

# An Empirical Analysis of Investment Efficiency of Manufacturing Industry in Anhui Province

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## Abstract

Manufacturing industry is the cornerstone of modern economic development and one of the main driving forces for economic development. In recent years, manufacturing industry in Anhui Province has played a huge role in promoting economic development, but there are still many problems in manufacturing industry investment. Based on the manufacturing industry investment data of Anhui Province, this paper uses the marginal capital output ratio (ICOR) and data envelopment analysis (DEA) methods to analyze the overall efficiency of manufacturing investment, manufacturing investment efficiency and manufacturing investment efficiency of various industries in different cities, and put forward targeted countermeasures and suggestions in order to improve the efficiency of manufacturing investment in Anhui Province, so as to better promote the sustainable and healthy development of Anhui economy.

## Keywords

Manufacturing industry, Investment efficiency, Marginal capital output ratio, Data envelopment analysis.

## 1. Introduction

In order to promote the transformation and upgrading of the manufacturing industry and catch up with the pace of the world's manufacturing industry powerhouse, China proposed the "Made in China 2025" strategy in May 2015. The first World Manufacturing industry Conference was held in Anhui in May 2018. The Global Chairman of the Global SME Alliance and former German President Christian Woolf said in the opening speech: "Anhui Province is an ideal investment base for world manufacturing industry. " It can be seen that the manufacturing industry in Anhui Province has great advantages. However, the investment efficiency of the manufacturing industry in Anhui is not high. Therefore, this paper uses marginal capital output ratio (ICOR) to analyze the overall efficiency of manufacturing industry investment in Anhui, and uses data envelopment analysis (DEA) to invest in Anhui's manufacturing industry in various cities and analyze the investment efficiency of the industry's manufacturing industry and put forward countermeasures and suggestions for the main problems existing in the investment efficiency of manufacturing industry in Anhui Province.

## 2. Overall efficiency analysis of manufacturing industry investment

Manufacturing industry investment efficiency is a key indicator for measuring the development of the manufacturing industry market. The higher the manufacturing industry investment efficiency, the more beneficial it is to the stable development of the market. The evaluation and measurement methods of investment efficiency generally include the marginal capital output ratio (ICOR), the constant element substitution elasticity (CES) production function [1], where the marginal capital output ratio does not consider fixed asset depreciation in the efficiency evaluation, and regardless of the capital stock and the depreciation rate, the calculation is relatively simple and relatively intuitive, so it is more commonly used. Based on its simple and practical characteristics, this part also uses ICOR to analyze the overall efficiency changes of manufacturing industry investment in Anhui Province over the years.

ICOR refers to the capital increase required to increase the total output of a unit. If K is used to represent the capital stock,  $\Delta K$  is the capital increase, Y is the annual total output, and  $\Delta Y$  is the total output increase, then  $ICOR = \Delta K / \Delta Y$ . The decline of ICOR indicates that under the condition that the total input per unit remains unchanged, the total output per unit increases, indicating the improvement of investment efficiency[2]. On the contrary, it means the decrease of investment efficiency. In the study of manufacturing industry investment efficiency, manufacturing industry investment completion amount PI replaces capital increment in fixed asset investment, and total output value of Industrial Enterprises above the annual scale replaces total output, that is  $ICOR = PI / \Delta Y$ .

In the calculation of ICOR, this paper directly selects the completion of investment in manufacturing of completion of investment in fixed assets and total sales value and total output value of industrial enterprises above designated size of 2012-2019 Statistical Yearbook for calculation, and draws a line chart

The investment efficiency of manufacturing industry in Anhui Province is shown in Table 1 and figure1.

