

Analysis of the Relationship Between Economic Development and Environmental Changes——Taking Shanxi Province as an Example

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ABSTRACT

Economic and environmental are always the primary concern of regions' development. They are both unifying and opposing, how to recognise and dealing with their relations has always the basic issue of development. Shanxi Province is one of the major provinces in my country for coal development and processing. Since Shanxi is located inland, it is difficult to achieve a balance between ecology and economy This paper studies the economic development and environmental improvement of Shanxi Province. The author found that Shanxi Province has issued a series of policy lists to support economic development and environmental changes through field research and its own status quo. After taking action in Shanxi, the conditions for economic development and environmental changes have been improved.

Keywords: *Economic development, Air pollution, Environment changes, Policy management*

1. INTRODUCTION

In the process for the world development, find the balance between the economic development and the environment protection has always the vital issue to humans. Lots of nature resources could provide the energy and power to the country's development, and its economic level will become better; while the environment has been changed by the humans' behaviour. Therefore, each country and every area in a country has been work hard to find the way to make sure they get economic has positive development while their area's environment situation has not been damaged anymore. With the situation of environment protection is becoming increasingly serious and the Global Warming has threaten human's survive and development[1] in recent years, people's requirement of the environment qualities improves continually, people realise that it is no time to delay to find the balance between the economic development and the environment changes. The emission of pollutant is one of the main reason of the Global Warming[2]. Therefore, the world has increase their concern about the carbon emission decline[3]. As on of the biggest country to release the carbon emission, China is currently facing tremendous pressure to solve the carbon emission problem as soon as possible. Shanxi is a resource-based province, it has been integrated with

extensive development and fragile ecology for a long time, the problem of structural pollution is raised, social economy development has facing the great stress from the ecological environmental protection. This article will be taking Shanxi province in China for example. The author will further discuss the relationship between China's Shanxi Province's economic development and environmental changes by analysing the economic development model and policy impact of Shanxi Province during the transition period.

2. THEORETICAL RESEARCH ON ECONOMIC DEVELOPMENT AND ENVIRONMENTAL CHANGES

It is fundamental to develop the economy, improve the ecological environment, and transform the industrial structure of Shanxi Province. The formulation and implementation of some policies in these industrial field will influence the industrial structure. Recently, with the rapidly increase of the economics and the grows of the environmental pollution the day after day, making some suitable policies for economic and biological is extremely urgent.

2.1 The Compliance Cost Theory

In the Compliance Cost Theory, it believes that the governance of the environment situation will make the firms have more costs during the production process. Therefore, the quality of the firms' production will decrease, and the economic grows will also get worse impact because of this. To solve the pollution problem, and satisfy people's requires about the higher life quality, the factories need to pay more for the aspect, while the other side do not change—their production technology and the earning as same as before, the factories' net income will decrease[4].

2.2 The Theory of Innovation Compensation

The Theory of Innovation Compensation is a kind of support the government give to the factories. Due to the environmental policies and the pressure of the economic development, the factories will follow the Compliance Cost Theory—the net gap of their costs and incomes will become much more less than before. This stopped their production efficiency and their ability to get profits[5]. Combine with the current situation of Shanxi Province, the slow development of economics will make the environment changes become harder, too. Only with the progress of both economics and biological environment will make the resource-based province get sustainable development[5]. The government therefore choose the suitable policies to estimate the factories to innovation themselves and decrease the production costs. In this theory, these economic policies will not only improve the factories' production efficiency and their ability in market competition, but also decrease the environmental pollution.

2.3 The Environmental Kuznets Curve

The Environmental Kuznets Curve is very famous and important in the environmental fields studies. This is a curve shows that two steps of the relation between the economic and environment. While the economy developed rapidly in the early stage, the environmental quality declined rapidly. The premise that people need to improve their economic conditions is that they need to use a lot of natural resources. The environment balance ha been broken. With time past, the relation and condition between economic and environment do not changes.

Until when these two factors get into a specific interaction point, the environment situation changes oppositely—the economic is still keeping increase while the environment gets better. People do not need to destroy the environment to develop the economy.

