Study on the Air Pollution Control Policy Coordination Status in Chengdu-Chongqing Urban Agglomeration, China

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Abstract. Air pollution is a severe problem that the government and society have paid wide attention to in recent years. Its spatial spillover effect and liquidity raises the necessity of collaborative governance among different administrative subjects. This paper selects 153 policy texts related to coordinated air pollution control released by Chengdu-Chongqing urban agglomeration from 2010 to 2020, and uses UCINET to analyze the centrality, density, and reciprocity of cooperation between cities and government departments. The results show that cities with high administrative levels and developed economies play a leading role in cooperation. Compared with administrative divisions, geographical proximity has a greater impact on the closeness of city cooperation. In terms of coordinated governance between departments, most departments have participated in the cooperation. This research shows the current status of the coordinated control of air pollution in the Chengdu-Chongqing urban agglomeration, which will help optimize such policies in the future.

1. Introduction

Many factors such as automobile exhaust, straw burning, and industrial emissions have caused air pollution. This environmental problem has a serious negative impact on the health of citizens and is not conducive to the sustainable development of society and economy. In the context of China increasing emphasis on ecological and environmental protection, the control of air pollution has become urgent.

Many scholars have conducted research in this field. Some scholars have studied the effects of air pollution on human health such as Qiu, et al.(2021)[1] have compared the effects of air pollution on the liver function of residents in Wuhan and Zhuhai, and found that short-term exposure to air pollutants has adverse effects on liver function among urban adults. Such adverse effects last longer in high-pollution area than that in low-pollution area. Research by Guo and Wei(2013)[2] also shows that PM2.5 will have a negative impact on the human body’s respiratory, immune, and cardiovascular systems. These studies have fully revealed the harmfulness of air pollution, prompting people to devote more energy and resources to the theoretical and practical exploration of air quality improvement.

Some scholars have conducted research from different angles starting from the factors that cause air pollution. For example, Jia(2021)[3] believes that urban traffic congestion has aggravated air pollution. A vehicle pollutant control model was established by VENSIM software that accurately described air pollution caused by vehicle emissions. The research results showed that a combination of fines and charges can effectively reduce air pollution. Vehicle congestion and exhaust emissions can help
improve air quality. Calvin and George (2012)[4] proposed some technical methods to reduce air pollution caused by chromium chemical plants.

Other scholars have conducted research as a whole. Lu, et al.(2013)[5] argue that air pollution has obvious compound pollution characteristics. Li, et al.(2012)[6] believes that air pollution has obvious seasonal and regional characteristics. Wang, et al.(2014) [7],Hu, et al.(2020) [8],Liu, et al. (2020)[ 9 ],Zhang, et al.(2020)[ 10 ], Hong, et al.(2020)[ 11 ] studied the air pollution in Beijing-Tianjin-Hebei, Guanzhong, Chengdu-Chongqing, and Northeast China.

In summary, in recent decades, the Chinese economy has developed rapidly, urbanization has accelerated, and many achievements have been made, but also led to air pollution and other environmental problems. Air quality has a great impact on human health and economic development. Therefore, the issue of air pollution has drawn much attention. The existing literature has conducted research on this issue from different angles and regions. However, there are few studies on the collaborative control of air pollution in Chengdu-Chongqing urban agglomeration. This area is an important urban agglomeration in Western China, with rapid economic development and great potential in recent years. It is composed of 16 cities and plays a role of connecting the southwest and northwest, connecting domestic and foreign countries. The establishment of this urban agglomeration is conducive to accelerating the development of the central and western regions and opening up new space for national economic growth.

In 2020, the government proposed to build the Chengdu-Chongqing urban agglomeration into an important economic center with national influence, and a high-quality livable place. Good air quality is necessary to achieve this goal. In addition, the mobility of the air and the diversity of pollution causes means air pollution control must be coordination between cities and departments. Therefore, this study has very important significance.