Table 1 Input and output of manufacturing industry in Anhui Province and China in 2012-2019  
unit: 100 million yuan

Year	Anhui Province		China	
	Manufacturing industry investment	Industrial output value above designated size	Manufacturing industry investment	Industrial output value above designated size
2012	6072.51	28584.11	124550.04	909797.17
2013	7272.91	32913.47	147704.96	1019405.3
2014	8378.35	36505.46	167025.29	1092197.99
2015	9458.09	38798.25	180370.38	1104026.7
2016	10388.31	42329.72	187962.12	1151950.07
2017	11434.23	46179.02	193709.97	1203036.38
2018	15245.33	50386.31	212112.42	1257290.05
2019	16785.0	54900.73	218687.90	1314636.17

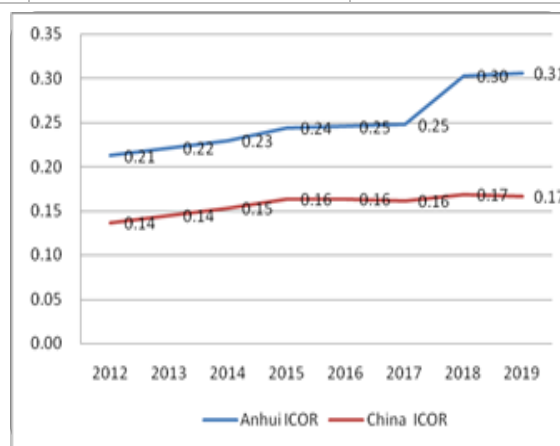


Figure 1 Investment efficiency coefficient of manufacturing industry in Anhui and China in 2012-2019

As can be seen from Figure 1, the overall change trend of ICOR value of Anhui in 2011-2019 is basically the same, showing an upward trend, which is higher than the national ICOR level. It shows that the investment efficiency of manufacturing industry in Anhui is slightly lower than the national average level. The investment efficiency of manufacturing industry in Anhui Province can be roughly divided into three stages: From 2011 to 2014, the investment efficiency of manufacturing industry in Anhui province gradually increased from 0.20 to 0.22; from 2015 to 2017, the increase of investment

efficiency ICOR slowed down, with little change in three years, fluctuating at 0.23; from 2017 to 2019, the investment efficiency gradually increased to 0.31.

### 3. Analysis of manufacturing industry investment efficiency of various cities

#### 3.1 Model construction and indicator selection

In this part, DEA is used to analyze the investment efficiency of manufacturing industry in Anhui Province. DEA is a data-oriented evaluation, especially in dealing with the relative effectiveness between multiple input and multiple output DMUs [3]. Therefore, this part can objectively evaluate the investment efficiency of all cities in Anhui Province by using this method.

The traditional DEA model, or BCC model, was proposed by Charnes in 1978 to evaluate the relative effectiveness of decision-making units under the "multiple input and multiple output" model. The BCC model is used to deal with the effectiveness of decision-making units under the assumption of "variable returns to scale" [4]. For any decision unit DMU, the input-oriented dual BCC model can be expressed as:

$$\begin{aligned} \min &= \{\theta - \varepsilon (e^t s^- + e^t s^+)\} \\ \text{s.t.} & \sum_{i=1}^n \lambda_i y_{ir} - s^+ = y_{0r} \\ & \sum_{i=1}^n \lambda_i x_{ij} + s^- = \theta x_{0j} \end{aligned} \quad (1)$$

$$\lambda_j \geq 0, \quad S_+ \geq 0, \quad S_- \geq 0, \quad \theta \text{ is free.}$$

The relaxation variables  $S_+$  and  $S_-$  are introduced to the model,  $x_{ij}$  is the input element,  $y_{ir}$  is the output element,  $\theta$  is the effective value of the decision unit DMU,  $\lambda$  is the coefficient of the linear combination of the decision unit, and \* indicates the optimal solution.

If  $\theta^* = 1, S_-^* = 0 = S_+^* = 0$ , the DMU decision unit is called DEA effective;

if  $\theta^* = 1, S_-^*, S_+^*$  has a non-zero value, the DMU decision unit is called weak DEA;

if  $\theta^* \leq 1$ , the DMU decision unit is called DEA invalid.

