Research on Optimization Strategy of Regional Haze Governance Based on Synergy Effect——A Case of Central Plains City Group

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Abstract. As an atmospheric pollution, haze governance involves economic restructuring, energy change, environmental science, laws and regulations and other aspects, is an important measure to improve people's livelihood and optimize the mode of economic development. Through the analysis of the causes of haze and based on the synergistic effect, taking the Central China urban agglomeration as an example, from the perspective of public management, this paper puts forward the optimization strategy of regional haze co-governance, by constructing government departments, different levels, inter-regional intergovernmental coordination mechanisms, mechanisms for communication between local government and enterprises, citizen and local government, enterprise's supervision mechanism, scientific research institutions and government, enterprise's decision-making staff and technical support mechanism, to form a multi-subject, multi-pronged, seamless haze governance structure, which will prevent and control the tragedy of public sharing, promote the governance of public goods such as the atmosphere, break the administrative limitations of the administrative region, crack the decline of the Central Plains, and the development collapse of central region. It is of great significance to avoid the ecological overload and atmospheric pollution of the Central Plains urban agglomeration and to build a beautiful Central Plains.

1. Introduction
Since the Chinese economic reforming, China's modernization process has accelerated, but it is based on an extensive development model that consumes massive amount of resources. Economic growths rapidly, at the same time modernization also brings a series of environmental pollution problems. In recent years, haze appears in concentrated and entire areas and has become a symbolic problem in most cities. Looking back at the development path of Western capitalist countries, haze problem is not uncommon. The haze incident in Los Angeles in 1943, July 26 and the Great haze in London in 1952 were all air pollution incidents that appeared in the process of industrialization in developed capitalist countries. Countries affected by air pollution has tried to govern the problem from laws and regulations, industrial upgrading, energy reform, market mechanism and other aspects, and experience of measures has been provided for reference. China has also adopted a series of haze control measures, and achieved some results, but the change is not big. The main reason on one hand is that haze pollution accumulated for a real long time, associated with the complexity and particularity of the cause of haze pollution in China. On the other hand, it is inextricably related to the problems of China's haze pollution control mechanism. As for now, most of the measures taken in China are administrative emission reduction
methods, lacking of incentives and behavioral normative mechanisms. And normalized multi-subjects collaborative participation network has not been formed, so that results of governing are difficult to cure.

2. Theoretical basis and research review

Distinction and emphasis on the rule of control and management efficiency, along with subject diversity and complexity of means on governance are the themes of public management in 21st century. [1] As a management theory based on the theory of governance, collaborative governance, in addition to the common characteristics of governance theory, emphasizes the synergistic effect of governance effects. It is a seamless management of the increasingly complicated affairs on the basis of decentralization and specialization. Service is a new strategy to make public management enter into multi-organization and multi-sector coordination. It is a transcendence of traditional bureaucracy and new public management theory. Collaborative governance is based on the theory of Synergetic, [2] aiming at achieving synergy effect. Collaboration has a good fit for understanding internal structure and external environment of public affairs governance.

2.1. Summary of research on Synergetic Governance Theory

The British scholar Hardin proposed the concept of tragedy of commons based on the phenomenon of overgrazing on public land, in order to describe the serious consequences of excessive use of public pond resources, and advocate private ownership to solve tragedy of commons. American economist Arrow believes that some resources cannot clearly define property rights. The existence of public resources is inevitable. For example, the atmosphere as a public pond resource cannot be defined to an individual or organization. [3] In some public resources areas where certain rights can be confirmed, the government is prone to power rent-seeking when dealing with market failures. In response to the market failures and government failures in the tragedy of the commons, Professor Elinor Ostrom proposed the institutional design of the long-term survival of public pond resources. [4] Ansel has studied the case of 134 collaborative governance in the United States, and believes that the history of conflict and cooperation and the participation incentives of stakeholders are the key variables that determine the success or failure of collaborative governance. [5]

Although there are synergistic ideas in ancient China, the research on the coordinated management of the real system started late. Professor Sang Yucheng’s cooperation with the people and the people first reflected the tendency of co-governance between the government and the people. Chen Ruilian and others took the lead in regional economic cooperation and regional environment. Collaborative governance research. He Shui believes that collaborative governance means in public management activities, social plural elements, with the support of network information technology, cooperate to govern public affairs and enhance public interest. [6] In general, researches on collaborative governance in China are constructive and exploratory study, which is a chaotic structure, and even mix multiple concepts, such as collaborative governance, collaborative government, multi-center governance, cooperative governance, and overall governance.