This paper conducts a quantitative study on policy texts, selects 153 policy texts related to coordinated air pollution control released by Chengdu-Chongqing urban agglomeration from 2010 to 2020, uses Ucinet software to conduct social network analysis, and analyze the cooperation between various cities and various government departments. The section 2 introduces the selection method of the policy text. Section 3 analyzes the coordinated control of air pollution among government departments. Section 4 focuses on the coordinated control of air pollution in 16 cities in the Chengdu-Chongqing urban agglomeration. Section 5 discusses research results and future development directions.

2. Data sources and data processing

In this research, a full-text search was conducted on the Peking University Law platform using “air pollution” as the key word. From the current effective policy texts, 153 policy texts that explicitly mentioned departmental or city cooperation were selected from the current effective policy texts. The content of a policy is converted into matrix data in Excel. In this process, the cooperating departments or cities repeatedly mentioned in the same policy text are counted once, and some policy texts that do generalize which department or city plays a leading role in the cooperation assume that the issuing agency is the lead department or city.

We have selected the policy texts of the past decade. During this time, government agencies have undergone some adjustments. This article uses the latest government agency settings as the standard, and according to the functions of the departments, the cooperation of the original departments is classified under the newly established departments. For example, in the institutional reform of 2019, Chengdu will no longer retain the Forestry and Garden Administration, and newly established the Park City Construction Administration. When analyzing the content of the policy text, we will consider the Forestry and Garden Administration mentioned before 2019. The cooperation of this bureau moved to the Park City Construction Administration. In addition, there are some subtle differences in the names of a few government agencies in different cities, but their functions are similar. We also classify them into one category in our research, such as the Bureau of Investment Promotion and the Bureau of Merchants Investment. The effectiveness levels of the selected policy texts are divided into three categories: local working documents, local normative documents, and local government regulations. Types of regulations mainly include comprehensive environmental protection laws and regulations, pollution prevention, environmental monitoring, energy conservation management, urban planning,
development and construction, agricultural management and agency work.

3. Collaborative governance between departments

Air pollution is a special environmental problem. Multiple factors work together to cause this problem. This must require coordination between different departments, relying on administrative, legal, scientific and technological means and other means and forces to adopt comprehensive prevention and control measures (Wang, 2014[12]). We listed the departmental cooperation mentioned in these 153 policy texts as matrix data, and used UCINET analysis to obtain a network diagram of each department in the process of coordinating air pollution control.

![Figure 1. Network diagram of collaborative governance of government departments.](image)

It can be seen from Figure 1 that the Bureau of Ecology and Environment, the General Office of the People's Government, the Municipal Commission of Development Planning, and the Bureau of Economy and Information Technology play a leading role in the cooperation network. This data analysis result is consistent with the functions of each department. Air pollution control belongs to the category of environmental protection. Of course, it is led by the Bureau of Ecology and Environment. The General Office of the People's Government has the functions and responsibilities of organizing and coordinating relevant departments, therefore plays an important role in cooperation. Air pollution is a negative impact of economic development, and it is related to development and safety. The functions of the Municipal Commission of Development Planning and Bureau of Economy and Information Technology correspond to each other. In addition, the Commission of Urban Management, Administration for Market Regulation, Bureau of Emergency Management, Bureau of Agriculture and Rural Affairs, Bureau of Transport, Bureau of Public Security and other departments also in an important position in the cooperation network.

It is worth mentioning that in addition to government departments, companies such as Luzhou Telecom Company, Sinopec Leshan Branch, Yanchang Shell Sichuan Branch, and Chongqing Public Transport Group have also participated in the work of air pollution control.

