ISSN 2616-5872 Vol.6, Issue 4: 69-75, DOI: 10.25236/AJEE.2024.060410

Research on coordination mechanism of public management of soil pollution control policy

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Abstract: *In the process of rapid development and modernization in China, soil pollution gradually showed a rising trend. This phenomenon has been a serious threat to the balance of man and nature coexistence. In order to meet the actual needs of sustainable development to meet the stability of the present, China's prevention and control of soil pollution has put forward a number of feasible policies. In this paper, we analyze the synergistic mechanism of public management of soil pollution prevention and control policy from the perspective of the current status of legislation and real soil pollution cases.*

Keywords: *soil pollution control; viable policies; public administration; synergistic mechanisms*

1. Introduction

The three elements of air, water, and soil interact with each other to form a multi-faceted system of space environment, which together provide an important survival mechanism for the livability of the Earth. However, in the current socio-economic development, the formation of the environmental multi-faceted system appeared to cause serious pollution, air pollution, and water pollution; people are familiar with all of them, and our country has introduced innovative technology to comprehensively analyze the source of pollution, but also the corresponding introduction of supporting policies and measures to promote pollution control. However, with regard to soil pollution, because of the relatively late start of research and development in this field in China, the foundation is relatively weak, which makes this field one of the serious challenges.

Regarding soil pollution, it mainly comes from industrial and mining industries as well as agricultural production, One of the most important characteristics of soil pollution is that it is hidden, not intuitively detectable, and can only be determined through analysis of soil samples or crop testing or even through studies of the health effects on humans or livestock. Therefore, this has led to many complex problems in the prevention and control of soil pollution in China; although effective preventive and control measures have been formulated and legislation has been enacted, in order to effectively and completely solve the difficulties faced in this field, further improvement and improvement of the management mechanism is still needed.

The purpose of this study is to deeply analyze the public management synergy mechanism in soil pollution prevention and control policy and to explore how to improve the implementation of soil pollution prevention and control policy through effective synergy and cooperation in order to achieve more efficient soil pollution management.

In terms of theoretical significance, this study helps to expand and deepen the theoretical system of synergistic mechanisms in the field of public management and provides new perspectives and theoretical basis for related research. In terms of practical significance, the study of the synergistic mechanism can provide a reference for government departments to formulate and optimize soil pollution prevention and control policies, promote synergistic cooperation among all relevant subjects, improve the efficiency and quality of soil pollution prevention and control, protect the ecological environment, safeguard the public health, and promote the sustainable development of economy and society.

The research argument of this paper will utilize a variety of research methods and approaches. Firstly, by using the literature research method of specialized fields, we will widely read and collect relevant literature on soil pollution prevention and control as well as synergistic mechanisms of public management and systematically sort out the existing research results, so as to provide reference for the research of this paper. Secondly, through the case study method, successful cases and failed cases of soil pollution prevention and control at home and abroad are selected to deeply analyze the operation and

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effect of the synergistic mechanism therein and summarize the lessons learned. Finally, the data and information collected are analyzed in depth by using a combination of qualitative and quantitative analysis methods in order to draw scientific and objective research conclusions.

2. Theories related to synergistic mechanisms in public management

The synergistic mechanism of public management emphasizes cooperation, coordination, and integration of resources among different subjects in order to achieve common goals. The theory of synergistic governance holds that when faced with complex public problems, it is often difficult for a single subject to solve them effectively, and it is necessary for multiple subjects to participate together and utilize their respective strengths. Resource Dependence Theory points out that organizations will depend on and cooperate with each other in order to obtain the required resources, thus forming a synergistic relationship. Network governance theory emphasizes the effective governance of public affairs through the construction of a network structure involving multiple subjects.

3. Implementation of Soil Pollution Control Policies at Home and Abroad

Developed countries abroad have been carrying out environmental management for soil pollution prevention and control for a long time, including but not limited to the adoption of sustainable management strategies centered on risk management and control, the formation of comprehensive and integrated soil pollution prevention and control technologies, and the establishment of multi-sectoral joint and coordinated supervision and policy mechanisms.