2.2. Summary of research on haze governance

In terms of haze governance, western countries are relatively mature in analysis of atmospheric pollutants, exploration of causes, and choice of preventive measures. American scientist Chow JC conducted a chemical analysis of PM10 by scanning electron microscopy, and Derek Elson proved the harm of PM2.5 and PM10 to human body. [7] In the face of haze, the United States emphasizes regional cooperation in air pollution control, breaking the administrative boundaries of the state, dividing the plate according to natural and geographical conditions, and conducting comprehensive collaborative management across the country through the joint office. Scholar Titanberg, from the perspective of efficiency and fairness, has systematically designed emissions trading, and advocates using market mechanisms to control.

For the haze pollution, Zhang Xiaoyu, Sun Junying and other research groups, through the analysis of haze weather and aerosols, pointed out that China's haze is a serious aerosol pollution. [8] Wang
Huiqin, He Yiping believes that through the construction of synergy mechanism, the combination of government, enterprises and people will be formed. Scholar Yang Huafeng demonstrated the necessity of coordinated management of post-industrial social environment and put forward the practical orientation of environmental collaborative governance. It shows that China's haze governance has a tendency of pluralism, but not yet formed a specific collaborative governance model and mechanism that can be based on reality and scientific.

3. Basic reasons for the formation of haze weather in China

Frequent occurrence and harmfulness of haze weather have led to lots explorations of its formation. At present, there are different opinions, but a certain degree of consensus has been reached, which mainly includes the following aspects:

3.1. Natural causes such as climate and terrain

Haze weather in China has mostly erupted in autumn and winter. This is caused by different topographical conditions and climate characteristics of China. When autumn turns into winter, flow of cold and warm air meets. Water vapor and moisture increase, while moisture in the air reaches saturation, and excess condenses. Excess moisture combines with dust particles easily lead a humidity condition that can produce haze. In autumn and winter, the solar radiation is weak and the ground radiation is strong. At night, the ground radiates heat outward. Due to less solar radiation received during the day, the surface temperature drops, resulting in low near-surface air temperature and high-rise air temperature. High density cold air always sinks, and warm air with less density tends to rise. Therefore, cold air near the ground cannot move to the upper air. The warm air at high altitude cannot fall to the ground. The inversion layer is formed on the near ground, and the vertical motion of the atmosphere is affected. The suspended particles in the atmosphere cannot spread to high altitudes, thereby they accumulate in the city near the ground.

3.2. Negative effects of extensive economic development

Haze history of western developed capitalist countries shows that haze pollution is concentrated in the middle and late stages of industrialization. During this period, heavy chemical industry developed which can lead to haze easily. [9] The development process of China's modernization is a modernization process driven by industrialization and urbanization. In the early days of the founding of the People's Republic of China, priority was given to the development of heavy industry. Since the reform and opening up, foreign companies have been introduced to set up factories in China, which is in line with the resource consumption of developed capitalist countries. The international transfer of labor-intensive industries, a large number of high-energy, high-pollution, high-emission, low-efficiency conversion, low value-added enterprises are stationed in China, and the secondary industry with iron and steel, coal, petrochemical as the main body is developing rapidly, and China's industrialization The process has followed suit, and this is still an old road of “first pollution, then governance”. China's highly polluting energy structure is determined by industrial structure and resource demand which focus on heavy chemical industry. In the field of energy supply, “one coal is alone” is the main source of atmospheric pollutants. With increasing cars and serious exhaust emissions, [10] pollution is further aggravated.

3.3. Air as an intrinsic property of public goods

As a public good, air is strongly non-competitive and non-exclusive. Individuals and organizations enjoy the right to use air without distinction. Rational economic people untimely discharge all kinds of pollutants to the atmosphere while pursuing maximum personal utility, so that pollutant discharge exceeds the carrying capacity of environment. Haze is the excessive use of public resources such as air, which is a pollution phenomenon caused by self-purification ability of environment. It is an atmospheric field version "Tragedy of commons." The haze pollution has a strong negative externality. The main source of the haze pollution, although its economic behavior affects other economic entities, does not bear the corresponding costs. On the other hand, because the atmosphere as a public share property
cannot be clearly defined. The haze management lacks a clear responsibility subject, and some economic entities who consciously adopt haze prevention measures have positive externalities in their economic behaviors. While bringing certain social benefits, individuals bear the full cost, which is not in line with the economic entity economy. The essential nature of behavior affects the efficiency of resource allocation and is not sustainable. In summary, air is non-competitive and non-exclusive as public good, and externality of haze pollution and control, from inherent properties of contaminated object to essential characteristics of pollution sources and pollution control, which illustrate that Air as an intrinsic property of public goods is one reason of Haze formation mechanism.

