

# *The Influence of Regional Economic Development on Basic Education (BE)*

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**Abstract:** The balanced development of BE is an important value orientation and choice of China's education reform. Compulsory education is the focus of the balanced development of China's BE at this stage, and the reform of compulsory education is of great significance in the development of education. At present, there are some problems in China's BE, which are caused by historical and institutional reasons. We should gradually solve the problems left over from history through economic and social development. The main purpose of this paper is to study the impact of regional economy on BE. In addition to analyzing the impact, this paper also mentions how to optimize the allocation of ER and conduct related research. The experiment shows that the difference coefficient of SN217 educational resource allocation in the university district is 0.76, and the difference coefficient of SN217 educational resource allocation in the university district is 0.53.

## 1. Introduction

The balanced development of BE has become an important issue facing my country's educational undertakings. To achieve the balanced development of BE, a series of educational reform plans should be formulated to clarify the government's responsibilities in the reform and provide citizens with equal rights to receive education. The balanced development of BE is also the trend of my country's education development. With the continuous advancement of people's living standards and economic and social development, people are very concerned about high-quality ER and whether they can enjoy the right to education equally. Increasingly attention, how to solve this problem has become the key to promoting the development of my country's education [1-2].

In the research on education and economy, Galieva focused on the problems existing in preschool education in municipal districts, which is the initial link in the continuing education system and the basis for the all-round growth of individuals [3]. Analyze the impact of various economic and social living conditions and reveal the problems that hinder the development of preschool education. Research by Karminskaya et al. investigated the impact of higher education and vocational education on the economic development of the region [4].

This paper adopts a step-by-step strategy to analyze the resource allocation in the education stage. First, analyze the distribution of ER in districts and counties, and construct eight evaluation indicators in the resource allocation model of districts and counties. Through the statistics of the resource index values per student in each district and county, it is found that the distribution of

resources in districts and counties mainly includes the low comprehensive level of educational resource allocation and the interdistrict and county-level resource allocation. There are great differences in ER, and the utilization rate of resource allocation is low, so the target of resource allocation in districts and counties is proposed. This paper analyzes the resource allocation problem of the mutual aid mode of resources in the university district and constructs five evaluation indicators in the resource allocation model of the university district. Through data analysis, it is concluded that the main problem existing between the university districts is the unbalanced development, and the goal of balanced resource allocation in the university district is put forward.

## **2. The Influence of Regional Economic Development to it BE**

### **2.1 The Main Impact of Regional Economic Development to BE**

The investment ratio of educational funds determines the educational conditions and the allocation of ER. ERS include external factors such as school classrooms, teaching experimental equipment, and book materials, as well as internal factors such as the quality and management of teachers and staff. Therefore, the balance of education is mainly the balanced distribution of ER. From the perspective of the distribution of ER, the public education funds, the average education funds of students, and the average education funds expected to be spent by students are not balanced, and the size of school districts, teaching materials and the proportion of excellent teachers are also not balanced; Look, the economic level in the west is relatively low, and the supply and demand are not balanced, so the economy will fall into a vicious circle; while the income in the east is high, the economic flow is opposite to that in the west, so the economic development is moving towards a relatively virtuous circle, so the economic development level gap between the east and the west is different. will be pulled bigger and bigger. In this extremely unbalanced state of economic conditions, the education level of a region is closely related to the economic conditions of the region. Under the current education investment system, the local INVESTMENT funds are mainly solved by the local township government's fiscal revenue and personal economic expenditure. As the economic conditions of the east and west are increasingly different, the BE in the west region has begun to pay a heavy price for the educational gradient development strategy caused by economic inconsistency [5-6].

