

# Route Optimization of Public Participation in Environmental Law Driven by Big Data

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## Abstract

The innovation of data technology has shaped a more open and symmetrical, convenient and interactive interaction platform, allowing the public to access more diverse information. In the context of the rapid development of the digital age, policymakers need to think about how to use big data to further enhance the effectiveness, inclusiveness and enthusiasm of public participation in environmental rule of law. However, the reasons of poor data quality, the lack of environmental information protection and the weak self-efficacy of the public lead to the problems of the high waste rate of environmental data, the leakage of public environmental information and the weak enthusiasm of the public to participate in the problem. The key to get out of the dilemma is to improve relevant legislation on public participation in environmental rule of law, update the multiple relief channels of public participation, and further consolidate the foundation of public participation. Only in this way can we promote public participation in environmental rule of law to a higher level, and then provide directional guidance for our country's current practice of digital environmental rule of law.

**Keywords:** big data, public participation, environmental rule of law, digitization, public environmental data

## 1. Introduction

The global spread of big data technology and environmental data sets has created a new situation of environmental governance. It breaks the imbalance of power and responsibility among different subjects such as the government, the market, society and the public in the traditional governance structure, and realizes information interconnection and data sharing through big data platforms. The General Secretary clearly pointed out that "we should use big data to improve the modernization level of national governance", "we should establish and improve the mechanism of big data to assist scientific decision-making and social governance, and promote the innovation of government management and social governance models", "environmental governance is a public problem that needs the joint efforts of all organizations and individuals to solve, and call for action by all people." The era of big data provides an open, symmetrical and convenient interactive platform, enabling the public to obtain more information and bringing new opportunities for public participation in environmental rule of law. The application of big data technology in modern environmental governance has become a hot spot in environmental law research. However, at present, most studies focus on the macro level, such as the analysis of big data's domain expansion of environmental rule of law (Zheng & Wang, 2020), the transformation of control mechanisms (Hao & Sun, 2019), and the impact of technological change on environmental protection industry (Fang & Xv, 2016) and comprehensive environmental governance (Xiong, 2015), etc., and there is a lack of applied research combining big data with public participation in environmental rule of law in specific fields. From the perspective of public participation in environmental rule of law, this paper intends to introduce big data technology and put forward corresponding optimization strategies in combination with its application in public participation in environmental rule of law, so as to further improve the level of environmental rule of law, promote the construction of ecological civilization system and implement the national digital development strategy.

## 2. Current Situation of Applying Big Data to Public Participation in Environmental Law

In July 2015, the General Secretary clearly pointed out for the first time at the 14th meeting of the Central Leading Group for Comprehensively Deepening Reform that it is necessary to promote the networking and sharing of national ecological environment monitoring data and carry out ecological environment big data analysis. The meeting adopted a number of policies on the construction of ecological civilization such as the "Ecological

Environment Monitoring Network construction Plan", and proposed that big data is a basic strategic resource at the national level. Subsequently, The State Council issued the "Action Program for Promoting Big Data Development" at the end of August 2015, which further pointed out the direction for China to build environmental protection big data. Since the Chinese leader delivered a speech entitled "The Community of Human and Natural Life" at the Climate Leaders Summit in April 2021, Chinese people have once again realized that the climate crisis is imminent. In the face of climate change, which is a global issue related to human survival and sustainable development, no country, nation, enterprise or individual can stay out of it. Since then, China has accelerated the improvement of a fair and reasonable global climate system, made extensive mobilization, formulated a public participation mechanism, and established a climate governance system featuring positive interaction among the government, enterprises and the public, so as to stimulate the sense of responsibility and the spirit of active participation of the whole society, and form a broad social consensus on green and low-carbon development, which has significantly improved the capacity of public participation. This has catalyzed the implementation of the global response to climate change.

### *2.1 Practical Effects*

In order to actively carry out the construction and application of ecological and environmental big data, in July 2015, the Ministry of Environmental Protection issued the Interim Measures for the Management of Information Construction Projects of the Ministry of Environmental Protection, and actively carried out the construction and application of ecological and environmental big data. In 2016, the "Outline of the 13th Five-Year Plan for National Economic and Social Development of the People's Republic of China" identified big data as a national strategy, and the former Ministry of Environmental Protection also issued the "Overall Plan for the construction of Ecological Environment Big Data" in the same year, which carried out a top-level plan for the development of ecological environment big data, and proposed to use data-based decision-making thinking to recreate environmental governance. In 2021, the 14th Five-Year Plan for National Economic and Social Development of the People's Republic of China and the Outline of the 2035 Vision Goals emphasized the construction of digital China and the construction of digital government, and the overall transformation of production methods, lifestyles and governance methods is driven by digital transformation. "Big data", "Internet+" and other information technologies have become an important means to promote the modernization of environmental governance systems and governance capabilities.

In recent years, big data technology has become a tool or bridge to broaden public participation channels in the field of ecological environment, and has achieved initial results. The rise of new media, especially the popularity of social media such as Weibo and We-chat, provides a more simple and convenient channel for the public to participate in environmental protection, and the concept of "everyone is an observer, everyone is a supervisor, and everyone is an environmental protection officer" is closer to becoming a reality.

