Predicament and Elimination of Beijing-Tianjin-Hebei Cooperative Air Pollution Control

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Abstract. The Beijing-Tianjin-Hebei air pollution collaborative governance still has difficulties such as insufficient willingness to participate actively, opportunistic behavior, and lack of stable and coordinated cooperation. By comparing the theoretical implications of collaborative governance and the reality of air pollution control in Beijing, Tianjin, and Hebei, the causes of the dilemma are explained from three levels: relationship networks, action strategies, and governance structures: stress-type relationships between central and local governments, and "strong-Chinese" — "Weak" development pattern and asymmetric resource dependence between government and enterprises lead to insufficient participation of local governments and enterprises; it is difficult for the actors to reach consensus on action strategies based on the "benefit-risk" analysis, making it easier for local governments and enterprises Opportunistic behaviors and inability to participate effectively in governance; the "pyramid" governance structure between central and local governments, the governance structure with insufficient communication and coordination between local governments, and the lack of incentives between government and enterprises affect the stability and cooperation of collaborative governance Coordination. In the future, it is necessary to eliminate the predicament of coordinated governance of air pollution in Beijing, Tianjin and Hebei, and promote air pollution through clear division of authority between central and local governments, effective communication and coordination of collaboration groups, improvement of income distribution and risk sharing mechanisms, and construction of selective incentive mechanisms. Effective problem solving.

1. Introduction
The Beijing-Tianjin-Hebei region is one of the most prominent areas of air pollution in the country, but the problem of air pollution in this area has not occurred in recent years. According to relevant data, the total number of haze days in Beijing in 1980 has reached 135 days [1]. With the progress of urbanization and industrialization, high-speed economic development and high-density social activities have further exacerbated the degree of air pollution in the Beijing-Tianjin-Hebei region, and smog has gradually been used as a catastrophic weather phenomenon to warn the public. From January 1 to January 29, 2013, a total of 4 haze weathers occurred in Beijing. The number of haze days observed by the observation station in the southern suburbs of Beijing was 24 days, and only 5 days were free of haze [2]. In 2013, 11 of the 13 cities in the Beijing-Tianjin-Hebei region ranked among the top 20 most polluted in the country, and 7 of the 10 cities with the worst air quality in the country were in Hebei Province [3].
In response to this regional environmental pollution problem, in November 2013, the Third Plenary Session of the Eighteenth Central Committee of the Party pointed out that it is necessary to establish a regional linkage mechanism for the protection and restoration of ecosystems and the prevention and control of pollution [4]. In the process of establishing and improving a joint prevention and treatment mechanism for air pollution, the air quality in the Beijing-Tianjin-Hebei region has improved to some extent. On April 30, 2015, the Political Bureau of the Central Committee of the Communist Party of China considered and approved the “Planning Outline for Beijing-Tianjin-Hebei Coordinated Development Planning”, which clearly promoted the important national strategic position for the coordinated development of Beijing-Tianjin-Hebei. Breakthroughs were made in key areas such as environmental protection and industrial upgrading. Chinese scholars have also demonstrated the collaborative governance of air pollution in the Beijing-Tianjin-Hebei region based on practical situations and feasibility [5]. For the prevention and control of air pollution in the Beijing-Tianjin-Hebei region, "coordinated governance" is not only a development trend under the direction of policies, but also a realistic and feasible governance model.

Although the Beijing-Tianjin-Hebei joint effort to prevent and control air pollution achieved remarkable results during the 2008 Olympic Games, the 2014 APEC Conference, the 2015 People’s Anti-Japanese War and the 70th anniversary of the victory of the World Anti-Fascist War, all of them achieved significant results, but in recent years, severe air pollution in the region still occurs. In August 2018, the average number of days with excellent air quality in Beijing, Tianjin, Hebei, and the “2 + 26” cities was 52.7%, a year-on-year decrease of 7.2 percentage points; the ratio of Beijing's excellent days was 64.5%, a year-on-year decrease. 9.7 percentage points [6]. The above data shows that the establishment of a joint prevention and treatment mechanism for air pollution has achieved short-term governance results in Beijing, Tianjin, Hebei and surrounding areas, but has not yet formed a long-term coordinated governance structure.