The main reason for the unbalanced development of IN my country is the unbalance between different regions, between urban and rural areas, and between schools. At present, the investment system of IN our country has gradually evolved from the responsibility of the government to the education investment mechanism of the local government. My country's economic and financial system has not been fully perfected, resulting in the unresolved shortage of investment funds for BE, which has also led to the development of BE in remote rural areas in a weak position, which cannot be fundamentally changed. Due to the shortage of investment funds, it also affects the welfare and environment of teachers, which leads to the imbalance of teacher resource allocation in the development of BE. The investment funds required for the development of urban education in my country can be guaranteed because the FUNDS are mainly borne by the government; while the sources of funds in remote rural areas are unstable and insufficient, the INVESTMENT in rural areas is overly dependent on townships and villages. The unbalanced economic situation has also widened the disparity in the investment of ER between regions, urban and rural areas, and schools, making it BE in remote and impoverished areas with slow economic development and schools with poor quality of education falling into a vicious circle[7-8].

## 2.2 Education Information Resource (EIR) Allocation Activities

EIR investment benefit evaluation In the process of educational information resource optimization, allocation activities, the analysis, comparison, and judgment of EIR input and output status can help education authorities to identify the input, output, and output of resource allocation activities. Check the relationship between the expected target values, and by adjusting the configuration strategy, achieve economic and social benefits that meet the target or exceed expectations. The whole process of the optimal allocation of EIR mainly includes: the investment of EIR—the design and development of EIR—the utilization of EIR—the output of EIR [9-10].

The output benefit of EIR is jointly determined by the input, development and utilization benefits of EIR and the coordination degree of the resource allocation environment: the investment benefit of EIR reflects whether the input and output of EIR in the allocation process is reasonable. Investigate the income generated by the overall investment in the construction of EIR; the development benefit of EIR mainly refers to the quality and service of EIR, including the main development of EIR and the purchase or introduction of external high-quality EIR; the benefit of EIR refers to how education-related departments organize and utilize limited EIR and make them play a maximum role, which is determined by the utilization rate of EIR purchased from development [11-12].

## 2.3 Construction of the Optimization Model of Educational Resource Allocation

Constructing the optimal model for the allocation of ER in districts and counties is to transform the actual problem into an objective function that can be represented by mathematical expressions under the condition of satisfying the specified constraints. The mathematical model of the objective function constructed according to this criterion will ultimately provide decision makers with an optimization strategy that not only satisfies the educational resource formulation strategy but also has scientific guiding significance.

### (1) Assumptions of the model

Through the detailed analysis of the optimization objectives of the district/county educational resource allocation, the establishment of the multiobjective optimization model of the educational resource allocation of the above-mentioned objective function will be completed. To remove the interference factors and make the model find the relative Pareto optimal solution reasonably and conveniently, the model needs to meet the following conditions:

1) Ensure that the original educational resource data of schools under the jurisdiction of each district and county are not adjusted during the research process.

2) Determine the relevant data of the eight indicators C1, C2, C3, C4, C5, C6, C7, and C8 related to the ER of the schools under the jurisdiction of each district and county, and can process the data to facilitate the simulation experiments..

### (2) The objective function of the model

For the optimization problem of educational resource allocation among districts and counties, the objective function constructed in this section is as follows:

1) Improve the level of educational resource allocation and establish the following objective functions:

$$\max F_{lev} = \sum_{i=1}^m \sum_{j=1}^5 \varphi_j lev_{ij} \quad (1)$$

2) To narrow the differences in resource allocation between districts and counties, establish the following objective function:

$$\min F_{diff} = \frac{1}{F_{lev}} \sqrt{\sum_{i=1}^m \frac{1}{m} \left( \sum_{j=1}^5 \varphi_j lev_{ij} - \overline{F_{lev}} \right)^2} \quad (2)$$

Among them,  $\overline{F_{lev}}$  represents the average level of all districts and counties within the jurisdiction of the city, and  $m$  represents the number of districts and counties within the jurisdiction of the city.

3) To improve the utilization rate of educational resource allocation, establish the following objective function:

$$\max F_{eff} = \sum_{i=1}^m \sum_{j=6}^8 \varphi_j eff_{ij} \quad (3)$$

According to the influence factors of the eight indicators C1, C2, C3, C4, C5, C6, C7, and C8 related to education resources on education, the corresponding weight of each indicator is considered. Therefore, the relevant weights  $\varphi_1, \varphi_2, \varphi_3, \varphi_4, \varphi_5, \varphi_6, \varphi_7, \varphi_8$  are introduced into the above objective function model.