The global environmental pollution problem in the United States in the 1970s and 1980s, namely, the Lafourche Canal soil contamination incident, triggered a crisis that brought serious trauma to the local ecological environment and people's health. In order to solve this major safety hazard, the United States formed a set of complete soil pollution prevention and control systems, and issued the Comprehensive Environmental Response, Compensation and Liability Recognition Act (Comprehensive Environmental Response, Compensation and Liability Act, CERCLA), also known as the Superfund Act. Superfund Act, the promulgation of which expanded the scope of the main body responsible for pollution control, created a super-trust fund with multiple ways of raising funds, attracted many investors with measures such as exemption from income tax, and, in addition, empowered departments to effectively carry out the management mechanism in this area, strengthened synergies and cooperation between administrative agencies, thereby realizing diversified governance.

Germany has also made an in-depth study on soil pollution control policy. In order to give guidance and advice on soil pollution and site management, the government of the country has set up a number of different organizations specializing in this field to jointly carry out comprehensive surveys, including plots of land that may be potential sources of contamination, key contaminated sites, etc., and ultimately establish a database of contaminated sites through a comprehensive analysis of the objects of the survey, which can be used by the local government departments to manage the information in order to carry out a work plan. The database can be used by the local government departments to manage the information in order to carry out the next work plan.

Domestic research on soil pollution prevention and control policies has also achieved certain results. Scholars have analyzed China's soil pollution prevention and control policy from different angles. Some studies focus on the construction of the legal system of the policy, exploring how to improve the laws and regulations in order to strengthen the supervision and punishment of soil pollution; other studies focus on the implementation of the policy, analyzing the problems and challenges in the actual operation, such as the ineffective implementation of the local goGovernmentthe lack of funds, etc.; some studies focus on the technical level, exploring the development and application of soil pollution remediation technology on the implementation of the policy; in addition, the most critical is to strengthen the synergy between the various sectors and actors of soil pollution prevention and control, and to strengthen the coordination and cooperation of the various sectors and actors. In addition, the key lies in strengthening the synergy of various departments and actors in soil pollution prevention and control, creating an all-area, all-process prevention, and control grid, and cracking the system and information barrier so as to grasp the accurate dynamics at any time, and implementing the gradual formation of a standardized operation mechanism.

Jiaxing Haining City, the establishment of a soil pollution synergistic mechanism, this initiative to open the linkage of innovative soil pollution management model, build a comprehensive and rigorous

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grasp of the action system, and fully promote the battle against pollution prevention and control, and reasonably consolidate the high quality of development of the green base, the purpose is to firmly win the battle for the defense of the soil and accelerate the formation of the green development of the new pattern together.

The studies that have been conducted provide an important basis and insight for our understanding of soil pollution control policies.however there is still much room for expansion and deepening. On the basis of existing research, this study will utilize multidisciplinary theories and methods to conduct a comprehensive and in-depth study on the public management synergistic mechanism of soil pollution prevention and control policies, with a view to providing useful references for improving soil pollution prevention and control policies in China.

4. Overview of existing domestic policies on soil pollution prevention and control

China attaches great importance to the prevention and control of soil pollution and has issued a series of relevant policies and regulations in recent years. 2016, the State Council issued the Action Plan for the Prevention and Control of Soil Pollution (referred to as "Soil Ten"), which is a programmatic document for the prevention and control of soil pollution in China and clearly defines the work objectives and main tasks of soil pollution prevention and control. Since then the Law of the People's Republic of China on Prevention and Control of Soil Pollution came into force on January 1, 2019, providing a legal guarantee for the prevention and control of soil pollution.

The implementation of these policies has achieved certain results. First, a soil environment monitoring system has been initially established, with an increasing number of monitoring sites and a gradual improvement in the quality of monitoring data, providing basic data support for grasping the state of soil environment quality. Secondly, in some key areas and polluted sites, soil pollution treatment and remediation work has been advanced in an orderly manner, and the ecological functions of some polluted soils have been restored to a certain extent. Furthermore, public concern about soil pollution has increased significantly, enhancing the awareness of soil environmental protection in all sectors of society.

At the same time, the policy has promoted the development of related industries, such as the research and development of soil pollution remediation technology and the manufacture of environmental protection equipment, which have achieved certain technological breakthroughs and growth on industrial scale. Moreover, in the field of agriculture, the irrational use of pesticides and fertilizers has been reduced through the promotion of green production methods, which has reduced the harm to the soil caused by agricultural surface pollution.

