

Research on the Influencing Factors of the Development of New Energy Industry Taking Anhui Province as an Example

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Abstract

Since the beginning of the 21st century, the utilization and research and development of new energy has played a more and more important role in the survival and development of the whole human society. However, Anhui's energy industry is still dominated by extensive and backward traditional industries, and the problem of energy shortage is increasingly prominent. Therefore, promoting the development of new energy industry is particularly important for the stable development of Anhui's economy. First of all, this paper analyzes the current situation of the development of Anhui new energy industry, and finds out the main factors that affect the development of Anhui new energy industry. Then, the time series econometric model is established to empirically study the influencing factors of the development of Anhui new energy industry. Finally, the paper puts forward countermeasures and suggestions on how to promote the development of Anhui new energy industry.

Keywords

New energy industry, Influencing factors, Multiple linear regression.

1. Introduction

In recent years, China has formed a diversified energy system including coal, oil, natural gas and renewable energy, but coal is still the main body of energy production and consumption. In 2019, China's raw coal production accounts for 69.3% of the total energy production, coal accounts for 57.7% of the total energy consumption, primary power energy production accounts for 18% of the total production, and renewable energy consumption accounts for 23.4% of the total consumption. It can be seen that the production and consumption of new energy is far less than coal. These data show that China's energy industry is still dominated by extensive and backward coal industry, but the reserves of traditional fossil energy such as coal are gradually reduced, while the demand for energy in industrialized and modernized countries is gradually expanding, so it is necessary to increase the production and consumption of new energy sources to overcome the energy shortage [1]. According to the report of the 19th National Congress of the Communist Party of China, we should adhere to the harmonious coexistence of human and nature, establish and improve the economic system of green, low-carbon and circular development, and show that saving traditional energy and expanding clean energy are the inevitable choice for building a Civilized Ecology and relieving environmental pressure.

Anhui is the area with the most abundant coal resources in East China. Coal mining is mainly concentrated in Huainan and Huaibei. Although coal is the largest energy industry in Anhui Province, it has gradually entered an aging period. In recent years, Anhui has begun to implement relevant policies on coal capacity reduction, and increased support for new energy industry. By expanding the research and development of new energy, reducing the demand for

traditional energy and optimizing the energy structure, there are still many problems in the development of Anhui new energy industry at this stage [2]. Therefore, this paper makes theoretical analysis and empirical research on the influencing factors of the development of new energy industry in Anhui Province, and puts forward relevant policy recommendations.

2. Analysis of the Current Situation of the Development of New Energy Industry

2.1. Added Value and Growth Rate of New Energy Industry

As a strategic emerging industry determined by the state, new energy industry plays an important role in the green transformation of industrial structure, the enhancement of economic strength and the strength of scientific and technological innovation. In recent years, the output value of Anhui new energy industry has been on the rise, from 31.16 billion yuan in 2012 to 122.13 billion yuan in 2019, an increase of 3.9 times. From the perspective of growth rate, the fluctuation range in the early stage is relatively large. High growth rate and low growth rate alternate. In recent years, the growth rate slows down to between 10% and 20%. In short, the development of Anhui new energy industry is not rapid, but it has great potential.

2.2. Structure of New Energy Industry

Generally, the research on the development of new energy industry will take the increase and accumulation of various installed capacity as an important indicator. Therefore, this paper compares the installed capacity of photovoltaic power generation, wind power generation and biomass power generation in 2018 and 2019 in Anhui Province. According to the cumulative installed capacity of various new energy sources, they are photovoltaic power generation, wind power generation and biomass power generation. In 2018, photovoltaic power generation, wind power generation and biomass power generation were 1.18 million kilowatts, 2.282 million kilowatts and 1.67 million kilowatts respectively; in 2019, photovoltaic power generation, wind power generation and biomass power generation were 12.54 million kilowatts, 2.74 million kilowatts and 1.95 million kilowatts respectively. The new installed capacity of photovoltaic power generation is also the most, and the new installed capacity of wind power and biomass power generation is far less than photovoltaic power generation. The comparison shows that the new energy power generation industry in Anhui is dominated by photovoltaic power generation.