4) Optimize the objective function

Considering the rationality, fairness, and efficiency of the objective function of the allocation of ER in districts and counties, Equation (4) is obtained:

$$\left\{ \begin{array}{l} \max \left( \sum_{i=1}^m \sum_{j=1}^5 \varphi_j lev_{ij} \right) \\ \min \left( \frac{1}{F_{lev}} \sqrt{\sum_{i=1}^m \frac{1}{i^2} \left( \sum_{j=1}^5 \varphi_j lev_{ij} - \overline{F_{lev}} \right)^2} \right) \\ \max \left( \sum_{i=1}^m \sum_{j=6}^8 \varphi_j eff_{ij} \right) \end{array} \right. \quad (4)$$

In formula (4):  $i$  represents the number of districts and counties within the jurisdiction of the city;  $j$  represents the weight number of ER-related indicators;  $m$  represents the number of districts and counties within the jurisdiction of the city;  $\varphi$  represents the weight of ER-related indicators;  $\overline{F_{lev}}$  represents the average level of educational resource allocation in all districts and counties within the jurisdiction of the city;  $lev_{ij}$  represents the ability performance of the  $i$ -th district and county within the city's jurisdiction in terms of the  $j$ -th indicator educational resource allocation level;  $eff_{ij}$  represents the  $i$ th district and county within the city's jurisdiction The capacity performance of  $i$  districts and counties in the  $j$ th index of educational resource allocation and utilization.

### 3. Research on Balanced Development and Optimal Configuration of BE

#### 3.1 Strategies for Sharing High-Quality ER in the Region to Promote the Balanced development of BE

(1) Material resource sharing

In the process of balanced development of education, the sharing of high-quality material resources is an important way. There is no need for every school to build a plastic track sports field, but a library, a local area network center, etc., for each school. For these devices, they can be shared within the region to play the role of resources.

(2) Human resource sharing

Many places pay great attention to the issue of school teacher setting. To help some weak schools improve the overall level of teaching staff, some outstanding normal graduates are sent to weak schools to teach, or outstanding leading teachers are sent to weak schools on a regular basis and in turn to communicate. Schools should break down the barriers between schools, establish a talent flow mechanism, and reasonably allocate human resources. To let teachers play a role in a wider range, some professional teachers should implement joint employment, and some outstanding teachers and well-known teachers can be shared in the region. Between model schools and ordinary schools, we implement the rotation system for outstanding teachers.

(3) Use the network platform to realize resource sharing

Make full use of the network to transmit and share ER, so that high-quality ERS can maximize their own benefits. Compared with the exclusivity of traditional textbook-style paper resources, the biggest feature of online platforms is sharing. The same educational information can be used simultaneously in different places, at different times, or by different people. The sharing of ER on the network platform can be represented by reprinting, uploading and downloading, media sharing, etc., On this network platform, all learners can share the same information resource at any time, which is beyond the reach of traditional paper education materials, saving money the cost of learner time and investment.

### 3.2 Configuration Process

Analytic Hierarchy Process (AHP) is an empowering method that provides support for dealing with multiple goals and multiple decision scenarios. The most significant feature of AHP is that in the multiobjective decision-making process, it adopts a hierarchical and quantitative analysis strategy according to the decision-maker's thinking mode and psychological value law. The steps of AHP are shown in Figure 1.