Since DEA has significant advantages in analyzing multiple inputs and multiple outputs, Therefore, this part uses DEA to evaluate the efficiency of manufacturing industry investment in Anhui Province. Considering that the input indicators of DEA are as small as possible and the output indicators are as large as possible. Therefore, the selection indexes of manufacturing industry investment efficiency evaluation are specifically as follows: First, input indicators. The selected input indicator is the completion amount of fixed assets investment in manufacturing industry in 16 cities in Anhui Province in 2019. The second is the output index. As the industrialization process is actively promoted and the transformation of traditional industries into modern processing and manufacturing industry industries is accelerating, as the core of the secondary industry, manufacturing industry is becoming the main source of power, and manufacturing industry has gradually become an important growth point of industrial economy in Anhui Province. Therefore, the added value of industrial enterprises above the designated size in 16 prefectures and cities is used as an output indicator to reflect the economic value of products or services provided by manufacturing industry investment activities in various regions. See Table 2 for the evaluation index system of Anhui manufacturing industry investment efficiency.

Table 2 evaluation index system of manufacturing industry investment efficiency in Anhui Province

Indicator type	First-level indicators	Second-level indicators
Input indicators	Capital investment	Investment in manufacturing industry fixed assets
Output indicators	Economic value of manufacturing industry investment	GDP

### 3.2 Empirical results and analysis

By using the input-oriented BCC model, the input and output index data of Anhui cities in 2019 are brought into the model, and the obtained data can be directly brought into the deap2.1 software for solution. After DEA calculation and analysis, the investment efficiency results of each city are obtained, including technical efficiency, pure technical efficiency, scale efficiency and scale return status [5]. Among them, technical efficiency, also known as comprehensive technical efficiency, is equal to the product of scale efficiency and pure technical efficiency, which reflects the allocation capacity and utilization efficiency level of investment resources of manufacturing industry industries in each city; pure technical efficiency reflects the change in the level of manufacturing industry investment efficiency caused by factors such as system and management level under the condition of constant scale returns; scale efficiency reflects the production efficiency affected by factors such as the size of manufacturing industry enterprises in various provinces, and reflects the gap between the actual scale and the optimal production scale; scale compensation reflects the stage of production of the enterprise and can help the enterprise determine the next production plan. The empirical results are shown in Table 3.

Table 3 Evaluation results of investment efficiency of manufacturing industry industries in Anhui in 2019

Region	Technical efficiency	Pure technical efficiency	Scale efficiency	Returns to scale
Hefei	0.431	1.000	0.431	Diminishing
Huaibei	0.295	0.442	0.667	Diminishing
Bozhou	0.482	0.722	0.668	Increment
Suzhou	0.241	0.466	0.519	Diminishing
Bengbu	0.256	0.491	0.521	Diminishing
Fuyang	0.656	1.000	0.656	Diminishing
Huainan	0.741	0.961	0.772	Diminishing
Chuzhou	0.268	0.553	0.484	Increment
Lu'an	0.494	0.729	0.678	Increment
Ma'anshan	0.156	0.336	0.463	Increment
Wuhu	0.201	0.453	0.442	Increment
Xuancheng	0.179	0.351	0.510	Increment
Tongling	0.185	0.308	0.599	Diminishing
Chizhou	0.200	0.306	0.654	Increment
Anqing	0.277	0.541	0.512	Increment
Huangshan	1.000	1.000	1.000	constant

Note: The technical efficiency value is equal to the product of pure technical efficiency and scale efficiency

Based on the DEA calculation results, the following analyzes the investment efficiency of manufacturing industry industries in Anhui from the perspective of technical efficiency, scale efficiency and scale efficiency:

Judging from the pure technical efficiency of various cities, the pure technical efficiency indicators of Hefei, Ma'anshan, Wuhu, Tongling, Chizhou and Huangshan are all equal to 1. Pure technical efficiency refers to the efficiency brought by the system and management level. The value of pure technical efficiency in these six cities is 1 indicating that the operating efficiency and management level of capital investment in manufacturing industry enterprises are relatively high. The investment structure and scale of manufacturing industry are relatively reasonable, which means that at the current technical level, the use of investment is efficient.