3. Theoretical Analysis of the Factors Influencing the Development of New Energy Industry

The influencing factors of the development of new energy industry are divided into internal factors and external factors, and these influencing factors have different mechanisms for the development of new energy industry. The following will focus on the composition and mechanism of the two influencing factors.

3.1. Internal Factors Influencing the Development of New Energy Industry

Internal factors are the components of new energy enterprises, including human capital, technology and capital investment. The core elements of internal factors are talents and technology, which directly affect the innovation and R & D stage of the industry. Talent is the main body of industrial R & D department, and technology can be improved by R & D system, so the quality of talent will directly affect the process of new energy technology R & D. There are two ways of technology research and development: technology introduction and independent innovation. The investment of capital is the investment in labor and technology. The development of new energy technology needs a lot of financial support, which is used for the

purchase of equipment, the remuneration of scientific researchers and the cost of technological innovation. Capital investment comes from enterprises and government, and capital investment is the main factor affecting the operation of new energy industry. [3]

3.2. External Factors Influencing the Development of New Energy Industry

External factors are the environmental factors of new energy industry, including policy environment, market environment, industrial structure, economic basis, resource efficiency, etc. The policy environment includes legal policies, financial policies, industrial policies, etc. through artificial restrictions and support efforts, such as the implementation of preferential tax policies for new energy industry, there will be incentive mechanisms to expand the scale of new energy industry. The market environment includes the relationship between supply and demand of energy, the price of energy, etc. all these factors will promote the new energy industry through continuous development, reduce the cost of industrial R & D and operation, expand the industrial scale, and improve product competitiveness. Economic basis, all industries are subject to the development of a country's economic level, and GDP is closely related to energy consumption. GDP is directly proportional to energy consumption. The higher the GDP is, the higher the energy consumption will be, which will stimulate the output of new energy industry. Resource efficiency, such as energy consumption per unit of regional GDP and energy consumption per unit of regional industrial added value, is used to measure the level of energy consumption and the status of energy conservation and emission reduction. The development of new energy and renewable energy can increase the efficiency of energy use and reduce the consumption of traditional fossil energy. Industrial structure, the change of industrial structure will affect the new energy industrial structure. The proportion of the first industry in China is gradually decreasing, the fluctuation range of the second industry is relatively large, and the proportion of the third industry is gradually increasing. It is an indisputable fact that industry has a great influence on energy industry. As a large industrial country, China consumes a lot of energy. The industrial structure of the secondary industry will directly affect the demand and supply of new energy.[4]

4. An Empirical Analysis of the Factors Influencing the Development of New Energy Industry

Empirical analysis is to observe and sort out the research objects, build a model by summarizing the data, and analyze and draw conclusions. The empirical research and analysis of this paper is based on the current situation of the development of new energy industry in Anhui Province, combined with the theoretical research of the influencing factors of new energy industry and looking for relevant data to establish indicators, using time series econometric model to study and analyze the influencing factors of its industrial development.

4.1. Variable Selection and Data Source

4.1.1. Variable Selection

(1) Explained variable

Set the output value (y) of Anhui new energy industry as the explained variable.

(2) Explanatory variable

Economic basis: every industry is inseparable from the development of a regional economic level. Economic growth will drive the development of the whole industry, so the relationship with various industries is inseparable. This paper chooses Anhui GDP as the explanatory variable (x_1).

Industrial structure: the upgrading and optimization of industrial structure play an important role in the development of industry. The change of industrial structure indicates the

development prospect of industry to some extent. In this paper, the ratio of secondary industry to GDP in Anhui Province (x2) is used to measure the industrial structure.