Judging from the release time of these policy texts, 2017 is a critical milestone. Since this year, the number of related policies has increased sharply. Based on the dynamic of central government and the analysis of the policy of Chengdu-Chongqing urban agglomeration, we think the "Blue Sky Protection Campaign" is the main reason for this change. The Blue Sky Protection Campaign was proposed to the government work report made by Premier Keqiang Li at the Fifth Session of the Twelfth National People’s Congress of the People’s Republic of China on March 5, 2017, focusing on pollution sourced treatment and motor vehicle emission management. These key tasks also correspond to the main departments in the network structure diagram. For example, the Bureau of Agriculture and Rural Affairs is responsible for managing straw burning, the Bureau of Transport is responsible for
restricting and prohibiting traffic in heavily polluted weather, and the Commission of Urban Management is responsible for urban pollution source inspection and urban greening. Since 2017, cooperation between various departments has increased significantly.

4. Collaborative governance between cities
Air pollution control requires coordination between different cities. This is because the air is fluid, and it is impossible to control the problem with only a certain local government. Zhao, et al. (2017)[13] believe that the most effective method to control air pollution is to implement the measures of regional cooperation and joint defense and control, and reduce local emissions during the polluted period, such as airborne dust, coal-burning, vehicle emissions, mobile sources and industrial production. The area selected in this study—Chengdu-Chongqing urban agglomeration is centered on Chongqing and Chengdu, including Zigong, Luzhou, Deyang, Mianyang, Suining, Neijiang, Leshan, Nanchong, Meishan, Yibin, Guang’an, Dazhou, Ya’an, Ziyang, etc. 16 cities with a total area of 185,000 square kilometers. The following picture shows the map of Chengdu-Chongqing urban agglomeration. As can be seen from Figure 2, Deyang, Ziyang, Meishan and Ya’an border Chengdu, while Guang’an and Zigong are closer to Chongqing.

Figure 2. Chengdu-Chongqing urban agglomeration map.

Compared with inter-departmental cooperation, the number of city cooperation mentioned in the policy is less. We use UCINET to analyze the data and get a network diagram of city cooperation on air pollution control.
Figure 3. Network diagram of collaborative governance of cities.

As can be seen from the figure 3, Chengdu and Chongqing are the central nodes of the network relationship graph. As provincial capitals and municipalities, they have better administrative levels and richer economic resources, which can drive surrounding cities to control air pollution. Moreover, cooperation between cities is not based solely on administrative divisions but depends more on geographical proximity. The three cities of Zigong, Yibin, and Guang'an that belong to Sichuan province are more closely linked with Chongqing in their cooperation. According to the results of data analysis, there are five cities that have not joined the cooperation network. This may be due to a lack of broad and in-depth collaborative governance or to the fact that the research did not gather enough data to make the analysis inaccurate.

5. Discussions and conclusions

Based on the data of 153 policy texts on coordinated air pollution control issued by 16 cities in the Chengdu-Chongqing urban agglomeration in the past ten years, this research uses UCINET to conduct social network analysis to study the actual situation of coordinated air pollution control in the region. The study found that cooperation between various departments has increased significantly after 2017, mainly because the Blue Sky Protection Campaign was launched in that year. Cities with high administrative levels and developed economies, i.e. Chengdu and Chongqing, play a leading role in the cross-border cooperation. Compared with administrative divisions, the degree of geographic proximity has a greater impact on the closeness of city cooperation. According to the division of responsibilities of administrative departments, they occupy different positions in the cooperation network. The Bureau of Ecology and Environment, the Municipal Commission of Development Planning, and the Bureau of Economy and Information Technology often appear as the leading departments in air pollution control. The Bureau of Transport, the Bureau of Agriculture and Rural Affairs, the Bureau of Housing and Urban-Rural Development, the Commission of Urban Management and other departments play an active role in their corresponding fields.

This research shows the current status and development trend of air pollution coordinated control in the Chengdu-Chongqing urban agglomeration, and has a certain guiding role in the formulation of relevant policies in the future. However, this study also has some limitations. The selected sample data is not large enough, and the content of the policy text is analyzed manually, and there may be omissions. Future research will include more comprehensive samples and continue to improve research methods.
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