On the one hand, the active public participation in environmental protection in new media platforms has greatly promoted the development of environmental protection government affairs. The Publicity and Education Center of the Ministry of Ecology and Environment has set up public participation platforms at different levels, such as the carbon inclusive Cooperation Network, the ecological and environmental vocational education network, the ecological and environmental volunteer service network, and the energy, climate and environment entrepreneur Salon, and extensively mobilized entrepreneurs, experts and representatives of social organizations to speak freely and conduct in-depth discussions, building a very important platform for public participation. In addition, some grassroots environmental protection departments have actively established Weibo, We-chat and other platforms, and have accumulated a lot of experience in the disclosure of information on social media. In Shandong Province and Chongqing Municipality, in the construction of social media, the "top leader" of the environmental protection department personally grasped the work, mobilized troops, formed a joint force, and improved and enhanced the efficiency of environmental law enforcement while responding to netizens in a timely manner. In particular, after encountering the crisis of underground sewage discharge in Weifang, Shandong Province made great efforts to publicize environmental information through social media and opened its environmental protection work to the public on a large scale, establishing a typical practice and valuable experience of accepting social supervision. The Ministry of Environmental Protection is also actively establishing an official We-chat reporting platform "12369". Jining Chen, former minister of Environmental Protection, said several times after taking office that China would establish an environmental pollution We-chat reporting platform to support and mobilize the whole society to fight against environmental violations. In 2006, the "Black and Smelly River Reporting Platform", developed by the Ministry of Housing and Urban-Rural Development in collaboration with the former Ministry of Environmental Protection and other departments, connects to the Blue map APP developed by the Institute of Public and Environmental Affairs (IPE). In this way, the government received tens of thousands of reports from netizens about

black and smelly water. At the same time, the "micro report" on the excessive online data of enterprises has also promoted more than 4,000 enterprises to make a public response (Ma, 2021). On the website of the Institute of Public and Environmental Affairs of China (IPE), the public can access a map of China's air pollution, water pollution and solid waste pollution. The data comes from data released by local environmental protection departments, as well as data collected by enthusiastic volunteers organized by the center's staff. In 2013, the Environmental Impact Assessment Public Participation website ([www.gzcy.org](http://www.gzcy.org)), established by Chongqing Liangjiang Volunteer Service Development Center, has made full use of online retrieval, administrative review and litigation to obtain information, and gradually developed into a public data platform for environmental impact assessment with the largest amount and the most abundant data types (Peng, 2017). Recently, Autonavi, in cooperation with the Beijing Municipal Commission of Transport, launched an intuitive display of the congestion level of Beijing subway buses in the Autonavi map, so that passengers can choose a more appropriate/fast transportation mode after knowing the congestion level. Data transparency makes it more likely for passengers to take the subway and buses, which makes it easier for the public to participate in low-carbon environmental protection and make their own contribution to the fight against climate change. This is also a typical case of providing low-carbon services to the public and promoting public participation in environmental protection through data integration and cooperation.

On the other hand, various environmental micro public welfare activities have been widely tried in social big data, and data-based public online supervision has continued to develop: activities such as "taking photos of hometown pollution", "taking photos of black chimneys" and "pollution map" have become hot topics in Weibo, awakening citizens' awareness of supervision. In 2015, during the national "Two sessions", CPPCC members also proposed to encourage the public to promote environmental remediation by taking photos. In February 2015, CCTV reporter Jing Chai's self-funded documentary "Under the Dome", which was jointly released by People's Daily Online and Youku, immediately topped the list of views on major video websites, and discussions about it also frequently swept the screen on social media such as Weibo and We-chat. According to statistics, within five days after the broadcast, the total number of plays on the whole network has exceeded 275 million, and more than 43% of netizens viewed the film in the first four days of the release of the video, creating a miracle in the history of communication, making the discussion around the film the top public event in recent years. "Under the Dome" lets us see the huge power that can be displayed by relying on the media and calling on the public. The pollution map mentioned in the film was paralyzed due to intensive visits by netizens, and the "12369" environmental protection report phone in many places was frequently called. According to the national "12369" environmental protection report handling announced by the Ministry of Ecological Environmental Protection, in November 2020, "12369" received 40,591 environmental protection reports, an increase of 29.4% month-on-month and 15.4% year-on-year; of the reports received, We-chat reported a total of 20,213 (about 49.8%), an increase of 33.0% quarter-on-quarter and 22.7% year-on-year. It can be seen that the miracle it has created is the result of the continuous efforts of several generations of environmental protection people over the years, from quantitative change to qualitative change.

In short, the rise and development of big data has brought a new world for public participation in environmental rule of law. In public participation in environmental governance, big data can play a fundamental supporting role. The use of big data to achieve diversified information publicity makes the public have a wide range of rights to know and participate, and opens up the situation for public participation in environmental law.

## *2.2 Dilemmas*

However, while big data technology promotes public participation in environmental rule of law, it also faces some practical dilemmas.

Firstly, the waste rate of environmental protection information and data is high. In general, environmental data is mostly in the hands of governments. Due to problems such as data security and data rights, the government seals a large amount of information data in the database, resulting in the waste of effective environmental data. In addition, many environmental data are only produced to meet the needs of administrative work, and once the work is completed, these environmental data seem to be left behind, becoming a resource that is put on the shelf by relevant departments and no longer used. In addition to the problem of environmental data disposal by government departments, environmental data fraud also leads to a high rate of data waste. Taking the practice of environmental impact assessment in China as an example, construction units or other relevant parties may face the pressure of economic interests and try to mitigate or avoid the negative results of environmental impact by manipulating data in order to obtain approval or reduce the requirements of environmental protection measures. For instance, in the case of public participation in the environmental impact assessment of an industrial park in Guangzong County, Hebei Province in 2020, in the Environmental Impact Report on the overall planning of Guangzong Huancheng

Industrial Park (Draft for comments), the public participation part is suspected of fraud, which means public participation is still in the publicity period, and the report shows that it has been completed; the public participation forum was not held, but the content of the forum was fabricated. Similar data falsification problems have also occurred in Shandong, Jiangxi and Heilongjiang provinces.