Judging from the technical efficiency of each city, only Ma'anshan's technical efficiency value is 1, indicating that Ma'anshan's manufacturing industry enterprises' technical investment is relatively effective compared to other cities. The technical efficiency values of Fuyang, Huainan and

Huangshan are relatively low, only 0.237, 0.210 and 0.156, indicating that the investment efficiency of manufacturing industry in these three cities is relatively low. The reason is that its manufacturing industry structure is relatively simple, lacking the unique characteristics of industrial development, lacking the ability to allocate resources and unable to improve the efficiency level.

From the point of view of the scale efficiency of each city, except Maanshan, the scale efficiency of the remaining cities has not reached 1, the scale efficiency of Bozhou, Bengbu, Lu'an and Xuancheng is close to 1, the closer the scale efficiency is to 1 or equal to 1, it means that the scale is more close to the optimal production scale. The scale efficiency of Hefei and Huangshan is low. The scale efficiency of Hefei is 0.361 and that of Huangshan is only 0.156, indicating that the actual production scale is far from the optimal production scale.

From the analysis of the scale benefit of manufacturing industry investment in various cities, Ma'anshan is in the stage of constant returns to scale, that is, the manufacturing industry investment scale of the city is in an optimal state. Bozhou, Huaibei, Suzhou, Huainan, Lu'an, Xuancheng, Tongling, Chizhou, and Huangshan are in the stage of increasing returns to scale, indicating that these nine cities can increase manufacturing industry investment efficiency by appropriately increasing the scale of manufacturing industry investment. Hefei, Bengbu, Fuyang, Chuzhou, Wuhu and Anqing are in the stage of decreasing scale, indicating that these six cities can increase production capacity by appropriately reducing the scale of manufacturing industry investment.

In general, In 2019, the overall level of investment efficiency of manufacturing industry in Anhui Province is medium, showing a good development trend, but there is still a large difference in the scale of regional manufacturing industry development, and the development of the central region of Anhui has great advantages. This is mainly because the central part of Anhui has a better geographical position and technological innovation than the northern part of Anhui, which belongs to the core area of economy and science and technology of Anhui Province, which is conducive to stimulating investment and driving the development of manufacturing industry industries, and the manufacturing industry investment efficiency is relatively high.

#### **4. Analysis on investment efficiency of manufacturing industry industries by industry**

The analysis ideas and methods on the investment efficiency of the manufacturing industry are consistent with the previous analysis of the investment efficiency of the manufacturing industry in various cities. In this section, DEA method and statistical regression model are used to measure the manufacturing investment efficiency of 31 manufacturing industries in Anhui Province in 2018, and relevant indicators and data are selected for efficiency measurement and evaluation.

##### **4.1 Model building and indicator options**

We use Data Envelopment Analysis (DEA) to analyze the investment efficiency of Anhui manufacturing industry by industry.

The manufacturing industry investment efficiency evaluation indicators include input indicators and output indicators. Considering the accuracy, operability and suitability of the data, we choose four indicators to measure the investment efficiency level of manufacturing industry, among which the specific indicators are as follows:

**Input indicators.** This section selects indicators from labor input and capital input. At present, China's wage system is not fully improved, and labor income and wages do not fully reflect the amount of labor input. Therefore, we select the number of employees in the manufacturing industry of Anhui Province in 2018 as the indicator of labor input, and the amount of fixed asset investment as the indicator of capital input.

**Output indicators.** This section selects the output indicators as the total industrial fixed assets and total profits of manufacturing industry industries (Enterprises above Designated Size) in Anhui Province in 2018.

See Table 4 for the evaluation index system of manufacturing industry investment efficiency.