Based on the current literature, the Beijing-Tianjin-Hebei air pollution co-governance mainly has the practical difficulties of insufficient willingness to participate, opportunistic behavior, and lack of stability and coordination of cooperation. First, there is insufficient willingness to participate. Through double analysis of structure and interests, Meng Qingguo and others found that the inter-governmental horizontal synergy of Beijing-Tianjin-Hebei air pollution is a passive synergy, not a synergy promoted by the subjective will of the three places [7]. Second, opportunistic behavior. Xing Hua et al. Believe that in the objective situation of high transaction costs caused by information asymmetry, there is a systemic collective action dilemma in the coordinated management of air pollution in the Beijing-Tianjin-Hebei region. Concealment of air pollution control data [8]. There have even been problems such as data falsification and inaccurate measurement by some companies in Hebei Province, and the Tianjin air pollution control measures appearing to be false [9]. Third, cooperation lacks coordination and stability. Zhang Yajun pointed out that environmental protection departments in Beijing, Tianjin and Hebei are unwilling to assume responsibility for air pollution management due to the consideration of protecting local interests. At the same time, due to the lack of effective mechanisms, the Beijing-Tianjin-Hebei joint prevention and control of air pollution still lacks coordination [10]. He Xuan and others pointed out that Beijing-Tianjin-Hebei’s impetus and continuity in environmental protection cooperation are “even caught in a vicious circle of environmental investment dependence” [11]. The effectiveness of the joint air pollution prevention and control mechanism during the Olympic Games and the Asia-Pacific Economic Cooperation (APEC) meeting has not reached a stable and sustainable cooperation effect. By 2017, Beijing had not reached the PM2.5 concentration control target proposed by the Ten Articles of the Atmosphere [12].

The joint prevention and control mechanism of air pollution is only the beginning of the coordinated management of air pollution in Beijing, Tianjin, and Hebei. In order to achieve practical results in the future, the practical dilemma of collaborative management needs to be eliminated. So, what are the reasons for the current difficulties in the coordinated management of air pollution in Beijing, Tianjin, and Hebei? How to dissolve? This article compares the basic meaning of the collaborative governance theory with the characteristics of Beijing-Tianjin-Hebei’s air pollution prevention, and establishes an
analytical framework that includes three key elements: relationship network, action strategy, and governance structure. Prevention and treatment of the predicament, and provide relevant ideas for the Beijing-Tianjin-Hebei air pollution prevention and control dilemma and current situation improvement.

2. Theoretical basis and analytical framework

2.1. The Basic Meaning of Collaborative Governance Theory

The theory of synergetics was proposed by the German physicist Hermann Haken. Synergy is a theory that studies how a large number of components of different nature in a system are governed by universal laws, and forms an ordered structure through collaboration [13]. The doctrine of dominance states that the development of things shows that the disordered part is involved in the ordered state and is governed by the ordered state [13]. An important concept of the theory of synergy is "order parameter", which is an "invisible hand" that is produced by the cooperation of various parts of the system and in turn dominates each part [13]. When there are only a few possibilities for the development direction of things under objective conditions, accidental factors will make things develop in one direction, and other factors are also governed by "order parameters" and jointly develop and change towards this factor. Sequence structure.

"Governance" was first proposed in the 1980s and has been widely used in various disciplines. In western academic circles, governance theory is characterized by continuous interaction among multiple subjects and consensus rules among various subjects. The main connotation of domestic governance theory is that the government interacts with multiple subjects to jointly deal with and deal with public affairs. The core value lies in the realization of public interests. Yu Keping summarized the views of scholars from various countries as follows: governance involves social and public institutions and actors outside the government; governance means the ambiguity of the boundaries and responsibilities between the state and society, and the public and private sectors; governance affirms the organizations participating in collective action. There are power dependencies between them; governance participants will form autonomous networks and cooperate with the government; governance methods and techniques are diverse [14].

Collaborative governance theory is formed on the basis of synergy and governance theory, and its core is that the various sub-systems of the system gradually develop the orderly state of interaction and collaboration by establishing close links. The theoretical framework of collaborative governance can be summarized from three levels:

2.1.1. Complex network of relationships in open systems. Collaborative governance theory emphasizes an open system with a complex network of relationships. According to the theory of synergy, the system is composed of a large number of sub-systems with different properties. The sub-systems are related to each other. Coordination is based on the energy or material exchange between the system and the outside world. Therefore, there are also correlations inside and outside the system. The governance process itself is an open system, and there are complex networks of relationships between different subjects. Therefore, the theory of collaborative governance acknowledges the existence of a complex network of relationships among multiple subjects.