Secondly, there is a risk of leakage of public environmental information data. In the era of big data, environmental information has been widely recognized as an important social resource. It is worrying that some administrative staff members may abuse their power or access when handling environmental information, and seek personal illegal economic benefits by disclosing citizens' private information. A civil servant in Nanjing used his position to illegally obtain and sell 820,000 pieces of personal information including name, ID number, mobile phone number, home address and work unit in 2018, the Beijing News reported. In addition, the environmental information database, which is established by administrative organs and contains a large amount of personal information, has become the main object of attack by cyber criminals. According to the China Cybersecurity Report 2022, the government has become the main target of Advanced Persistent Threat (APT) attacks, which illegally obtain personal information resources by exploiting system vulnerabilities or phishing emails.

Thirdly, the public's enthusiasm for providing environmental information is not high. It is undeniable that big data technology has provided more opportunities for the public to participate in environmental governance, but relevant departments have not yet implemented in terms of listening to public demands, interacting with the public, and handling complaints. According to the "2019 China Internet Public Opinion Analysis Report", the trend change of the public opinion pressure index of various government departments in the past five years can be seen that the public's attention to the environment is much lower than that of hot topics such as public security emergency response and education (see Figure 1). It can be seen that compared with public security education and other issues directly related to their immediate interests, the public's demands for environmental governance are not urgent. In the process of environmental information transmission and policy implementation, it is difficult for the public to understand relevant decision-making information, and often can only passively accept relevant environmental policies, and it is difficult to participate in and play a role.

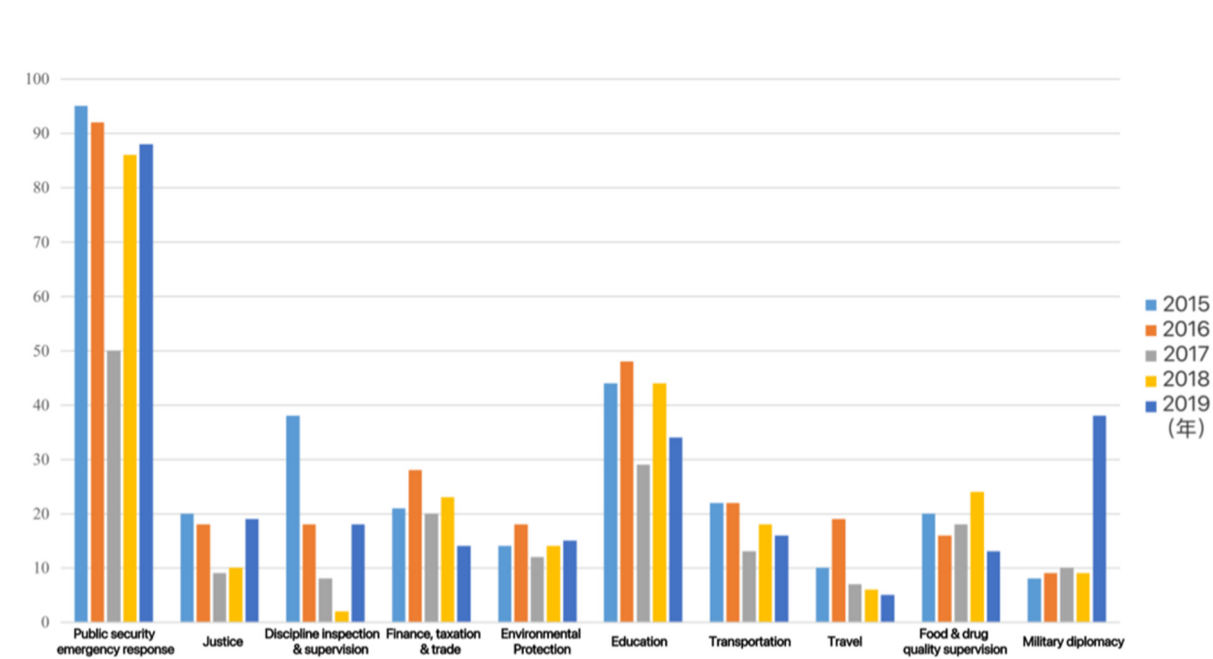


Figure 1. Trend of public opinion pressure index of government departments in recent five years

### 3. Causes of Public Participation in Environmental Rule of Law in the Era of Big Data

Behind the lack of effective operation of public participation in environmental rule of law in the era of big data is the problem that the current environmental information data system in China is not synchronized with the development of public participation in environmental rule of law. Further refinement, can be summarized as the following three reasons.