3.4. The consequences of government haze governance “failure”

China’s development path centered on economic construction, but it is not a development path that denies ecological environment. There are still some government officers don’t realize the concept of green GDP, lacking initiative and consciousness to take responsibility for haze governance, which binging problems such as absence of law, poor implementation, and imperfect means. At present, the haze governance model in China is mainly responsible for the territorial management of the local government. The competent authorities at the higher levels formulate the overall tasks and overall objectives of haze prevention and control. Governments at all levels, their departments and units have formulated haze prevention and control plans for the region. The enterprise accepts the management and supervision of the government, and completes the assigned environmental protection tasks through the application of the pollutant discharge permit and the payment of sewage charges. [11]

In terms of governance, the government has taken administrative measures as the mainstay and achieved certain results, but it has no long-term effect. Polluting enterprises and environmental protection social organizations have insufficient motivation to control, and haze governance lacks strong synergy of multiple subjects. Due to different levels of economic development, air pollution and emphasis on haze pollution, inter-regional standards for access, monitoring and punishment are inconsistent, leading to cross-regional transfer of pollution sources. Besides, lacking of legal lead and supporting funds, joint prevention and control mechanism between different regions are also not perfect.

4. Path choice of haze governance in central plains city group from the perspective of synergetic governance

Due to imperfect laws and regulations, competitiveness of interest, lacking of interest compensation mechanisms among the governance entities, haze synergy governance in China has problems like multiple subjects absent, imperfect powers and responsibilities, and lacking of coordinated linkage mechanisms. Based on these situations, a seamless haze governance system has been formed, involving Corporate self-discipline, citizen consciousness and social supervision, including the following measures:

4.1. Establish a intergovernmental coordination mechanism for regional governments and government departments

A country cannot clearly define property rights of public resources, but government that represents a country should play a leading role in haze governance. Ministry of Ecology and Environment and the local environmental protection department are responsible for controlling haze pollution in China. They play the role of supervision and management in environmental protection. US environmental protection agencies enjoy the power of legislation, law enforcement and punishment and can be carried out through enforcement. Compare to US environmental protection agencies, power given by the Chinese law to environmental protection department is too narrow, which requires the improvement of the supporting power of the environmental protection department.

As far as the inter-governmental cooperation of local governments at different levels in the region is concerned, it is mainly to solve the problems of the assessment system and the fiscal and taxation system. The management of haze pollution, high administrative and economic costs, requires the financial support of the higher level government as a special fund for haze management.
Regional governments should use green GDP as a guide for local economic development, carry out regional coordination and cooperation, and enhance the effectiveness of haze governance. It is necessary to break single environmental management model at present stage as soon as possible, and coordinate with main government to strengthen the main target and implementation of the general plan for regional municipal government's haze pollution control, so as to form a dual haze governance of higher-level supervision and regional government horizontal cooperation system.

4.2. **Construct a non-governmental coordination mechanism between local government and enterprises**

Through transparent consultation, communication and demonstration with leaders of enterprise, regional government shall scientifically and democratically achieve the closure, suspend, reorganization and transformation of high-energy, high-pollution and high-emission enterprises, and break the alliance of improper government and enterprises. The government should further improve China's emissions trading market, provide a smooth and perfect platform for enterprises to conduct emissions trading, and gradually open up the experience of piloting emissions trading to the whole field, and promote the emission rights of lower pollutant discharge units to a higher level. The paid transfer of pollutant discharge units reaches the goal of controlling the total amount of pollutants. In terms of tax, according to the principle of multi-emission, multi-burden and who discharges who is responsible, government shall tax on high-emission enterprises and increase subsidies for enterprises which adopting clean technology and equipment, thereby eliminating high law-abiding costs and low illegal costs problem.