Technological innovation: as a strategic emerging industry, the most important thing is technological innovation. Only advanced technology can lead the new energy industry to flourish. This paper chooses fixed investment (x3) of scientific research and technology service industry in Anhui Province as the explanatory variable.

Financial support: the development of new energy industry involves many links, which needs the strong support of the government. Specific safeguard measures include not only providing energy conservation and emission reduction policies, but also requiring the government to invest a lot of funds for research. In this paper, the sum of the financial expenditure of science and technology and energy conservation and environmental protection in Anhui Province is selected as the indicator (x4) to reflect the financial expenditure of new energy industry.[5]

4.1.2. Data Sources

All data are from progress data of Anhui Statistics Bureau. As the new energy industry belongs to the strategic emerging industry, the development time of the emerging industry is not long, so the year of the observation data is relatively short, the year is 2012-2018. Due to the short number of time years and unstable time series, in the establishment of time series measurement model, the variable model needs sufficient data to ensure that the following results have economic value. In order to be rigorous and scientific, quarterly data is used to expand the number of variable samples. In order to eliminate the influence of heteroscedasticity of the original time series data and enhance the comparability of time series, all data are logarithm. Eviews 7.0 is used for operation and analysis.[6]

4.2. Test of Model

4.2.1. Unit Root Test

In order to ensure the accuracy of the measurement model, avoid the phenomenon of pseudo regression as much as possible, and make the analysis of the model have practical significance, we need to determine the stability of the time series first. In this paper, the ADF test is used to test the unit root of each variable. The original variables LNY, LNX1, LNX 2, LNX3 and LNX 4 are all nonstationary. After the first-order difference, the variables pass the ADF test, so these variables are first-order stationary series.

4.2.2. Cointegration Test

After ADF test, LNY, LNX1, LNX 2, LNX 3 and lnx4 are first-order single integer sequences. It is necessary to test whether there is co integration relationship between them to avoid the phenomenon of pseudo regression. According to the test results of trace statistics of each variable, there is only one cointegration relationship between these variables.

4.2.3. Granger Causality Test

In order to test whether the lag value of various variables can predict the information of the interpreted variables, Granger causality test is carried out. According to the test results, the probability value of F-statistic that lnx1 is not Granger cause of LNY is 0.0496, less than 0.05. That is to say, the original hypothesis is rejected, which shows that lnx1 is the Granger cause of LNY, and the same test method proves that LNY is also the Granger cause of lnx1. The result shows that there is a significant two-way causal relationship between the output value of new energy industry and GDP at the 5% significance level, which can be explained as the mutual influence between the development of new energy industry and the economic basis. Because economic growth will promote the demand of various industries for energy, which will stimulate the development of new energy industry, and the development of new energy industry will provide more new energy products, supply other industries, and other industries will get power for development, and the economy will grow. The probability values of lnx2,

LnX3, LnX3 and lnx4 to the Granger causality of LNY change are all greater than 0.05, indicating that there is Granger causality.

4.3. Establishment and Analysis of Regression Model

Through the previous tests, we can see that these data are first-order difference stationary and have a cointegration relationship. In this paper, we need to explore the relationship between the output value of new energy industry and the four variables, so we can use OLS regression method to build the model. Because the regression model needs to use stationary data to avoid the occurrence of pseudo regression. Differential data is used for regression. The purpose of differential data is to ensure the stability of data, and the first-order difference of variables can show the growth rate of variables.