### *3.1 The Inadequacy of the Relevant Legislation in Environmental Law*

In the era of big data, there are many discomfort in the traditional public participation regulations, which restricts its due effectiveness. The application of big data technology to environmental information needs to be calculated in an order of magnitude manner. The collection, sharing and protection of public environmental data has become an important issue for public participation in environmental rule of law. On the one hand, public participation in administrative decision-making legislation is incomplete, leading to conservative administrative behavior. Due to the late start of the research on environmental rule of law in the field of administrative law in China, there are fewer laws and regulations related to administrative decision-making, and the level is low, so it is difficult to deal with the problems brought by the application of big data in public participation in environmental rule of law. Undoubtedly, the Interim Regulations on Major Administrative Decision-making Procedures (IRMADP) promulgated by The State Council in April 2019 has achieved a new breakthrough in the field of administrative decision-making legislation, and is a model of the system to promote the standardization of administrative decision-making. The promulgation of the regulations fills the gap of the lack of uniform laws and regulations in the administrative decision-making system, marking a major development of the rule of law in China's administrative decision-making. However, IRMADP on public participation in the process of administrative decision-making are too principled, and do not make specific provisions on the specific content and process of public participation, and subsequent regulations have not been issued to adapt. The main reason for this design is to maintain the flexibility of the system design, allowing administrative decision-making organs to refine and explore matters that need to be "adapted to local conditions", and leaving room for specific requirements to be formulated separately in relevant regulations. But from the perspective of the local government regulations formulated in actual places, almost all local government regulations are only the repetition and formal extension of the content of public participation in IRMADP, and have not made substantive provisions on the specific content. Although the abstract rules are more flexible than the concrete rules and can adapt to different situations in different regions, the lack of concrete rules leads to the public participation procedure is far from adapting to the reality of public participation in our country at the present stage. The current laws and regulations do not make clear provisions on how to carry out public participation in a specific administrative decision-making process. This also leads to various problems in the actual application of big data in the process of public participation, and even leads to the virtual existence of public participation. The legal system regulating major administrative decision-making matters is still not perfect, and the subject of general administrative decision-making is more complicated and broader than that of major administrative decision-making, which leads to the legal norms applicable in the process of public participation in general administrative decision-making. On the basis of collecting a number of small environmental data from the public, the government forms a systematic environmental big data through integration, analysis and utilization. Although these environmental data are collected spontaneously by the public, can the government use them freely? As the data holder, the government often adopts conservative data application ideas for data security considerations. For example, restrict the access and sharing of data to ensure that data is not obtained by unauthorized personnel (Ni, 2021), so as to protect the privacy of public environmental information data. However, this also means that other potential users cannot use this environmental data for environmental monitoring, research or decision-making. Whether it is IRMADP or the regulations formulated by local governments, there is a lack of reference to emerging technologies such as big data, which is mainly reflected in the outdated identification of public participation and the relatively general application of public environmental data. Therefore, from the practical operation point of view, in order to avoid the legal risk of data infringement, the government adopts a conservative and negative application idea.

On the other hand, the legislation to punish the falsification of public environmental data is incomplete, resulting in mixed data quality. In April 2018, the Ministry of Ecology and Environment issued the Measures for Public Participation in Environmental Impact Assessment (MPPIEIA), which put forward higher requirements for public participation in environmental impact assessment in terms of the scope, form, disclosure content, supervision and other aspects of public participation in environmental impact assessment. Article 25 of MPPIEIA stipulates that public participation has become a necessary condition for EIA approval, and an EIA report that is not based on extensive public consultation is unqualified. Although the implementation of MPPIEIA provides a more accurate legal basis for more specific implementation of public participation in EIA, the specific implementation depends on the efforts of various government departments to ensure the effectiveness of public participation. In the actual operation process, when or how to introduce public participation and how to carry out public participation procedures in a specific field are not given a specific answer in the current legislation, so it is difficult to provide a basis for administrative decision-making and implementation of laws lacking specific implementation. The public cannot really participate strongly and quickly in the implementation of the process, and the work of environmental protection is still unable to be effectively participated and implemented.

The wide application of advanced technology in various fields, the fast pace of social life and the trend of the government to simplify the process of government affairs require administrative decision-making to use big data technology to make the process of public participation efficient, process transparent and channel facilitation. The provisions of traditional public participation models such as hearings, symposiums or questionnaires set by the current regulations are obviously unable to meet the needs of the era of big data and the needs of public digital participation. If it is not updated and refined from the legislative provisions, it is difficult for the public to truly participate in the environmental rule of law. For this purpose, it is urgent to regulate them through complete laws and regulations, so as to improve the application effect of environmental data, avoid data information conflicts, and achieve green governance of public environmental data.

### *3.2 Lack of Public Environmental Information Protection*

Relief system is one of the important ways to protect public environmental information rights, and its perfection is closely related to the protection of public environmental information rights and interests. Unlike the rapid development of environmental big data, the public personal information relief system seems to be stagnant. Indeed, the Decision of the Standing Committee of the National People's Congress on Strengthening the Protection of Network Information, the Cyber-security Law of the People's Republic of China, and the Protection of Personal Information of the People's Republic of China all stipulate, to varying degrees, the responsibilities of relevant functional departments for the protection of citizens' personal information. In particular, the fifth chapter of the Personal Information Protection Act specifically provides for the obligations of personal information processors; however, it does not clearly define the specific responsibilities and roles of administrative organs in the field of personal information protection. In most cases, administrative agencies only pay attention to the confidentiality of public environmental information; the relevant responsible subjects can not provide relief in time or adequately, resulting in public environmental information relief laws and regulations become mere formalities. If public rights and interests cannot be effectively protected, the authority of law will also be weakened.

Although China's administrative law clearly stipulates that citizens can protect their rights by means of administrative reconsideration or administrative litigation, the remedy process of administrative organ staff's inaction or illegal acts lacks operational normative guidance due to the lack of specific procedural provisions in existing laws. When the legitimate rights and interests attached to citizens' personal information are infringed, the relevant administrative departments mostly put forward rectification suggestions, and rarely transfer them to judicial departments for investigation (Song et Al., 2020). In this way, it encourages the disorderly development and utilization of public environmental data. It is also difficult for judicial departments to effectively deal with large-scale information leakage risk control tasks (Wang, 2022). It can be said that the public environmental information protection mechanism has not played its due role in practice, but has intensified the risk probability of citizen information disclosure.