2.1.2. Self-organizing Behavior under the Action of Multiple Subjects. Collaborative governance theory believes that the action strategies of different subjects will form self-organized collective behaviors during interaction, and this self-organization has an important role in achieving collaborative governance. Synergetics points out that self-organization can promote the development of the system from a disordered state to an ordered structure, which is a collective movement without any external guidance [13]. In other words, the parts of the system do not consciously take collective action, but happen by accident. Governance theory believes that governments, enterprises, and social organizations are the subjects of governance. The possibility of forming conscious collective action among multiple subjects should be seen in the theory of collaborative governance. At the same time, the impact of social
capital and public power intervention on the self-organizing behavior of the entire system needs to be recognized [15].

2.1.3. Development from disordered state to ordered structure. Collaborative governance theory emphasizes the formation from disordered state to ordered structure. Synergetics believes that the development of things is a process that changes from disorder to order under the domination of "order parameters" and changes in macroscopic nature. Governance theory also emphasizes the orderliness among various actors. The formation of an ordered structure is essentially a result of collaborative governance. In the collaborative governance process from disorderly to orderly development, different subjects are also in continuous interaction. In the long run, the process of interaction will form an orderly governance structure, which in turn will have an impact on the interrelationships between the subjects and even the entire system.

2.2. Applicability analysis of collaborative governance theory

The collaborative governance theory has important theoretical value for the study of cross-regional public affairs, and its theoretical logic is highly compatible with the Beijing-Tianjin-Hebei air pollution prevention process.

2.2.1. Openness of public affairs across regions. Beijing-Tianjin-Hebei’s air pollution control is highly open as a cross-regional public affairs. Air pollutants are fluid and complex. The geographical locations of Beijing, Tianjin, and Hebei are adjacent, which will undoubtedly lead to mutual pollution between the three places and even more cities, which will increase the pollution serious consequences. Beijing-Tianjin-Hebei air pollution control is no longer a public affairs within cities, but a trans-regional public affairs, that is, "those that require the joint supply of more than two local governments, and the externalities of their consumption will generally overflow certain geographical boundaries Public services and public goods "[16]. Cross-regional public affairs has a high degree of openness, making the region an open system space, requiring the participation of different types of subjects, and easily forming a complex relationship network.

2.2.2. Diversity of actors and strategies. The diversity of the relevant subjects in the Beijing-Tianjin-Hebei air pollution prevention and control responsibility makes it possible for self-organized collective action. The prevention and control of air pollution in the Beijing-Tianjin-Hebei region involves different types and diverse subjects. The prevention and control of air pollution is both the responsibility of the government as a representative of the public interest and a public service provider, and the enterprise as a producer of air pollutants should also bear corresponding responsibilities. Social organizations related to environmental protection are also important participants in the prevention and control of air pollution. Subjects of different natures will adopt self-organizing collective actions in the course of mutual gaming and interaction with different action strategies, thereby determining the development direction of the air pollution prevention process in the entire region.

2.2.3. Disorderly to orderly governance logic. Beijing-Tianjin-Hebei air pollution prevention and control is a process from disorderly to orderly development. Under the past territorial air pollution prevention and control model, the Beijing-Tianjin-Hebei region has not had many connections and interactions in air pollution control. It is a relatively scattered and isolated, disorderly state of "every door sweeping snow"; Beijing The collaborative treatment of air pollution in Tianjin and Hebei is actually a model that is conducive to strengthening the correlation and degree of interaction among local governments, enterprises, and social organizations in Beijing, Tianjin, and Hebei Province. Through continuous interaction between different subjects, each action subject The interstate can also achieve a transition from disorder to order. Therefore, the main characteristics of the Beijing-Tianjin-Hebei air pollution prevention problem are fully consistent with the three key elements of collaborative
governance. Using the theory of collaborative governance to analyze the predicament of air pollution prevention and control in Beijing, Tianjin and Hebei is highly consistent.

2.3. An Analysis Framework of Beijing-Tianjin-Hebei Cooperative Control of Air Pollution

Based on the three key elements of the relationship governance, behavior, and structure of the collaborative governance theory and the characteristics of Beijing-Tianjin-Hebei's air pollution prevention and control, this article takes the local government as the core action subject and constructs an analysis framework that includes the three elements of the relationship network, action strategy, and governance structure. As shown in Figure 1.