Table 4 Evaluation Index System of Manufacturing industry Investment Efficiency in Anhui

Evaluation Index System of Investment Efficiency of Various Industries in Manufacturing industry	Indicator type	First-level indicators	Second-level indicators
	Input indicators	Capital investment	Investment in fixed assets by industry
		Cost input	Number of employees by industry
	Output indicators	Industrial economic value	Total fixed assets
Profit		Total profit	

#### 4.2 Empirical results and analysis

This section uses the DEA model to measure the manufacturing industry investment efficiency of 31 manufacturing industry industries in Anhui in 2018, and selects relevant indicators and data for efficiency calculation and evaluation. The empirical results are shown in Tables 5 and 6.

Table 5 Investment and output of manufacturing industry in Anhui Unit: 100 million yuan

Industry	Investment in fixed assets by industry	Number of employees by industry Unit: People	Total fixed assets	Total profit
Agricultural and sideline food processing industry	7003327	126669	1030.96	121.68
Food manufacturing industry	4371113	59822	361.27	39.57
Wine, beverage and refined tea manufacturing industry	2723013	62241	698.98	92.69
Tobacco products industry	59170	10756	323.76	5.69
Textile industry	4746672	103670	559.97	49.45
Textile and apparel, apparel industry	5349175	180070	362.51	49.54
Leather, wool, feather and their products and footwear industry	1482138	49741	223.45	34.13
Wood processing and wood, bamboo, rattan, palm, straw products industry	3802721	46241	246.37	40.13
Furniture manufacturing industry	2931083	29422	161.98	22.40
Paper and paper products industry	2181874	24441	448.95	31.20
Printing and recording media reproduction	1353382	34081	232.63	26.71
Culture, industry, sports and entertainment manufacturing industry	1661275	63327	226.18	32.78
Petroleum processing, coking and nuclear fuel processing industry	496815	6379	204.05	28.28
Chemical raw materials and chemical manufacturing industry	7892815	115761	2142.56	188.59
Pharmaceutical manufacturing industry	4748249	70172	1019.91	74.18
Chemical Fiber Manufacturing industry	380236	8292	155.05	8.79
Rubber and plastic products industry	7785062	130174	1175.46	99.28
Non-metallic mineral products industry	14594267	191343	2385.83	374.00
Ferrous metal smelting and rolling processing industry	1198466	57798	1391.10	152.13
Non-ferrous metal smelting and rolling processing industry	2114162	46947	1430.27	69.39
Metal products industry	8548847	119146	1031.68	102.06
General equipment manufacturing industry	13356785	153337	1561.91	118.70
Special equipment manufacturing industry	11684648	107323	1176.29	85.61
Automotive Manufacturing industry	10466754	192624	2755.89	76.55
Iron, ship, aerospace and other transportation equipment manufacturing industry	1761351	18658	204.03	8.75

Electrical machinery and equipment manufacturing industry	14456660	253237	3455.65	276.93
Computer, communications and other electronic equipment manufacturing industry	11410115	199233	3494.67	145.45
Instrumentation manufacturing industry	2335512	14371	156.84	17.15
Other manufacturing industry	2251248	12896	78.52	10.50
Comprehensive utilization of waste resources	1889468	11033	110.84	24.93
Metal products, machinery and equipment repair industry	112539	4569	127.74	3.37

Table 6 Evaluation Results of Investment Efficiency of Manufacturing industry in Anhui