3. THE CHARACTER OF ECONOMIC DEVELOPMENT IN SHANXI PROVINCE

Shanxi Province is a large resource-based province, and industrial production mainly uses natural energy and raw materials. As a developing country, China needs a lot of energy and materials for development. These natural resources are also the inevitable development of Shanxi Province. With the nature characteristics, Shanxi province's economic development cannot leave from the coal, it is also one of the main place to provide the coal for China's developing. This industry has actually help the province's economy better than before. As shown on the diagram 5, the blue line is the primary industry, the red line is the secondary industry, and the green line is the tertiary industry. On the figure 1, the primary industrial account for the smallest part, and this number is still keeping decrease (15 percentage in 1992 and 4.4 percentage in 2018). While the secondary industry and the tertiary industry were shown on the grows tend. This proves that Shanxi Province is running the transformation and development—does not only and pay its most attention on the heavy industrial to develop the province's economic level, Shanxi Province need to find some other methods and industrial fields to develop the economic situation. This action has made some achievement until now, the economic become better, while not only because of the coal exploit and process. The secondary and tertiary industry's development also proves that Shanxi Province has increasing its attention on the energy economic development, especially after past the half year of 2014. The proportion of the tertiary industry become the biggest economic process ways—with some more environmental protection and effective, green energy industries to develop the Shanxi Province's economics. For example, through the new technology change and development, the evolution in finance and education fields, these kind of emerging industries could led to the economic situation in Shanxi Province has more effectively development, while not only rely on the traditional heavy industry.

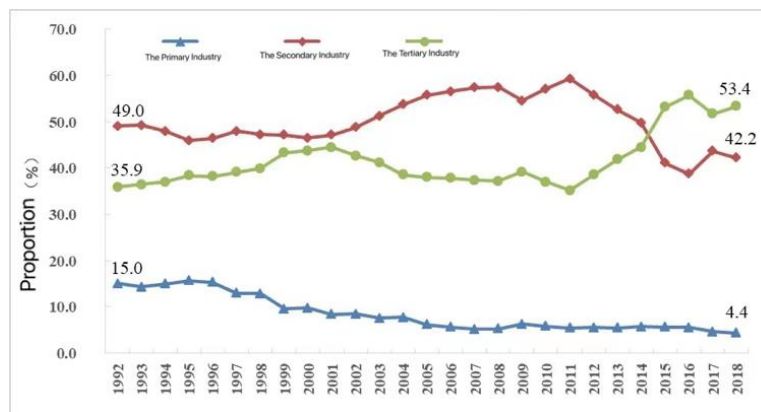


Figure 1 The structural changes of three industrial output values in Shanxi Province [6]

4 THE AIR QUALITY AND THE POLLUTANT EMISSION SITUATION IN SHANXI PROVINCE

Shanxi province always use the heavy industry organisation of the energy sources and the raw material industry. Exploit and process these raw materials has been create lots of pollution, these pollutant could become the pollutant gas and released into the air. Therefore, the air quality in Shanxi became worse. These

years, with the intensified efforts to protect and improve the ecological environment, and industrial transformation and upgrading, the amount of pollutant emission in Shanxi Province has been reduced. As shown on the figure 2, from 2013 to 2018, the sulphur dioxide emission has been decreased continually. The red line is Shanxi Province and the blue line is China. In 2013, shown on the red line, the sulphur dioxide released around 125.54 ten thousands tons, and in 2018, this number decreased to 89.58 ten thousands tons.

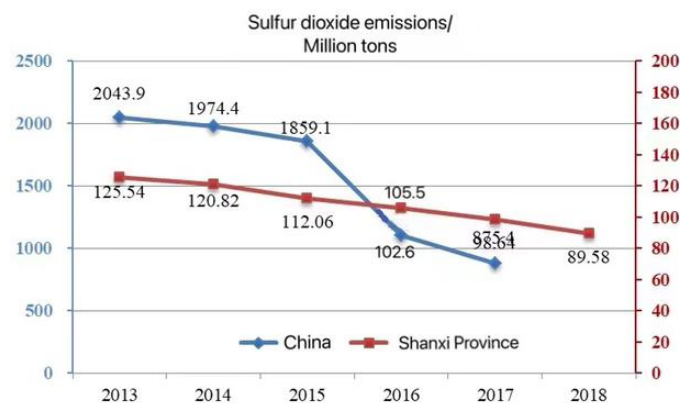


Figure 2 Pollutant emission trend chart of Shanxi Province [7]

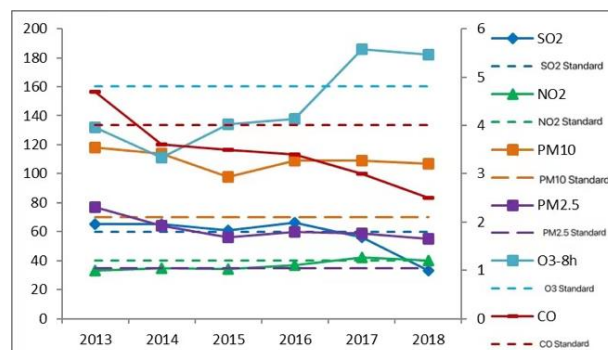


Figure 3 Concentration change of major atmospheric pollutants in Shanxi Province during 2013-2018 [8]