However, there are some problems in the implementation of the policy.

1) It is a fact that some regions still pay insufficient attention to soil pollution prevention and control, and the implementation of policies is insufficient to the phenomenon of formalism. Some local governments have not properly grasped the balance between economic development and environmental protection and have not been strict enough in their supervision of polluting enterprises.

2) It is the capital investment in soil pollution prevention and control that is still insufficient. Soil pollution treatment and remediation require a large amount of funds, and the current source of funds mainly relies on government finance, with low participation of social capital and a large funding gap.

3) The relevant technical standards and norms are not perfect. Soil pollution is complex and hidden, and there are still some ambiguities and inconsistencies in the technical standards for pollution assessment, treatment, and remediation, affecting the effective implementation of the policy.

4) Coordination between departments is not smooth enough. The prevention and control of soil pollution involve a number of departments, such as environmental protection, agriculture, and land and resources, and there are problems such as unclear responsibilities, poor information-sharing, and lack of work coordination, leading to low efficiency.

5) The public participation mechanism is not sound enough. Public participation channels in soil pollution prevention and control are limited, and the supervisory role in soil pollution prevention and control has not been brought into full play.

In summary, China's soil pollution prevention and control policy has achieved certain results while still facing many challenges, and it is necessary to further improve the policy system, strengthen the implementation and supervision of the policy, and improve the science and effectiveness of the policy in

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order to realize the fundamental improvement of the quality of the soil environment.

5. Components of a synergistic mechanism for public management

The synergistic mechanism of public management in soil pollution control consists of the following elements: goal synergy, information synergy, and action synergy. Goal synergy refers to the fact that each subject of soil pollution control should, under a common vision, clearly define the long-term and short-term goals to be realized so as to ensure the consistency of direction and position. Information synergy requires the establishment of a unified information platform between each subject and the smooth flow of communication channels to ensure that information can be shared and accessed in a timely and accurate manner. Action synergy focuses on emphasizing the coordination and cooperation of each subject in specific prevention and control actions to form a synergy.

5.1. Different subjects also have different roles in coordination

Government departments: As the leading and supervisory authority, they should formulate and improve relevant laws and regulations as well as policies and standards for the prevention and control of soil pollution in accordance with the current situation, plan and coordinate the implementation of each accompanying work plan, provide the necessary special financial support, the implementation of work programs and guidance on the application of technology, and supervise and manage the behavior of enterprises and social organizations.

Enterprise organization: as a production operator, is the main responsible for pollutant emissions and treatment of the main body, should strictly abide by environmental protection laws and regulations, and actively adopt cleaner production technology from the source to start, as a way to reduce the emission of pollutants, in addition to the soil pollution caused by the governance responsibility, and in the case of the project feasibility analysis after the permission to participate in the soil pollution remediation project.

Social organizations and institutions: they can play a bridging and supervisory role, raise public awareness of environmental protection through publicity and education, organize volunteers to participate in soil protection activities, and at the same time supervise the behavior of the government enterprises, and provide professional technical support and services for the prevention and control of soil pollution.

The public: The public is the direct beneficiary and participant of soil pollution prevention and control and should enhance environmental protection awareness, actively participate in the publicity and supervision of soil protection, reflect soil pollution problems through reasonable channels, and promote the relevant work.

5.2. Operational modalities and processes of the synergetic mechanism

The mode of operation of a synergistic mechanism usually consists of four stages: integrated planning, division of labor, communication and coordination, and monitoring and evaluation. At the stage of integrated planning, government departments take the lead in formulating an overall strategy and action plan for the prevention and control of soil pollution, taking into account the views of all parties. In the division of labor stage, specific tasks and division of labor are clarified according to the strengths and responsibilities of each subject to ensure that each of them performs its own duties. The communication and coordination link is carried out throughout, and work progress, problems, and solutions are exchanged in a timely manner through regular meetings and information platforms. In the monitoring and evaluation stage, a scientific indicator system is established to assess and provide feedback on the effectiveness of the work of each subject, providing a basis for adjusting and improving the work.