Industry	Technical efficiency	Pure technical efficiency	Scale efficiency	Returns to scale
Agricultural and sideline food processing industry	0.273	0.356	0.765	Decreasing scale
Food manufacturing industry	0.190	0.208	0.911	Decreasing scale
Wine, beverage and refined tea manufacturing industry	0.444	0.532	0.834	Decreasing scale
Tobacco products industry	1.000	1.000	1.000	Unchanged scale
Textile industry	0.174	0.188	0.927	Decreasing scale
Textile and apparel, apparel industry	0.094	0.100	0.942	Increasing scale
Leather, wool, feather and their products and footwear industry	0.235	0.269	0.873	Increasing scale
Wood processing and wood, bamboo, rattan, palm, straw products industry	0.196	0.244	0.801	Decreasing scale
Furniture manufacturing industry	0.172	0.202	0.851	Increasing scale
Paper and paper products industry	0.574	0.592	0.969	Decreasing scale
Printing and recording media reproduction	0.251	0.280	0.895	Increasing scale
Culture, industry, sports and entertainment manufacturing industry	0.185	0.219	0.844	Increasing scale
Petroleum processing, coking and nuclear fuel processing industry	1.000	1.000	1.000	Unchanged scale
Chemical raw materials and chemical manufacturing industry	0.583	1.000	0.583	Decreasing scale
Pharmaceutical manufacturing industry	0.458	0.514	0.892	Decreasing scale
Chemical Fiber Manufacturing industry	0.600	0.631	0.951	Increasing scale
Rubber and plastic products industry	0.287	0.339	0.846	Decreasing scale
Non-metallic mineral products industry	0.446	1.000	0.446	Decreasing scale
Ferrous metal smelting and rolling processing industry	1.000	1.000	1.000	Unchanged scale
Non-ferrous metal smelting and rolling processing industry	0.979	1.000	0.979	Decreasing scale

Metal products industry	0.272	0.339	0.802	Decreasing scale
General equipment manufacturing industry	0.318	0.417	0.764	Decreasing scale
Special equipment manufacturing industry	0.343	0.392	0.873	Decreasing scale
Automotive Manufacturing industry	0.456	0.762	0.599	Decreasing scale
Iron, ship, aerospace and other transportation equipment manufacturing industry	0.342	0.342	1.000	Unchanged scale
Electrical machinery and equipment manufacturing industry	0.434	1.000	0.434	Decreasing scale
Computer, communications and other electronic equipment manufacturing industry	0.558	1.000	0.558	Decreasing scale
Instrumentation manufacturing industry	0.341	0.388	0.880	Increasing scale
Other manufacturing industry	0.190	0.394	0.483	Increasing scale
Comprehensive utilization of waste resources	0.510	0.556	0.917	Increasing scale
Metal products, machinery and equipment repair industry	0.914	1.000	0.914	Increasing scale
Average value	0.446	0.557	0.824	-

Note: The technical efficiency value is equal to the product of pure technical efficiency and scale efficiency

From the perspective of the average efficiency of various industries in the manufacturing industry, without considering the external environment and other factors, the average value of technical efficiency is 0.446, the average value of pure technical efficiency is 0.557, and the average value of scale efficiency is 0.824, which is close to 1. Scale efficiency is higher than technical efficiency, indicating that scale efficiency is in the leading position and pure technical efficiency is in the secondary position. The manufacturing industry has not reached the full scale and efficiency, but it is at a high level.

From the perspective of technical efficiency and scale efficiency, tobacco products industry, petroleum processing, coking and nuclear fuel processing industry, ferrous metal smelting and rolling processing industry, railway, shipbuilding, aerospace and other transportation equipment manufacturing industry, metal products, machinery and equipment repair, the technical efficiency and scale efficiency of the industry and non-ferrous metal smelting and rolling processing industry are both 1 or close to 1, indicating that the investment efficiency of manufacturing industry in these six industries is at the forefront, the current scale and technology are effective and beneficial to the development of this industry. The chemical raw materials and chemical manufacturing industry, non-metallic mineral products industry, electrical machinery and equipment manufacturing industry, computer, communications and other electronic equipment manufacturing industry industries all have a pure technical efficiency of 1. However, its scale efficiency is relatively low, which is below the average value of 0.824, resulting in its low technical efficiency, which shows that the capital operation efficiency and management level of these industries are relatively high, but the investment scale control is relatively unreasonable.

