high level of annual household income and per capita consumption.

Society Zurich is a historical and cultural city, so the tourism industry brings wealth and new productivity to the city .There are world-renowned prestigious schools and many schools at all levels ensure a high level of education. Zurich's infrastructure is completed. While land mixing is acceptable. The per capita housing area and infrastructure area is 402 m2. In short, the city is at a high standard of living.

Environment The ecological environment is also very well in Zurich , greening rate of 38%, reasonable energy use, low overall pollution.

Zurich: $SI = 0.7768$

The level is excellent. It needs to be kept.

4. City status of Beira

Beira is the third largest city in Mozambique. It lies in the central region of the country in Sofala Province, where the Pungwe River meets the Indian Ocean. Urban population is 450,000. It holds the regionally significant Port of Beira which acts as a gateway for both the central interior portion of the country as well as the land-locked nations of Zimbabwe, Zambia and Malawi.

Economy In Beira, 80% of people are engaged in agriculture .And the main cash crop is cashew nuts. The Secondary and tertiary sector of the economy is

underdeveloped. Per capita GDP is less than 1000 dollars, while Beira is rich in mineral resources. As the Port of Beira, this city become the economic and trade hub of Mozambique.

Society The infrastructure is poor in Beira. The Gini coefficient of the Beira is 0.47, the gap between rich and poor is relatively large. For housing, people are generally concerned about the construction materials (such as wood, iron, brick) rather than housing area. Due to poverty and backwardness, the education level of Beira is very low, illiteracy rate is 30%. Land use ratio is very low.

Environment Beira ecological environment is superior. Due to underdeveloped industry, there is basically no environmental pollution. As the low vitality of human production, the burden on the environment is also very little.

Beira: $SI = 0.2647$

The level is Moderate. It needs new plan.

5. New Plan for Beira

Beira is an underdeveloped city under the backwardness and poverty. Throughout the history of the world, the development of underdeveloped areas is always accompanied by environmental sacrifices and social imbalances. Since the development of smart growth plans can maximize appearance these problems, Beira can avoid the detours. Specific measures are as follows:

Develop education: Beira illiteracy rate is still 30%, which is the underlying reason for poverty and backwardness of the city. The development of education can allow more people to master the technology and have ability to build their home. We can apply a compulsory education system, so that more people will be at the primary cultural level. What's more, we should develop university education to provide the community with talent and leaders in various fields.

Adjust the industrial distribution: Beira locates in the north shore of the Penguin estuary, the west coast of Mozambique. The existence of the Port of Beira pull part of the economic trade. Beira is the main gateway to the outside world for not only Mozambique but also Zimbabwe, Zambia and Malawi. Therefore, we should seize the opportunity of investment attraction and balance the proportion of the three industries. In Agricultural, we should put more attention to Advantages Economic crops, such as cashews for export trade, which can pull the economic development of Beira.

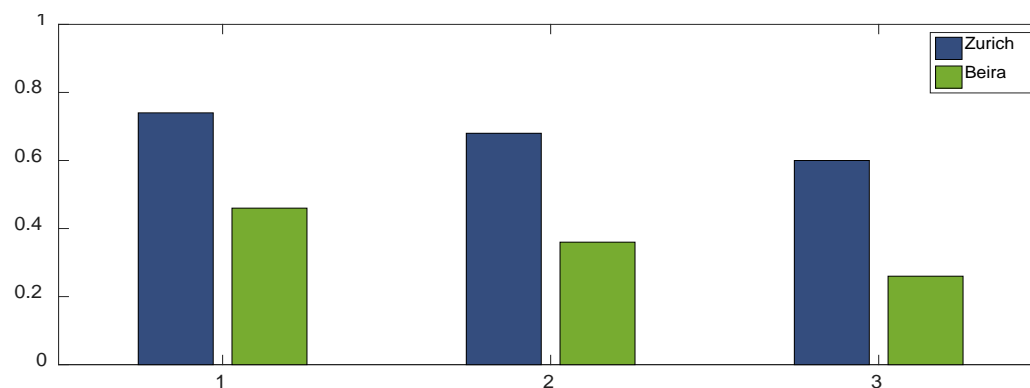
Request assistance: Establish relief agencies to make request to the international and domestic for incidental assistance and reducing debt. Stimulate local enterprises through foreign enterprises. Underdeveloped countries have been seriously affected local economy due to the huge debt problem. Foreign aid can also introduce technology to help local people out of poverty.

The development of culture: Underdeveloped countries are in a state of economic and technological backwardness and the traditional concept of deep-rooted. Social

cultural industries are not high. In economic globalization, its cultural strategy is not only significantly behind the developed countries, but also significantly behind their own development needs. Culture embodies a city's soft power and vitality. However, some feudal practices restrict the development of the region, while other feudal customs have the value of tourism. Therefore, we should take advantages and abandon coarse, expand cultural tourism projects and abandon the feudal dross.

6. Sensitivity Analysis for $\alpha \beta \gamma$

Zurich belongs to the cities of developed countries, while Beira belongs to the underdeveloped cities. Due to the three different weights, corresponding to the developed countries, developing countries, underdeveloped countries. Using three different weight combinations to deal with ESM SSM EEM of two cities, we get the SGM values of different combinations. From the Figure 3, the SGM values of two cities under different weight combinations have great changes, and there is a strong sensitivity to the weight combinations. It proves the correctness of the different weight combinations in the model.[2-3]



7. References

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