![Figure 1. An Analysis Framework of Beijing-Tianjin-Hebei Cooperative Control of Air Pollution](image)

2.3.1. Relationship network. Beijing-Tianjin-Hebei Air Pollution Coordination is an open system. The government, enterprises, and social organizations within the system have a complex network of relationships. The relationship network is mainly used to describe the type and strength of the relationship between local governments and other different entities in the process of air pollution control. Theoretically, the relationship network in Beijing-Tianjin-Hebei air pollution control mainly involves the central government, local governments and enterprises. If you refine and type, the relationship between different subjects is very complicated. This article uses local government as the most important and critical action subject for research. Local governments are the main actors in the prevention and control of air pollution in the Beijing-Tianjin-Hebei region, including 11 prefecture-level city governments in Beijing, Tianjin, and three provinces of Hebei. The most important of Beijing-Tianjin-Hebei's air pollution prevention and control is the relationship network between the three provinces of Beijing, Tianjin, and Hebei Province. At the same time, the relationship network between the central and local governments and the relationship between the government and enterprises need to be considered in the analysis. The internet. Therefore, the relationship network can be divided into three levels from the macro, meso and micro levels: the relationship network between the central and local levels, the relationship network between the local government levels, and the relationship network between the government and enterprises.

2.3.2. Action strategy. The "synergy" emphasized by the theory of collaborative governance is achieved through self-organizing collective action. To achieve the coordination of different elements, it is necessary for the action subject to cooperate based on a certain consensus and adopt corresponding action strategies under specific conditions. When choosing the action strategy, the action subject generally needs to consider two aspects: income expectation and risk prediction.
2.3.3. Governance structure. Collaborative governance itself is an orderly governance process that is gradually formed by the interconnection and interaction between different factors. According to the theory of synergy, this orderly state must be structured, so the governance structure established by the actors in collaborative governance has become a key element of the analysis. Governance structure is an institutional arrangement produced in collaborative governance with orderly and structural characteristics, which is embodied in the organization, agreement, mechanism, etc. of collaborative governance. Governance structure is gradually established in the interaction and collaboration by all actors of collaborative governance, and has certain stability.

3. Explanation of the Difficulties in Coordinated Air Pollution Control in Beijing, Tianjin and Hebei

According to the constructed analysis framework, this article explains the dilemma of Beijing-Tianjin-Hebei's collaborative governance of air pollution from three levels: one is to analyze the reasons for the lack of willingness to participate actively from the perspective of the relationship network, and the other is to explain the opportunistic behavior from the perspective of action strategies. The third reason is to explain the reasons for the lack of stability and coordination from the perspective of governance structure.

3.1. Relationship network analysis

3.1.1. Central and Local Governments: Top-down Pressure Relationship. The Beijing-Tianjin-Hebei region is China's "capital circle", the country's political and cultural center, and has a very close relationship with the central government. The joint prevention and control mechanism for air pollution between Beijing, Tianjin, and Hebei was mainly formed by the top-down external pressure of the central government. At a deeper level, this dynamic mechanism is gradually formed in the long-term administrative system and power operation process. This mechanism can encourage local governments to adopt a centralized approach to public problems under the direction of the central government, and promote the establishment of temporary or specialized systems. During the Beijing Olympic Games, under the leadership of the former Ministry of Environmental Protection and the Beijing Municipal Government, Beijing, Tianjin, Hebei and other relevant departments jointly formulated the "Air Quality Guarantee Measures for the 29th Olympic Games in Beijing", and set up an Olympic air quality coordination team to Strong measures to control air pollution have reduced the emissions of air pollutants during the Olympic Games by about 70% compared with 2007, reaching the best air quality level in Beijing in the past 10 years [17]. The air pollution control results obtained during the APEC meeting in Beijing in 2014 were also achieved through the cooperation of six provinces, municipalities, and cities across Beijing under the organization of a higher government. During the World Expo, the Asian Games and other major events, air pollution in Beijing, Tianjin and Hebei was also strictly controlled, and air quality was effectively improved. The short-term effects of pollution control seem to show the role of joint prevention and control of air pollution, but the enthusiasm of local governments has not really been mobilized.