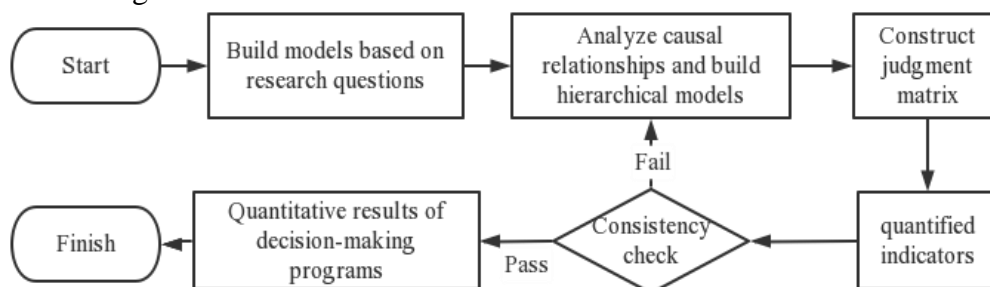


Figure 1: The flow chart of the hierarchical analysis of the comprehensive configuration level of BE in the university district

(1) Establish a system hierarchy. The comprehensive configuration level of compulsory education in the university district is taken as the decision-making evaluation target, and the five indicators are used as practical factors to be considered in decision-making.

Construct the judgment matrix. The judgment matrix represents the comparison of the importance of all factors to each other in the decision-making of the program. The judgment is quantified according to the Saaty1-9 scale, and the judgment matrix is constructed according to Table 1, where  $X_{ab}$  represents the elements in the judgment matrix, that is, the importance scale values of the a-th index compared with the bth index are shown in Figure 2.

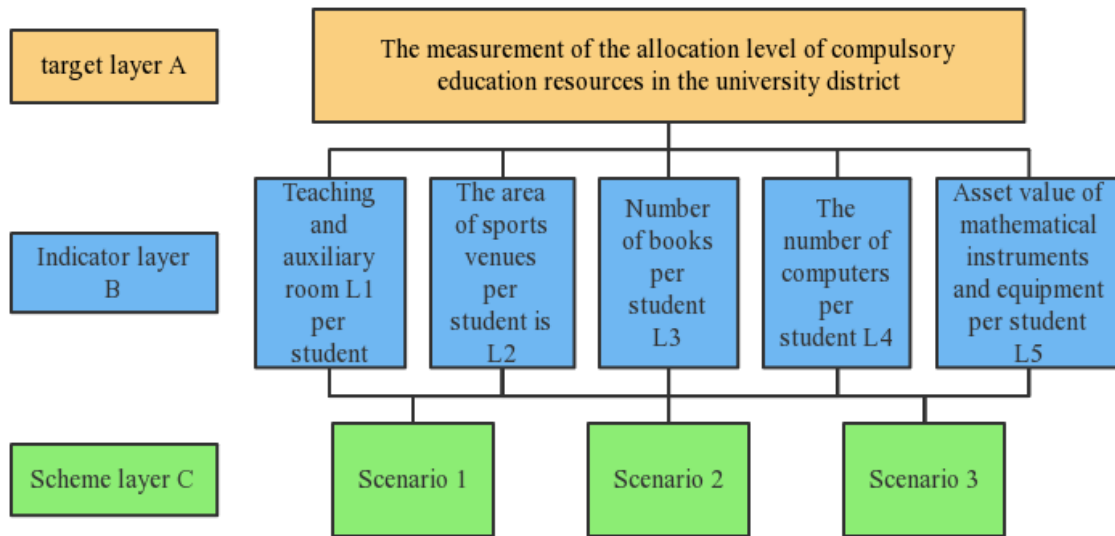


Figure 2: Hierarchical structure of the level measurement of educational resource allocation in the university district

Table 1: How to judge the scale of a matrix

Scaling	Meaning
1	Compared with index a and index B, it is equally important
3	Compared with index a and index B, index A is slightly more important than index b
5	Compared with index a and index B, index A is clearly more important than index b
7	Compared with indicator a and indicator B, indicator A is more important than indicator b
9	Compared with index a and index b, index a is extremely important than index b
2,4, 6, 8	Transitions between materiality judgments
Reciprocal	$X_{ab}=1/X_{ba}$

## 4. Analysis on Balanced Development and Optimal Configuration of BE

### 4.1 Example Analysis of the Algorithm

The KnEA algorithm is used for simulation experiments, and KnEA is used to solve the multiobjective optimization model of educational resource allocation in the mutual aid mode of the university district constructed in this chapter. Since the proposed educational resource allocation optimization of the university district resource mutual aid model contains the weights corresponding to five indicators related to educational resources (ER), the corresponding weights of the five indicators L1, L2, L3, L4, and L5 are calculated by the AHP, and the results are shown in Table 2.