### *3.3 Weak Self-Efficacy of Public Participation*

Self-efficacy is the biggest factor that affects the public's willingness to participate. The self-efficacy of public participation in environmental rule of law refers to the public's speculation and judgment on whether they have the ability to help realize environmental governance. Many factors, mainly including the accessibility of participation channels, the ease of participation methods and the responsiveness of participation feedback, will affect the public's judgment on self-efficacy, and thus affect the public's enthusiasm for environmental information dissemination.

Firstly, blocked channels of participation. On the one hand, the channels are not diversified enough. Although big data technology has increased the opportunities for public participation in the public opinion collection, public hearings, public complaints and other channels led by the government and environmental protection agencies, the use of public environmental information data obtained through these channels is not clear. Government agencies often only collect opinions and suggestions from the public. This one-way data collection method is not conducive to communication and understanding between the public and government agencies, and it is difficult to truly incorporate public participation into the decision-making and practice of environmental rule of law. On the other hand, the channel is not transparent enough. The public often only gets information through the media or community forums. This information asymmetry makes it difficult for the public to obtain accurate and comprehensive information and to provide effective environmental information data. In addition, opacity is also reflected in the high threshold of channels, the public in the official government platform to release environmental information data usually need to register or log in to the account, fill in the corresponding form or provide personal information. The process is relatively cumbersome and there may be certain thresholds for some members of the public who are unfamiliar or unwilling to provide personal information. Therefore, it is necessary for the government to provide more convenient, understandable and easy-to-operate public participation channels, so that

the public can participate in the environmental rule of law anytime and anywhere.

Secondly, limited way of participation. Although some local governments have begun to adopt new technologies, such as We-Chat public accounts and online questionnaires, to collect public environmental information data. However, this way of submitting environmental information data through forms cannot be directly communicated and discussed with other members of the public. This reduces the opportunity for public interaction and collaboration, as well as further in-depth discussion and refinement. Furthermore, the visits and exposure of official government websites are relatively low, and the environmental information data submitted by the public is difficult to obtain widespread attention and influence. In general, government officials usually collect environmental data for specific issues and government functions, but do not cover all environmental data. The public may not be able to submit environmental information data related to other fields on the official website. But in fact, for some major environmental protection events, the public often has no more opportunities to participate and no more right to speak, which limits the breadth and diversity of public participation and artificially hinders the enthusiasm of public participation.

Thirdly, insufficient attention is paid to data on public participation. It is reflected in the lack of public response from the construction unit and the government. The response mechanism plays an important role in promoting and supporting the government in providing high-quality public services and enhancing public satisfaction. Under the realistic conditions of insufficient effective public participation, no matter whether the identification of facts or the application of laws is correct or not, the environmental governance actions carried out by the government are usually difficult to obtain the broad recognition of the public. At present, laws and regulations have not established the response as a system, which is rather arbitrary. The Environmental Impact Assessment Law of the People's Republic of China only stipulates that, when preparing the environmental impact statement, the construction unit should attach an explanation of whether the public opinions are adopted, and the feedback requirements of the construction unit to the public are not clearly defined. Therefore, construction units often choose to directly omit this link. It is not known whether the public who participated in the EIA adopted its views or not. Without positive feedback from the public, the public may feel that their opinions cannot influence project approval or that decision makers do not really value their participation. Public participation in EIA may be regarded as a form of formalism, and the enthusiasm of public participation will be reduced or even lost. Although the Measures for Public Participation in EIA provide for the improvement of the feedback mechanism for public opinions, the construction unit shall contact the public and explain to them the reasons for not adopting the opinions; Similarly, after accepting the environmental impact report of a construction project, the competent ecological environment department shall also report the adoption of opinions to the public through its website or other means. However, in the practice of EIA in China, the importance of public opinion data is far from enough, and the feedback mechanism of public opinion data is not perfect, which greatly reduces the enthusiasm of public participation. At the present stage, an effective response mechanism has not been established, and traditional methods such as answering questions to the parties by the reception staff or the news spokesman system are often unable to effectively respond to the public in a substantive way, but tend to be a symbolic measure in form. The result is often that public participation becomes a mere formality. Under such a response mechanism that cannot realize the effective linkage between the government and the public, the public cannot objectively and comprehensively understand the process of environmental rule of law, and it will not be able to resolve the original doubts gathered, which will lead to the weakening or even loss of public participation enthusiasm, which is an inevitable consequence.

#### **4. Recommendations of Public Participation Driven by Big Data**

The development of environmental big data has profoundly affected the mode of public participation in environmental law. Applying big data to public participation in environmental law is a beneficial exploration by government departments on the road to improving environmental law. It can obtain relatively objective results through the analysis of massive data, so as to eliminate the influence of various human factors in the traditional administrative decision-making process, so as to optimize the path of public participation in environmental law. However, the content covered by the Environmental Protection Law is too broad, mostly in principle and general provisions, and there is not too much legal language to regulate public participation. About that, the Measures for Public Participation in Environmental Protection have made some efforts, but the effect is little due to the reasons of legal rank. After clarifying the causes of the application of big data to public participation in environmental governance, how to adjust and optimize public participation in environmental rule of law has become a realistic problem that must be solved.

#### *4.1 Improving Relevant Legislation on Public Participation, Driving Green Governance of Public Data*

In order to make big data technology can be better applied in the public participation process of environmental rule of law, the effective guidance of laws and regulations is indispensable. The government should formulate a national macro big data strategy based on its national conditions and technological development, and provide policy guidance and legal support for big data technology development, ecological and environmental data sharing and commercial application. To realize the complete legislation of environmental rule of law, it is necessary to make efforts from two aspects: public participation in environmental administrative decision-making and the punishment mechanism of environmental information and data fraud, so as to realize the decision-making basis. At the same time, it also allows public participation to better integrate with big data technology, so as to continuously optimize the path of public participation in environmental rule of law under the technological wave.