3.1.2. Local government: "Strong-China-Weak" development pattern. The fragmentation of administrative divisions in China has led to the decentralization and imbalance of power within the region. In the context of "administrative district administration," the three places in Beijing, Tianjin, and Hebei, although geographically adjacent, are still one This is the state of "snow before each sweep". This status quo of administrative divisions and power distribution can easily exacerbate information asymmetry in the regional environment, cause regional control of local governments, and hinder the free flow of resource elements within the region [18]. At the same time, Beijing and Tianjin, as municipalities, have more resources and voice than prefecture-level cities in Hebei Province. In particular, Beijing, as the country’s capital, political center, and central government seat, has a more active position in air pollution control-related decisions, while Tianjin and Hebei provinces are in a relatively passive position.
Beijing's important status determines its advantages in decision-making and implementation. Although the Beijing-Tianjin-Hebei joint air pollution prevention and control mechanism has been established, there is no "three-legged stand" situation between the three places, but a "strong-China-weak" development pattern, which can easily lead to weak economic strength and the right to speak. Local governments "hitchhiked". Long-term development will reduce the enthusiasm of the three places to participate in the prevention and control of air pollution.

3.1.3. Government and Enterprise: Asymmetric Resource Dependence. In the prevention and control of air pollution in Beijing, Tianjin and Hebei, enterprises are the source of pollution and also the main subject of social responsibility. On January 22, 2014, the Beijing Municipal People's Congress passed the "Beijing Regulations on the Prevention and Control of Air Pollution" and proposed to establish and improve government-led, regional linkage, unit governance, public participation, and social supervision work mechanisms, including enterprises and social organizations. Multiple subjects are included in the prevention and control of air pollution. Enterprises have a high dependence on resources owned by local governments, which is mainly reflected in relying on the government to give them preferential policies and give them more space for action. Local governments can adopt mandatory methods in the formulation and implementation of policies to require enterprises to abide by the air pollution control system and reduce emissions. At the same time, local governments also have a certain degree of dependence on resources such as funds, human resources, and technology. Therefore, the government will not always adopt high coercive measures to exert pressure on enterprises. Instead, it will mainly adopt centralized control measures during major meetings, competitions and higher-level inspections, and usually adopt relatively modest policy measures. The incentive mechanism of this pollution control model is not perfect enough, and it is difficult to fully mobilize enterprises to actively participate in the prevention and control of air pollution.

3.2. Analysis of governance structure

3.2.1. Central and local governance structure. In the past, the prevention and control of air pollution in China mainly adopted the single responsibility sharing model under the control of the central government. This model is essentially a single territorial air pollution control model [1]. The "Air Pollution Control Law of the People's Republic of China" based on this period was revised in 2000 and cannot meet the current social needs very well [19]. The "People's Republic of China Air Pollution Control Law", which was revised and adopted in 2015 and implemented on January 1, 2016, explicitly mentioned the establishment of joint prevention and control mechanisms for air pollution in key areas, and provided for joint meetings, key project consultations, joint Enforcement, cross-regional enforcement, cross-enforcement, etc., so that the combination of territorialism and joint prevention and control of air pollution areas in key areas has been identified as China's air pollution prevention model. The transition from single responsibility sharing to territorialism to a combination of joint prevention and control, although it is clear that local governments have common responsibilities in the prevention and control of air pollution, has not fundamentally changed the reality of the central government's promotion of air pollution prevention from top to bottom. This reflects the governance structure between local and central government in terms of air pollution control, as shown in Table 1.

| Governance structure | Central government | Beijing | Tianjin | Hebei |
|----------------------|--------------------|---------|---------|-------|

3.2.2. Local governments: governance structures with insufficient communication and coordination. A series of policies and schemes provide a system-level action basis and rigid constraints for local governments to coordinate air pollution control. However, in the prevention and control of air pollution, local governments still lack sufficient enforcement power and enthusiasm for cooperation. It is undeniable that this situation stems from the environment of asymmetric information and the limited
rationality of individuals, but the lack of communication and coordination between local governments is the key reason for failure. First of all, although the Beijing-Tianjin-Hebei and surrounding areas air pollution prevention and control cooperation group and its commissioned “Air Pollution Comprehensive Governance Coordination Office” have been established, the cooperation agency has a lower administrative level and is vulnerable to multiple parties under the current administration Constraints, it is difficult to effectively coordinate the parties and promote cooperation. Secondly, the Beijing-Tianjin-Hebei environmental protection cooperation framework agreement clearly stipulates that breakthroughs will first be achieved in joint legislation, unified planning, unified standards, unified monitoring, and joint law enforcement. in accordance with. Finally, in the past, a single hierarchical territorial management system still had a large institutional inertia. Many Local governments still make relatively independent decisions in their own jurisdictions [20]. Due to the lack of effective communication and negotiation, the "Air Pollution Control Regulations" implemented in Beijing, Tianjin, and Hebei provinces are not uniform in terms of regulations, and the basis and standards for air pollution control are different, making effective collaboration difficult.