The workflow of soil pollution prevention and control can be as follows: firstly, the governmental administrative department determines the main objectives and tasks of soil pollution prevention and control according to the current situation of soil pollution and the needs for sustainable socio-economic development, proposes how to implement them, and at the same time, prepares corresponding policies and regulations in order to strengthen the supervision. Then, the enterprise organization formulates its own pollution prevention and control management system as well as work plan according to the requirements and submits it to the government department for review. The main responsibility of social organizations is to actively carry out publicity and educational activities on soil pollution control, expand

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the rate of knowledge, and improve the public's understanding of soil pollution prevention and control and participation. During the implementation of the new model, each subject should communicate and share the real-time situation in a timely manner through the information platform so as to realize the effective operation of the public management synergy mechanism in the prevention and control of soil pollution and improve the prevention and control effect.

5.3. Selection of successful synergistic cases of soil pollution control at home and abroad

5.3.1. Domestic case: illegal dumping of hazardous wastes by 33 steel wire rope producers in the city of Rio de Janeiro

Series of Cases on Compensation for Damages to the Ecological Environment:

A development zone branch inspection near the highway found piles of white solids suspected to be phosphide slag without pollution prevention measures, resulting in the surrounding soil producing a different color, causing environmental damage up to tens of millions of dollars. In this case, the local government carries out horizontal and vertical multi-departmental joint action to promote the start of the consultation process, the composition of the consultation working group for discussion through a number of scheduling cooperation, articulation, and communication to ensure that the remediation of the contaminated soil has been the works of the contaminated soil. In addition, according to the investigation and negotiation of the local environment bureau, 33 enterprises were willing to sign the compensation agreement, and all of them have fulfilled it.

5.3.2. Overseas Case: Soil remediation and restoration in the Kempen area of the Netherlands

At the end of the 19th century and the beginning of the 20th century, the Kempen region of the Netherlands attracted many zinc smelters from Belgium due to the low labor costs and unused land, and these factories emitted a large amount of zinc ash, which was widely used by the local residents in their daily lives. The high concentration of metals in the zinc ash resulted in serious damage to the local soil. In order to carry out reasonable remediation, the Ministry of the Environment and other provincial and municipal governments in the Netherlands have formed a joint special committee group, with different responsible parties playing their respective roles, focusing on consultations and joint promotion of the matter, and realizing the purification of the soil through the development of a comprehensive soil remediation plan, as well as the formulation of a series of policies and regulations on the prevention and control of soil contamination and the use of modern technology to curb new contamination at the source, among other means.

5.4. Lessons learned

5.4.1. The government to take the lead

The government should formulate clear policies, regulations, and long-term plans, launch a series of powerful measures on soil pollution prevention and control in a timely manner, maximize the comprehensive effect, strengthen the supervision and management of the industry, and guide the joint participation of all social parties.

5.4.2. Implementing corporate social responsibility

Enterprises should effectively fulfill the main responsibility of pollution control, consciously comply with relevant laws and regulations, legal production and operation, and set practical quantifiable and comprehensive safety goals to better protect the life safety of employees and the sustainable development of enterprises.

5.4.3. Strengthening technological innovation and cooperation

Scientific research institutions should combine work with reality, improve the service system, do a good job of comprehensive docking around the special technology, industrial end, personnel training, and other aspects, and increase the promotion of soil remediation technology innovation and application.

5.4.4. Establishment of effective monitoring and evaluation mechanisms

The process and effects of soil pollution control are strictly monitored and evaluated to ensure the effectiveness and sustainability of the synergistic working mechanism. By analyzing previous successful cases, we can provide a useful reference for building a better synergistic mechanism for soil pollution prevention and control.

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6. Strategies for building a synergistic mechanism for public management of soil pollution control policies

The synergistic goal should be to realize fundamental improvement in soil environmental quality and safeguard public health and ecological safety. Principles include (1) the principle of wholeness, considering soil pollution prevention and control as a systematic project and taking all factors into account in an integrated manner; (2) the principle of shared responsibility, clarifying the responsibilities of the goGovernmententerprises, social organizations and the public in prevention and control; (3) the principle of fairness and impartiality, ensuring that all parties rights and interests in the synergistic mechanism are equally safeguarded; and (4) the principle of sustainable development, focusing on the long-term effects and realizing the economic, social and environment.