Table 2: The weight corresponding to the indicator

Weights	w1	w2	w3	w4	w5
Calculation results	0.3794	0.1741	0.0892	0.1224	0.2349

The weights of the five indicators are brought into the model, and the population size in this experiment is set to 100 and the maximum number of iterations to 300. Kn, EA, MOEA/D-DE, SPEA2SDE are used to optimize the allocation of ER in the university district resource mutual aid mode., NSGA-III algorithm for model comparison and solution. The following table 3:

Table 3: Calculation results of HV indicators in the model

Obj	M	D	KnEA	MOEA/D-DE	SPEA2SDE	NSGA-III
My_fitness2	18	90	0.562826	0.521462	0.552681	0.538942
			0.384475	0.284764	0.378429	0.364165
			0.486759	0.435671	0.475627	0.448951

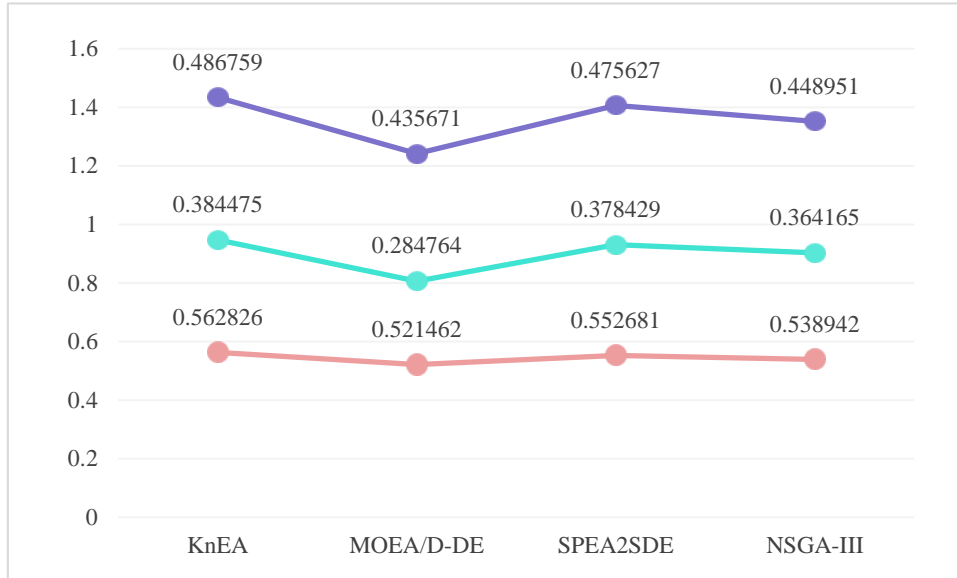


Figure 3: Analysis of HV index calculation results

Figure 3 shows the HV values obtained by the four algorithms running the model for 30 times. From the data shown in the table, it can be seen that the KnEA, MOEA/D-DE, SPEA2DE, and NSGA-III algorithms are obtained after 30 running experiments. The relationship of the mean HV with the HV is:  $HV(KnEA) > HV(SPEA2DE) > HV(NSGA-III) > HV(MOEA/D-DE)$ . This shows that the diversity of Pareto nondominated solutions obtained by KnEA in this model is significantly better than that of MOEA/D-DE, SPEA2DE, and NSGA-III.