3.2.3. Between government and business: governance structure lacking market incentives. From an economic perspective, on the one hand, the root of environmental problems lies in externalities. In order to save private costs, producers need to sacrifice the interests of society and others through environmental pollution. This is the external diseconomy of production or consumption. On the other hand, environmental problems arise from the public goods attributes of environmental resources. As a public good, the environment has both the indivisibility of utility, the non-competitive nature of consumption, and the non-exclusiveness of income, so it is difficult to supply through the market, and it is difficult to specifically divide the ownership of the environment. In the absence of effective control, it is likely Leading to the "tragedy of the commons" [21]. Therefore, government involvement in environmental governance is necessary. Then, how to establish an effective governance structure between local governments and enterprises has become an unavoidable issue.

Olson believes that only by establishing independent, "selective" incentives can rational individuals in "potential" groups take actions that benefit the group. Such incentives can be positive or negative, but they must be differentiated, that is, "selective incentives" [22] 41-42. According to Olson's idea of selective incentives, the state needs to provide a dual incentive system for local government cooperation: one is a positive incentive mechanism including a more equitable benefit distribution rule; the other is a negative incentive including a risk sharing rule, mechanism. However, judging from the current situation of air pollution prevention in Beijing-Tianjin-Hebei, the positive and negative incentives of the market have not been brought into full play. At present, the charging mechanism for air pollutant discharge and pollution control in China is still incomplete, and the behavioral cost of air pollution has not been raised to a certain level. As a polluter, enterprises lack economic restraint mechanisms, and they will continue to sacrifice environmental and social benefits to seek economic benefits. As a polluter, they also lack the motivation to invest sustainably and control pollution.

4. The Dilemma of Beijing-Tianjin-Hebei Cooperative Control of Air Pollution

4.1. Clarify the division of authority between the central and local governments

The key to regional air pollution control lies in the authorization of the central government to local governments, provided that the central government has enacted laws to define such "partial priorities" [23]. Judging from the current situation of air pollution control in Beijing, Tianjin and Hebei, the cooperation among local governments still mainly depends on the intervention and leadership of the central government, and the autonomy of local governments is still lacking. Under the dominant model of the central government's strong promotion, it is difficult for local governments to make good use of their capabilities in the process of collaboration. From the perspective of collaborative governance theory, the foundation for achieving synergy is "self-organized collective action", and it is important to give play to the autonomy of each subject. Therefore, in order to truly achieve efficient collaborative
governance, a clear power boundary needs to be drawn between the central government and local
governments, and more local autonomy should be given.

On the one hand, the central government needs to retain the power to formulate policies and guide
supervision at the macro level. On the other hand, through legislation, local governments can be given
certain autonomous decision-making and enforcement rights in collaboration, allowing local
governments to cross the boundaries of administrative divisions, break psychological constraints,
strengthen each other's sense of identity, fully reach collaborative consensus with each other, and
promote collaborative governance Stability and sustainability. At the same time, the central government
needs to legislate to further clarify the powers and responsibilities of the central and local governments
in collaborative governance, decompose and refine the tasks and responsibilities of air pollution
prevention and control to achieve a high degree of matching of powers and responsibilities. Daily
guidance and supervision work to promote the long-term and effectiveness of collaborative governance.

4.2. Strengthen the coordination and coordination of the collaboration group among local
governments

The key to the success of governance is that the main bodies interact through dialogue and negotiation,
and reach consensus with each other. This often requires an independent collaborative organization. At
the end of 2013, the Beijing-Tianjin-Hebei and surrounding areas had established a collaborative team
for air pollution control; in May 2015, the members of the collaborative group expanded to 8 central
ministries and commissions and 7 provinces. Although the Air Pollution Prevention Cooperative
Organization has covered Beijing, Tianjin, Hebei and surrounding areas extensively, the organization
still mainly plays a liaison role in the form, and has not achieved substantial coordination and
coordination. The impact of the balanced inter-governmental power structure, there are still some
obstacles in the coordination and coordination of local governments, and it is difficult to form deep-
level collaboration between local governments.