4.3. **Build a decision-making participation and technical support mechanism between scientific research institutions and government, enterprise.**

As scientific research institutions, universities and research institutes, have strong experimental demonstration and technical research capabilities. They are indispensable for the government to make scientific decisions and upgrade technology. It is possible to set up staff positions in government agencies, hire experts in the field of haze pollution control research, and provide scientific decision-making basis for policy formulation of haze governance through scientific research and assessment, and play their positive role. Enterprises can entrust scientific research institutions to cooperate with the R&D department to achieve collaborative research in the field of technology research and development, to improve the efficiency of technological research, to enhance the ability of technical research, and to achieve a win-win situation between economy and environmental protection while sharing patent.

4.4. **Set up a monitoring mechanism between citizens and government, enterprises**

In order to give full play to self-supervisory role, regional government shall promptly publish monitoring values such as PM2.5 on department website, to break digital divide, and to hold citizen hearings on introduced projects, clarifying seats, specific procedures and methods for environmental organizations and media to participate environmental assessment. From the preparation of environmental impact reports, follow-up evaluation of projects, to feedback of public, full democracy must be given, and only listening, not adopting democratic hearings must be avoided. Citizens are highly evolved in environmental pollution incidents such as smog governance and they have strong demand of it. Therefore, government should relax threshold for entry, simplify approval process, actively support and guide the establishment and development of civil environmental organizations, call for professional and technical personnel to form Environmental Monitoring Brigade. By issuing inspector certificate, Environmental Monitoring Brigade will be allowed to enter the enterprise in a reasonable time interval to conduct sampling inspection of pollutants discharged. Enterprises fail to meet the standards will be reported online so that they will regulate their own production in the economic process. Government should also provide financial support for non-government organizations to organize and operate through establishing an environmental protection funds, etc., giving full play to the strong and powerful supervision weapon civil organizations.
5. Conclusion
From the construction of beautiful China to the writing of ecological civilization into the 13th Five-Year Plan, ecological environment has become a global topic. As a public pond resource, atmosphere has faced air pollution problems such as greenhouse gases, ozone, and haze. Frequently happened haze pollution at this stage is a global governance problem. China's haze pollution is related to all aspects of people's production and daily life. Based on the synergistic effects of collaborative governance, this paper reviews literature, uses theoretical research and analyze cases, realizing that regional coordinated governance in China is still in a fragmented stage. Then this paper explores the construction of regional haze pollution synergy government mechanism and provides countermeasures for environmental governance.

References
[1] Juan Tang. Government Governance Theory[M]. Beijing: China Social Sciences Press, 2006:19.
[2] Huafeng Yang. Environmental collaborative governance in post-industrial society[M]. Changchun: Jilin University Press, 2013:107.
[3] Shihong Zeng, Jiechang Xia. Commons tragedy, transaction costs and haze governance[J]. Research on Financial and Economic Issues, 2015(1).
[4] Elinor Ostrom. Governing the Commons[M].Shanghai: Shanghai Translation Publishing House,2012: 106.
[5] Xianjin Lai. On Intergovernmental Collaborative Governance[M]. Beijing University Press, 2015:8.
[6] Shui He. The Synergy Governance and Its Realization in China——Analysis from the Social Capitalist Theory[J]. Journal of Southwest University (Social Sciences Edition), 2008(3).
[7] Hua Wang, Shaowei Lu. Inhalable particulate matter and fine particulate matter:Their basic characteristics, monitoring methods, and forest regulation functions [J]. Chinese Journal of Applied Ecology, 2013(3).
[8] Xiaozhui Zhang etc. Factors contributing to haze and fog in China [J]. Chinese Science Bulletin, 2013(5).
[9] Xiaogang He. Structural Transformation and Interregional Coordination: Economic Observation of the Cause of the Haze [J]. Reform, 2015(5):33-42.
[10] Xuegang Cui, Chengxin Wang, Xueqin Wang. A Probe into the New Path of Optimizing the Spatial Structure of Metropolis under the haze Crisis [J]. Shanghai Journal of Economics, 2016(1):13-21.
[11] Qingxin Lan. Research on Problems and Solutions of Haze Management in China[J]. Qinghai Social Sciences,2015(1).
[12] Fuzhou Liao. Construct and improve the inter-regional linkage development mechanism of urban agglomeration——A Case of Central Plains City Group[J]. Tribune of Study, 2014, 30.