The first is to improve the relevant legislation of public participation in environmental administrative decision-making. In order to ensure the flexibility of the system, the Interim Regulations on Major Administrative Decision-making Procedures (IRMADP) in 2019 left enough space for the relevant laws and regulations to formulate specific provisions separately, and did not make more detailed provisions on public participation procedures. The advent of the era of big data provides more space for environmental administrative decision-making procedures, especially public participation, which can be expanded and operated. In this regard, we can consider developing a legal and regulatory system for information disclosure and sharing of ecological civilization construction on the basis of existing laws and regulations such as the Regulations of the People's Republic of China on the Disclosure of Government Information, the Current Key Work Arrangements for the Disclosure of Government Information, and the Measures for the Disclosure of Environmental Information. Exploring the legal and regulatory construction of personal information protection and data security in the process of ecological environmental data mining, and bring the disclosure and management of ecological environmental data into the legal track. In recent years, data disclosure has become the trend of modern social governance, and at the same time provides the necessary guarantee for the public to participate in modern social governance. We can refer to the "Open Government Date" campaign advocated by the United States and the European Union to put forward comprehensive requirements for the disclosure of government environmental governance information. A "national action plan" can be developed for the opening of government environmental governance data to further open government environmental governance data. In addition, vigorously popularize the data analysis and three-dimensional presentation of big data technology based on visual methods, so that the government's environmental governance data is no longer high, narrow the distance between the public and environmental protection, so that even the public without professional knowledge of environmental protection can read and use environmental protection data. At the same time, the information contained in a large number of data, as well as the mobility and freedom of data itself, also need more detailed provisions to regulate. Therefore, it is necessary to further improve the relevant laws and regulations at this stage. In terms of the refinement of the provisions, detailed standards or corresponding operational guidance should be formulated for the whole process of public participation in the mining, collection, storage, analysis, research and judgment of large data, which is the basis for scientific use of big data to promote public participation, and helps to provide legal protection for the application of big data in public participation in administrative decision-making. Moreover, in terms of legislative content, we should not ignore the legislation on data use norms, so that the administrative departments can always stay within the scope of legal provisions in the process of using big data, and clarify the rights and responsibilities enjoyed by decision-makers and data users in the process of using data. And pass legislation to shift responsibility for data from citizens to data users. This is because data users are more aware of how they will use the data, and they should be responsible for the consequences of their use of the data (Mayer-Schönberg & Cukier, 2013). Furthermore, it is also possible to increase support for the development of ecological environment big data industry from legislation and fiscal and tax policy formulation, expand the commercial value and market development of ecological environment big data, and strengthen the joint development of big data technology and core technology capacity building. Through the above legal regulations, the public participation process is regulated to ensure the quality of data and decision-making, so as to facilitate the formulation and implementation of environmental administrative decisions.

The second is to strengthen the legal regulation of environmental information data fraud and personal credit construction. Big data technology has a strong openness, integration and interaction, so that the government's environmental administration is facing certain challenges when it moves towards the direction of it. Therefore, at this level, the goal should be to build a government based on the rule of law and a service-oriented government, deepen the reform of the environmental administrative system, and promote the construction of supporting policies and regulations for ecological environmental data security, data openness, and data sharing. On the basis of the establishment of sound laws and regulations, the government should also reasonably apply relevant laws and



regulations, and impose strict sanctions on the implementation of environmental information data fraud. In the face of the serious problem of environmental information and data fraud, it is urgent to define in detail the various types of fraud behavior and treatment implementation measures, and crack down on data fraud enterprises, institutions or individuals by legal means. In recent years, several laws and regulations, including The introduction of the Cybersecurity Law of the People's Republic of China, the Determination and Treatment of falsification of Environmental Monitoring Data, the Opinions on Deepening the reform of environmental monitoring and Improving the quality of environmental monitoring Data, the Interpretation of several Issues concerning the Application of the Law in handling Criminal Cases of environmental Pollution, and the Regulations on Ecological Environmental Monitoring (Draft), have played a positive role in cutting off the interest chain of environmental data fraud, restoring the real data, and providing an important basis for the standardization of relevant regulations. On the one hand, the focus of the investigation and punishment of leading cadres at all levels and personnel of relevant departments to manipulate and falsify public environmental data behavior, for leading Party and government cadres to manipulate and falsify monitoring data, in accordance with the relevant provisions of the "Measures for Investigating the Responsibility of Leading Party and Government Cadres for ecological environmental damage (Trial)". On the other hand, it is necessary to increase the punishment of enterprises or individuals who falsify environmental data, and reward units or individuals who report and expose environmental data falsification, so as to mobilize the enthusiasm of the public. If the circumstances are so serious that they have brought huge losses to the State and constitute a crime, they shall be investigated for criminal responsibility in accordance with the second paragraph of Article 286 of the Criminal Law of the People's Republic of China. Strictly punish data fraud, increase the cost of illegal enterprises or individuals, and make reasonable use of legal deterrence. In this way, improve the effectiveness and utilization of Chinese public environmental data. Moreover, accelerate the construction of the personal integrity system, increase the punishment of falsification of environmental data, and incorporate it into the credit information platform, and incorporate enterprise illegal information into the national enterprise credit information publicity system according to law, in order to promote the formation of a long-term regulatory mechanism for trustworthy incentives and punishment for dishonesty.