In order to study the relationship between the influencing factors of the output value of new energy industry in Anhui Province, the following model is established:

$$DLNY=C+\beta_1DLNX1+\beta_2DLNX2+\beta_3DLNX3+\beta_4DLNX4+\varepsilon \quad (1)$$

The general least square method is used to estimate the above regression model, and the following regression equation is obtained:

$$DLNY=0.1636+0.4112DLNX1+0.0397DLNX2+0.0844DLNX3-0.0276DLNX4 \quad (2)$$

It can be seen from (2) that there is a positive correlation between LNX1, LNX2, LNX3 and LNY, which shows that GDP, the proportion of the secondary industry in GDP, and the input of science and technology have a certain role in promoting the output value of Anhui new energy industry. However, the fiscal expenditure has a restraining effect on Anhui new energy industry, which is not consistent with the actual situation. Because the regression coefficients of DLNX1, DLNX2, DLNX3 and DLNX4 fail to pass the significance test, which indicates that there is a serious multicollinearity problem. Therefore, this paper uses the method of stepwise regression to establish the model, and obtains the following stepwise regression equation:

$$DLNY=0.2422DLNX1+0.0845DLNX3+0.0374 \quad (3)$$

The determinable coefficient of the model is 0.8562, and the adjustable determinable coefficient is 0.8614, both of which are greater than 0.8, indicating that the fitting degree of the equation is relatively good, and the p value of dlNX1 and dlNX2 is less than 0.05, which has passed the significance test. This shows that the impact of GDP and investment in science and technology on Anhui new energy industry is more significant, that is, when the growth rate of GDP and fixed investment increases by 1%, the growth rate of Anhui new energy industry output value will increase by 0.2422 and 0.0845. However, the impact of industrial structure and financial expenditure on the development of new energy industry is not significant.

According to the stepwise regression equation, the input of science and technology and the economic foundation have a significant impact on the development of new energy industry in Anhui Province. The main reasons are: new energy industry is a technology intensive industry, which cannot be separated from technology innovation. The lack of technology will largely restrict the innovation and scale expansion of enterprise products, and the improvement of technology can also reduce the new energy industry. Economic growth also plays an important role in the development of new energy industry in Anhui Province. Economic growth will promote more industrial development, and energy is the basis to support the development of various industries. Therefore, economic growth will also promote the production and

consumption of energy, thus promoting the transformation of energy structure, and more new energy will be developed and used.

5. Conclusions and Suggestions

Through the theoretical and empirical research on the influencing factors, combined with the current situation of the development of new energy industry in Anhui Province, we can see that the two most important factors affecting the development of new energy industry in Anhui Province are the investment in science and technology and the foundation of economic development. Although the development of new energy in Anhui Province started relatively late and its scale is relatively small, it still has advantages in some new energy fields. Here are two suggestions to promote the development of new energy in Anhui.

First, we should increase investment in science and technology and accelerate research and development of new energy. Technological innovation is the core force to promote the foothold and growth of emerging industries. The new energy industry highly relies on advanced equipment and professional R & D talents. The cost of developing new energy industry is high. A large amount of investment in science and technology can improve the maturity of technology so as to improve the conversion efficiency and reduce the actual cost. There are many ways to increase the investment in science and technology. The first is to cultivate talents, because the input of talents can normally operate the system of scientific research and development, and the new energy industry has the ability of independent research and development. The training of talents includes not only professional knowledge, but also practical knowledge of new energy industry in actual operation and maintenance. The second aspect is to establish the R & D platform of new energy products, through the training of professional talents to create new energy research institutions and key laboratories and other professional platforms to increase the research on new energy. The third aspect is to establish a new energy industry base, that is, scientific and technological research and development will go deep into every link of the industry, improve the efficiency of energy utilization, improve the new energy industry chain, and promote the development of the whole industry.

Second, speed up the transformation of economic development mode and optimize the energy structure. In the early stage of industrialization, economic development is very dependent on energy consumption. China is experiencing this period of high energy consumption, which is a period that every developing country with rapid development must experience. According to Granger causality test, there is a causal relationship between the economic development and the development of new energy industry in Anhui Province. Therefore, Anhui Province should reduce the economic dependence on traditional fossil energy, vigorously develop new energy, diversify the energy supply, and encourage new energy enterprises to expand their development. In addition, vigorously develop new energy, constantly optimize energy structure and improve energy efficiency.

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