## 4.2 Balanced Comparison

To observe the comparison before and after the configuration of each university district more intuitively, the balance before and after the allocation of ER in the university district is now represented by a bar chart, as shown in Table 4:

Table 4: A comparison of the balance before and after the allocation of ER in the university district

District Number	1	2	3	4	5	6	7	8	9
Before configuring the 1experiment	0.28	0.29	0.10	0.41	0.34	0.26	0.10	0.08	0.19
After configuring the experiment	0.19	0.19	0.08	0.31	0.24	0.23	0.10	0.07	0.17
District Number	10	11	12	13	14	15	16	17	18
Before configuring the 1experiment	0.27	0.29	0.10	0.32	0.28	0.10	0.48	0.76	0.6
After configuring the experiment	0.19	0.21	0.12	0.23	0.22	0.08	0.23	0.53	0.42

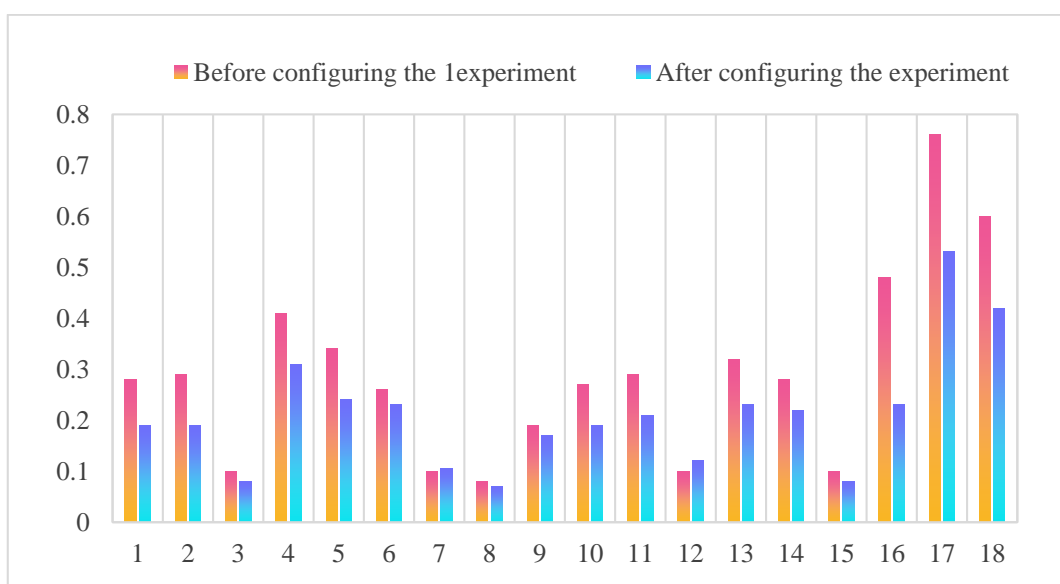


Figure 4: Analysis of Difference Coefficient of ER Allocation in University District

It can be seen from Figure 4 that before the configuration experiment, the difference coefficient of SN201 educational resource allocation in the university district was 0.28. After the allocation experiment, the difference coefficient of SN201 educational resource allocation in the university district was 0.19; the difference coefficient of ER allocation in district SN217 was 0.53, and the difference within the university district became lower, indicating that the university districts in the district tended to develop in a balanced manner.

Through the above analysis, the optimization of each indicator in the educational resource allocation model of the university districts under the jurisdiction of districts and counties can not only improve the level of resource allocation in the districts and counties, but also help in the process of allocating ER in the districts and counties. Provide decision support to obtain configuration solutions supported by scientific theory.

## 5. Conclusions

BE is the foundation for improving national quality and enhancing national strength. The balanced development of BE plays an important role in accelerating social development and improving economic strength. In recent years, the issue of BE has attracted attention, and China has also learned from developing countries on the issue of balanced development of BE. This paper conducts preliminary research and analysis on the issue of balanced development of BE. There are interregional, urban-rural, and interschool differences in our country. In view of the unbalanced development of BE in my country, several policy suggestions are put forward on how to promote the balanced development of BE in China. We should keep a clear head, carefully study the new situation that my country's education cause is facing in the process of REFORM and balanced development, seize opportunities, face challenges bravely, make up for deficiencies, and strive to promote the balanced development of my country's.

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