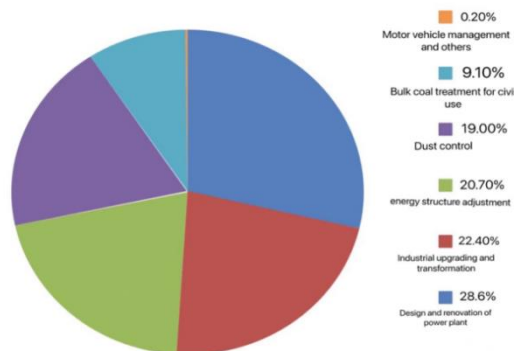


Figure 4 Contributions of various measures to environmental quality improvement [9]

With the sulphur dioxide emission decrease, the other pollutant gas emission were also declined during these five years—from 2013 to 2018. As shown on the figure 3, in Shanxi Province, the pollutant concentration sulphur dioxide, particulate matter 10, particulate matter 2.5 and the carbon dioxide were all become smaller. The sulphur dioxide released 65 in 2013, and in 2018 it becomes under 40. The pollutant concentration of particulate matter 10 (PM10) decreased from 120 in 2013 to 110 in 2018. The figure of PM2.5 changes over 20 (nearly 80 in 2013 and under 60 in 2018). The carbon dioxide reduced most over these four pollutant, it lessened almost 70 over the five years, decreased from under 160 in 2013 to around 90 in 2018. Through some figure collection and data analysis, as shown on the figure 4, there are six fields contribute most to the ecological environment govern. Through upgrading of power plant (contribute 28.6%), industrial upgrading (contribute 22.4%), energy structure adjustment (contribute 20.7%), dust control (contribute 19.0%), bulk coal treatment for civil use (contribute 9.1%), and the motor vehicle management (contribute 0.1%). Both 28.6 percents and 0.1 percent are all make the contribution to the Shanxi Province's biological environmental situation become better.

5. THE IMPACT OF PUBLIC POLICY ON SHANXI'S ENVIRONMENT AND ECONOMY

Rely on the limited nature resources and at the cost of huge environmental pollution is not a long-term solution. Shanxi was trying to find another way to development its mixture power, including the economic situation. The government published new policies to help the province gets the transformation development. The government then encourage the enterprises to study, install and use the low energy consumptions while high environmental protections equipments through the policies. These policies include some award and punishment system, for example, to the lower pollution district, the government may award them some comment, and it may become the

more important company for their own country. This could play the leading role to all of the other heavy industry districts. With these policies requirement, the companies use the better technology equipment, to exchange the pollutant into something which have less pollution power than before, or become something which can be useful at the second time. In the future, the scientific and technological progress will help the economic getting greater and the air quality will not be damaged anymore. After push the new technology and encourage method in to the heavy industry district, the government will take the test first after six mouths, then take the test for them once a year, these can be remembered as the two-tail analysis—the data will be in a section which settled by the experts, whatever it become better or worse. With these action, the test result will be change to better side, and this shows the improvement of the science technology and the policies is useful for increase the heavy industries districts' air quality.

In addition, there are some suggestions for formulating policies in accordance with the development status of Shanxi Province. First, the government should expand local production industries and extend industrial lines, such as some high-level production and electricity production. In addition, the government should pay more attention to the development of the tertiary industry and the service industry, to achieve agglomeration of the service industry, and to increase industrial utilization. Secondly, Shanxi Province should improve the technical structure of high-pollution, high-consumption, and high-emission industries, and increase the utilization rate in the process of resource utilization. Shanxi Province has a large number of highly polluting industries. It is essential to make these industries more efficient and less polluting. Thirdly, strength the control level of Shanxi Province's carbon emission level.[9] Carbon emission is one of the most urgent issue around the world, Shanxi Province holds the huge amount of the coal reserves, this is also a big reason to cause the environment pollution in Shanxi Province. By using the Theory of Innovation

Compensation, some money support given from the government to these factories may help the factories decrease their cost while increase their technology work more effectively.

6. CONCLUSION

In conclusion, for a developing area, it is always not easy to find the balance between the economic development and the environment changes. Especially for some resource-based areas like Shanxi Province. People's economic behaviour are always damage to the environment—the cutoff trees to provide the raw material for the regimes's building, they exploit mineral substance to provide the energy of people's living and studying. With the better economic situation, the environment pollution make people's living place becoming worse. Try to find a way which could satisfied both in the economy field and the environment field is the most the important thing for Shanxi Province's transformation and development in the economic and biological fields. The government published some useful and suitable policies, with some higher technology used in the industrials, factories are willing to follow these—their produce process are more effectively while become less pollution than before, people are also use their own ways to help their live environment become greater. The economic development and environment situations are not be opposite with each other, they can be not only interacting, but also mutual promotion with other. It is realizable for Shanxi to achieve the rapid development of economy and the sustainable development of the environment. Besides, the government can adapt these policies as much as possible to the actual situation of the region, and researchers also need to work hard to research and create more effective and environmentally friendly green energy equipment.

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