Government departments should improve the institutional guarantee of the coordination mechanism: Establishing and improving laws and regulations, clarifying the rights and obligations of each subject, and regulating synergistic behavior. Improve the standard system for soil pollution prevention and control and provide a unified technical basis for synergistic work. Set up incentive mechanisms to reward subjects that actively participate in and effectively promote synergistic work, such as tax incentives and financial subsidies. At the same time, a system of accountability must be established, and subjects who fail to perform their duties or cause pollution severely penalized.

Enterprises should Strengthening information-sharing and communication platforms: Constructing a unified soil pollution information database, integrating data from monitoring, investigation, and assessment, and realizing centralized management and sharing of information. Utilize modern information technology to build an information exchange platform, such as a dedicated website and mobile application, to facilitate timely access to and exchange of information among all parties. Regularly organize activities such as symposiums and seminars to promote face-to-face communication and exchanges and improve synergistic efficiency.

A scientific and reasonable evaluation index system will be formulated, and the operational effect of the synergistic mechanism, the implementation of policies, and the improvement of soil environmental quality will be evaluated on a regular basis. Timely adjustments of synergistic strategies and measures will be made on the basis of the assessment results, and the synergistic mechanism will be continuously optimized to ensure its effectiveness and adaptability.

7. Conclusion

This study thoroughly explores the synergistic mechanism of public management of soil pollution prevention and control policies, and through the study of related theories, analysis of the current status of domestic and international policies, and the dissection of successful cases, the following main results are drawn:

The importance of public management synergy mechanisms for soil pollution prevention and control is clearly identified, and its components include goal synergy, resource synergy, information synergy, and action synergy. Different actors, such as government departments, enterprises, social organizations, and the public, have their own unique and indispensable roles and functions in the synergy. The government plays a leading and supervisory role, enterprises carry out their governance responsibilities, social organizations provide support and supervision, and the public actively participates.

The study reveals the effectiveness of China's current soil pollution prevention and control policies, including the initial establishment of a monitoring system, the advancement of governance in some regions, and the improvement of public awareness. However, it also points out existing problems, such as weak implementation in some areas, insufficient funding, imperfect technical standards, poor sectoral coordination, and inadequate public participation mechanisms.

In the case analysis, the features and advantages of the synergistic mechanism of successful cases at home and abroad are summarized, which provides valuable experience for constructing and improving the synergistic mechanism in China. Strategies for building a synergistic mechanism for public management of soil pollution prevention and control policies in China are proposed, including clarifying synergistic objectives and principles, improving institutional safeguards, strengthening the construction of an information-sharing and communication platform, and establishing an effective monitoring and evaluation system.

However, this study also has certain limitations. In terms of research methodology, despite the

ISSN 2616-5872 Vol.6, Issue 4: 69-75, DOI: 10.25236/AJEE.2024.060410

comprehensive use of various methods, it still focuses on qualitative analysis, with relatively few quantitative studies, which may be lacking in the accuracy and persuasiveness of the data. In terms of research scope, it mainly focuses on policies and mechanisms at the macro level, and the research on synergistic prevention and control of soil pollution in specific areas and specific types of soil pollution is not deep enough. Meanwhile, the exploration of the application of new technologies and methods in synergistic mechanisms needs to be further strengthened.

In the future, with the continuous progress of science and technology and the sustained development of society, the synergistic mechanism of soil pollution prevention and control policies is expected to realize the following developments:

In terms of technological innovation, more efficient, green, and sustainable soil pollution remediation technologies will emerge, providing stronger technical support for the implementation of the synergistic mechanism. At the same time, the application of big data, artificial intelligence, and other information technologies will further enhance synergy efficiency and precision.

In terms of policies and regulations, it is expected that they will be improved and refined, resulting in a more rigorous legal system and a clear policy orientation that will strengthen the constraints and incentives for each subject.

In terms of international cooperation, given that soil pollution is a global priority, there is an urgent need for an extensive exchange of experience and cooperation among countries to jointly promote the green module on soil decontamination for global sustainable development.

All in all, the public management synergy mechanism of soil pollution prevention and control policy has a broad development prospect, which needs the joint efforts of different subjects, that is, the government, social organizations, and the public, to continuously transform and innovate, and vigorously promote the green development of green ecology.

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