#### *4.2 Updating Multiple Relief Channels for Public Participation in Environmental Rule of Law to Protect the Public's Right to Environmental Information*

The relief procedure is the ultimate guarantee of public participation in environmental rule of law. And the remedy procedure should form one of the independent pillar systems, like the relevant provisions of the Aarhus Convention. In order to solve the problem that the traditional single relief method is difficult to fully protect the legitimate rights and interests of the subject of environmental information rights, the multiple relief channels of public participation in environmental rule of law should also be updated accordingly.

In terms of administrative remedies, the Administrative Procedure Law of the People's Republic of China and the State Compensation Law of the People's Republic of China clearly stipulate that when government organs collect personal information of citizens, if the personal information is not effectively protected, resulting in information leakage or excessive use of authority, causing losses to citizens' personal life or property, citizens have the right to defend their rights through legal channels such as reconsideration and litigation. And get the corresponding compensation. To this end, we should discuss the administrative reconsideration, administrative litigation and administrative compensation in order to perfect the current public environmental information relief system. The first is to expand the scope of administrative reconsideration and administrative litigation, when government agency staff in the process of handling public environmental information protection is not in place, active disclosure and other illegal acts of overstepping their powers, citizens have the right to apply for administrative reconsideration to the relevant agencies or file administrative litigation to safeguard their environmental information rights and interests. Since it is difficult to determine the exact infringing subject in environmental information infringement, measures can be taken to make the suspected infringing subject bear the corresponding responsibility. At the same time, we can learn from the practice of the European Union and Hong-Kong to set up a special information protection agency. When individuals believe that their information rights and interests have been infringed, they can submit an application for administrative relief to the information protection agency. The information protection agency shall accept and examine the application for relief submitted. Once the relief application is approved, the information protection authority will investigate and collect relevant evidence and data; at the same time, try to mediate, negotiate to solve the dispute, reach a satisfactory solution for both parties. The second is administrative compensation. When the legitimate rights and interests of citizens are infringed upon in the collection and storage of environmental information and other government affairs, citizens have the right to file an application for administrative compensation with the relevant functional departments, asking them to compensate for the economic losses and mental damage suffered as a result of the infringement. If the infringed

party is not satisfied with the compensation decision of the administrative organ, the infringed party may bring an administrative lawsuit to the court in accordance with the law, requiring the court to review and judge the compensation of the administrative organ.

In terms of judicial relief, environmental administrative public interest litigation provisions should be added in time. Although the new Administrative Procedure Law does not make a distinction between concrete administrative acts and abstract administrative acts, it is still unclear whether most of the environmental administrative decisions that once belonged to abstract administrative acts can enter the scope of general administrative litigation relief. The prosecution of traditional administrative litigation is limited to the administrative counterpart, and the scope is obviously small, while the environmental administrative decision-making and other behaviors affect all the unspecified public in a specific region, which makes the supervision and participation of other social public on environmental administrative decision-making can not be effectively remedied. Also, with the Personal Information Protection Law as an opportunity, prosecutors should take the initiative to assume the responsibilities entrusted by the new era and build the last line of defense for public welfare relief of personal information. In addition, based on the experience of the environmental civil public interest litigation system, the specialized agencies for information protection can also file public interest litigation on behalf of data rights subjects or procuratorial organs in the absence of litigation. The establishment of environmental administrative public interest litigation system is the key to effectively solve all the problems mentioned above.

By updating and strengthening administrative and judicial relief channels, we can make them adapt to the needs of public participation in environmental rule of law in the era of big data, and realize the protection of public environmental information rights. The public will more effectively exercise the right of public participation in environmental rule of law. This will contribute to the legitimacy of environmental decision-making, enhance the substantive effect of public participation, promote the breadth and depth of participation, and build a positive interactive relationship between public participation and environmental law.

#### *4.3 Implementing Big Data Thinking, Promoting the Democratization of Environmental Law*

The transformation and updating of the concept of "digital environmental protection" is the primary condition for enhancing the self-efficacy of public participation and mobilizing the enthusiasm of public participation, and the advancing of the practical operation of "environmental big data" is an important guarantee for consolidating public participation.

Firstly of all, implementing big data thinking and promoting the digital upgrading of public participation. Adhering to the five development concepts of "innovation, coordination, green, sharing and openness", promote the high integration of big data technology with new media technologies such as Weibo and We-chat, break information barriers and data monopoly, break through time and space restrictions, attract the public to participate in national environmental governance, and reflect the different interest demands and value preferences of multiple subjects. A new pattern of environmental governance featuring government-led, public participation and collaboration among multiple entities will be formed, and a paradigm shift from single governance to multiple co-governance, from closed governance to open governance, and from government-led to consultative governance will be realized. And making use of big data technology to promote the reform of the concept of government governance of "responsibility first and people first", establish the ruling concept of collaboration, sharing and openness, and public trust, continuously improve the information technology level and information management level of government management departments and administrators, realize the government environmental governance by asking the people, asking the people, gathering ideological consensus, reaching a consensus of interests and expanding government credibility and participate in the incremental enhancement of democracy (Wang, 2022).