Therefore, the core of whether a collaborative organization can play an effective role lies in whether
the local government can transfer part of the power to the collaborative organization and really play its
role in communication and coordination. In order to strengthen the connection and cohesion between
local governments, it is necessary to further clearly define the power of the air pollution collaboration
group, improve the organization and function configuration of the collaboration group through laws and
regulations and policies, strengthen the collaboration group's ability to promote communication and
coordination, and form a smooth flow of local governments Efficient negotiation mechanism. In the
future, it can also combine network information and big data technology to provide reliable technical
support for local government communication and cooperation by establishing a unified network
database and formulating unified standards.

4.3. Improve the mechanism of income distribution and risk sharing among actors

Collaborative governance emphasizes cooperation between the public and private sectors. By analyzing
the action strategies of different actors, it can be seen that the key to whether all parties, especially the
private sector, can actively participate in collaborative governance is to provide a relatively fair
mechanism of benefit distribution and risk sharing that is acceptable to all parties. In the context of the
Beijing-Tianjin-Hebei coordinated development policy, on December 4, 2015, the Environmental
Protection Departments of the three places in Beijing-Tianjin-Hebei formally signed the "Beijing-
Tianjin-Hebei Regional Environmental Protection Pioneer Breakthrough Cooperation Framework
Agreement" as A formal government cooperation agreement on air pollution prevention. The
agreement broke the relatively fragmented and decentralized pattern of air pollution control in Beijing,
Tianjin, Hebei and surrounding areas, but failed to truly establish an effective revenue distribution and
risk sharing mechanism among local governments and between governments and enterprises.

On the one hand, in view of the "poor interest" in air pollution prevention and control among different
local governments and enterprises, it is necessary to establish a fair and effective income distribution
mechanism to define the benefits of air pollution prevention and control in Beijing, Tianjin and Hebei
And division, so that all parties can share the results and benefits of air pollution control, and achieve "three wins." On the other hand, the main motivation of actors to participate in collaborative governance includes the risk avoidance in addition to the gain of benefits. Therefore, it is necessary to establish a sound risk sharing mechanism between local governments and enterprises to enhance the prevention and control of air pollution in the entire Beijing-Tianjin-Hebei region. The ability to perform risk identification, risk assessment, and risk response in order to reduce uncertainty and improve collaboration efficiency.

4.4. Establish and improve selective incentive mechanism for enterprises

The realization of collaborative air pollution management needs to fully motivate the participation of actors outside the government by providing incentives. The United States has established a cooperative mechanism involving governments, corporate organizations, experts, and citizens in the governance of "photochemical smog" in Los Angeles. It has introduced market mechanisms, promoted the implementation of trading plans that allow companies to buy and sell emission allowances, and encouraged companies to take the initiative to use new technologies Reducing the amount of pollutants discharged and making profits from the sale of emissions balances have prompted enterprises to actively participate in the management of smog [24]. After experiencing the "London Smoke Event" in 1952, the United Kingdom has gradually established a collaborative air pollution control mechanism led by the government and involving multiple entities from the corporate and public sectors. The UK has adopted "who pollutes, who governs" economic measures. It encourages companies to actively undertake social responsibilities by establishing a competition mechanism to encourage enterprises to improve process levels, control pollution discharge behaviors, and participate in environmental protection investments [25].

Judging from successful foreign practice experience, this incentive mechanism includes dual positive and negative incentives, which meets the requirements of "selective incentives". The true realization of Beijing-Tianjin-Hebei's collaborative governance of air pollution also requires a differentiated and selective incentive system. On the one hand, it strengthens government and market subsidies to enterprises and encourages their active participation; on the other hand, it clarifies the cost of illegal enterprises and increases the penalties for illegal acts, providing effective double incentives for parties involved in collaborative governance to truly give play to corporate participation Enthusiasm to promote collaborative solutions to air pollution problems.

4.5. Improve governance technology

We should continue to improve air pollution-related treatment technologies and enhance the ability of treatment technologies so that secondary pollution can be effectively reduced. Dust removal, denitrification and desulfurization are the main treatment techniques for air pollution in China. Dust removal methods include wet electricity, water film, bag, and electrostatic dust removal technology; denitrification includes ozone denitration, selective non-catalytic reduction technology, selective catalytic reduction technology; desulfurization includes wet desulfurization, dry desulfurization, semi-dry Desulfurization.

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