Agricultural and sideline food processing industry, food manufacturing industry, textile industry, textile and clothing, apparel industry, leather, wool, feather and their products and footwear industry, wood processing and wood, bamboo, rattan, palm, straw products industry, furniture manufacturing industry, printing and recording media replication, cultural, industrial, sports and entertainment manufacturing industry, rubber and plastic products industry, metal products industry and other technical efficiency and pure technical efficiency are below the average level of 0.557, especially in



food manufacturing industry, textile industry and the leather, wool, feather and its products and the footwear industry have pure 0.288, 0.108 and 0.01, and the pure technical efficiency is all around 0.1, but the scale efficiency is relatively close to 1. This shows that the structure and capital operation level of manufacturing industry investment in these industries still need to be improved. The general equipment manufacturing industry, automobile manufacturing industry and other manufacturing industry industries have low levels of pure technical efficiency and scale efficiency, resulting in low overall efficiency and are below average. This shows that there are investments in these industries. The problem of low efficiency and backward management level also has the problem of unreasonable investment scale control. On the one hand, the government should increase investment in manufacturing industry investment in these industries, and on the other hand, it should strengthen the intensity of control over manufacturing industry investment in these industries.

From the point of view of scale efficiency, of the 31 industries, 17 industries present a stage of diminishing returns to scale, indicating that the investment scale and structure of these 17 industries need to be improved and optimized; 4 industries present a stage of constant scale, indicating that these 4 manufacturing industry investment efficiency is at the forefront, and the current scale and technology are effective and beneficial to the development of this industry. Nine industries are showing a stage of increasing scale, and manufacturing industry capital should be encouraged to invest more in this industry, focusing on adjusting the investment structure and strengthening the management level of investment, thereby promoting the healthy development of manufacturing industry investment in various industries.

## 5. Conclusions and suggestions

In general, the overall level of investment efficiency of manufacturing industry in Anhui Province is medium, showing a good development trend, but there are still large differences in the scale of regional manufacturing industry development, and the development of central Anhui has a large advantage. The main characteristics of investment efficiency in Anhui manufacturing industry by industry are: manufacturing industry industries have not reached full scale efficiency, but are at a high level; high-tech industries such as electrical machinery and equipment manufacturing industry, computers, communications and other electronic equipment manufacturing industry The investment capital and management efficiency of traditional manufacturing industry industries such as food manufacturing industry, textile, and furniture manufacturing industry are severely differentiated, and the advantages of leading industries are not obvious. The internal structure of the manufacturing industry is low, and most industries are in a stage of diminishing returns to scale. The investment efficiency and scale still need to be optimized.

In order to improve the investment efficiency of manufacturing industry in Anhui Province, the following measures should be taken: to help the manufacturing industry enterprises "open source and reduce expenditure" and increase the rate of return on investment; comprehensively use various macroeconomic policies such as fiscal and monetary policies to guide manufacturing industry investment to pursue investment efficiency [6]; overall planning to improve the coordination of investment efficiency of manufacturing industry industries in different regions and different industries; Fourth, improve the supervision system to promote the overall investment efficiency of manufacturing industry industries.

## References

- [1] Q.ZWang. Research on the Marginal Efficiency of Fixed Assets Investment in China. *Economic Mathematics*, (2019)No.4,p.27-31.
- [2] Z.F.Lü, H.J.Zhi Contract execution efficiency and regional industrial investment differences: an empirical study based on industry samples. *Contemporary Finance and Economics*, (2017)No. 12, p.13-23.

- [3] Y.F.Yuan. Study on the economic efficiency of land use for urban infrastructure investment in Henan——Empirical analysis based on DEA model. Journal of Henan University of Science and Technology (Social Science Edition), (2020)No.2,p.37- 42.
- [4] F.H.Yan. Research on the impact of investment efficiency on the transformation of equipment manufacturing enterprises . Friends of Accounting, (2019)No.14,p.97-103.
- [5] W.P.Peng. Analysis of the difference in investment efficiency of industrial enterprises with different ownerships in Liaoning Province. Liaoning University, (219).
- [6] M.Y.Lü, X.D.Miao. Evaluation of Tianjin manufacturing industry development quality and analysis of influencing factors-based on data from 2003 to 2017. Journal of Tianjin University of Commerce, (2019)No.5,p.12-19.