Secondly, expanding the public participation platform with big data technology. To be specific, it is to build different forms of "environmental big data" public service platforms - using mobile Internet means such as Weibo, We-chat, QQ and their embedded message services and interactive functions to improve the data collection and accurate cognition of the public's environmental needs by the government and environmental protection departments, and provide differentiated, refined and hierarchical environmental public services. The government's provision of environmental and ecological services will be effectively combined with public participation in environmental pollution supervision and reporting, and the wisdom of social groups will be actively used from the aspects of data, technology, manpower, etc., to make up for the lack of government decision-making resources. From the perspective of practical operation, we can proceed from the following aspects. The first is to create a special online window, set up a special opinion expression window on the official government website, social media accounts, online forums, special pages, etc., so as to make up for the deficiency of comprehensive and long-

term discussion. The second is to design a user-friendly interface. Ensure that the relevant website interface design is simple, clear and easy to navigate and use. An intuitive menu structure and search function maximize the ability for users to quickly find the information and engagement they need. The third is to support multi-device access. Make sure the website is accessible on different devices, including computers, tablets and mobile phones. The responsive design and mobile optimization of the website make it easy for users to access and engage regardless of the device they are using.

Thirdly, making use of the advantages of we-media to optimize the way of public participation. The rise of "we media" has provided more possibilities for the public to express environmental interest demands, report environmental problems, and disseminate public environmental information and data. The public can display environmental information data through various forms such as text, pictures and videos, vividly convey the content and importance, arouse public resonance and attention, and expand the influence of data. At the same time, the public can interact with other users through comments, forwarding and private messages, accelerating the dissemination of environmental information and data, and making the government more responsive to the needs and opinions of the public. In the dissemination of environmental information, we-media platforms such as Weibo, We-Chat and news clients can become network information channels built by official accounts to broaden the ways of public participation. For example, on the Weibo platform, the official government Weibo account can regularly release high-quality and valuable content such as policy interpretation, activity reports, case sharing, etc., and increase the number of fans through targeted promotion to achieve accurate drainage. On the We-Chat platform, attractive titles, pictures and quotes are used to subtly guide readers to click to read more content, or encourage readers to forward and share articles to improve the click-through rate and spread of articles. On the news client platform, establish an official client account, produce short video introductions instead of lengthy text propaganda, and make use of the popular trend of short videos to quickly promote publicity and attract the public to participate in the construction of environmental rule of law through major information media platforms.

Finally, advancing the timing of information disclosure, and building a feedback mechanism for public participation and opinion data. Drawing on the experience of public participation in the EU under the Aarhus Convention, public participation should be accountable (Alberton, 2014), that is, decision makers should report and feedback the results of the public participation process to stakeholders, especially the contributions of their input to decision-making (Yu, 2017). It can be seen that an effective government response is a key element in stimulating active and sustained public participation in environmental rule of law. Therefore, on the one hand, it is necessary to speed up the legal construction of the public participation response mechanism, set up relevant functional departments to respond within the specified date, timely accountability for the phenomenon of delayed response and delayed response, and establish the responsibility of each part of the governance subject. On the other hand, the feedback evaluation system of response mechanism is established, and indicators such as immediate response of public data, immediate tracking of response, and response attitude are set in the evaluation system, so as to promote the enthusiasm of government response and standardize the government response behavior of public participation in environmental rule of law. As far as the environmental rule of law is concerned, natural resources, as a kind of public property, are essentially owned by the whole people, and citizens naturally have the right to participate in them (Li, 2003). In practice, the government should pay full attention to the huge role played by social media, use social platforms to set the heat ranking of issues of public concern, and share the progress and results of environmental governance on the platform. Through the tracking and reporting of the whole process, the public discussion and feedback on specific issues are triggered; after that, relevant functional departments will combine the best solution formed by public opinions and formulate measures for implementation. In this process, the public is the leader, the platform is the leader, and the functional department is the executive. In this way, the government's attitude of attaching importance to public opinions is conveyed, and the positive interaction with public participation is strengthened, so that the public can see its contribution to environmental improvement and enhance their sense of identity in the value of participating in environmental rule of law work. By continuous improvement of participation channels, ways and response mechanisms, it is expected to form a good participatory culture in the whole society and promote the democratization process of environmental rule of law. Through continuous improvement of participation channels, ways and response mechanisms, we hope to form a good participatory culture in the whole society and promote the democratization process of environmental law.

## 5. Conclusion

In the era of big data, public participation is crucial to improving environmental law. The application of big data is an important starting point for improving the government's environmental governance capacity, and provides important technical support for public participation in environmental governance. By improving the relevant legislation on public participation in environmental law to enhance the green governance of public environmental

data, updating multiple relief channels to protect the public's right to environmental information, enhancing the public's willingness to participate through big data thinking and consolidating the participation foundation, and promoting the public's comprehensive and in-depth participation in the digital environmental law.

Just as the idea of Participatory Democracy first proposed by Arnold Kaufmann in the mid-20th century, it emphasizes that multiple governance entities can actively, fully and effectively participate in the formulation, implementation, supervision and other aspects of public affairs decision-making. It is different from the limited and formalized form of participation, but advocates that multiple subjects fully participate in the governance of social affairs without external interference and restriction (Pateman, 1970). Public participation in environmental law actually represents the concrete practice of democratic principles in the environmental field. It has become the focus of the government and the public to jointly manage environmental issues, in order to make up for the shortcomings of the government's "paternalistic management" and solve the embarrassing situation that the public lacks the right to speak in specific environmental protection fields. This paper attempts to apply big data to public participation in environmental law, hoping to find a balance between the two in dealing with social inefficiency; by building an environmental information interaction system closely connected with the public, and giving play to the advantages of big data technology in popularizing environmental protection knowledge, public environmental awareness is enhanced and advanced environmental protection concepts are disseminated; finally, relying on the big data platform to build a three-dimensional governance model with the participation of the government, the public and enterprises, it has strong practical significance for improving the current situation of China's environmental governance.

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