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Research Article

The Evolution of Ecological and Environmental Governance Attention Allocation in J City Based on Big Data Analysis

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Analysing the evolution process of attention allocation in city governance is an effective way to understand modern governance. Among the city types, heavy industry cities are special cities. It relies too much on heavy industry and is difficult to achieve ecological and environmental governance. This study takes J City in Northeast China as an example. Based on big data analysis, this study analyses the evolution process of governance attention allocation in J City. It can be found that the realization of ecological and environmental governance requires people's participation. City development needs multiple synergies and an ecosystem-led governance model. However, this process is not a subjective product but needs to be promoted by history. Fundamentally, people need to change the logic of economic development.

1. Introduction

Attention allocation is an important theory to understand modern governance. In the governance agenda, there will be competition between different affairs, distracting leaders' attention. The preconditions of this theory are limited rationality, incomplete information, and social participation. In governance, whether a public affair can occupy the agenda fundamentally depends on people's conceptual understanding of the affair [1]. The cognitive change of this concept leads to a change in attention allocation. For the governance system itself, attention allocation should keep pace with the times. In the era of increasingly widespread ecological and environmental crises, the government needs to get rid of traditional administrative and economic thinking. Thus, this change can promote more sustainable governance. The transition to sustainability remains an important direction in the future [2]. This change in attention allocation is a meso-theory. It is not a visual meaning, but a historical concept. As long as a few people make decisions, attention is limited. For the government, they must find effective information in a large amount of information. This represents the problem domain and response domain of governance.

To understand this complex scope problem, we should not rely on a traditional questionnaire survey and statistical technology but should use big data collection and analysis methods [3]. In this way, people can better understand how the governance subject completes knowledge matching [4]. At the same time, people can also understand the production process of government decision-making to reasonably control their actions. Of course, the use of big data itself needs to be managed. It is not only a tool to understand governance but also the object of governance. In terms of method application, big data analysis has rich data sources. For example, under the framework of legal norms, the government can manage cities by collecting data traffic from mobile phones, sensors, and applications [5]. But this must be strictly authorized. The government must guarantee people's privacy. At the same time, the government should enhance the openness of information. People and governments should adapt to the changes in the era of big data [6]. Big data is also abused by some enterprises [7]. This is an

irregular action. Through information disclosure, people can understand the government and supervise the government. Ultimately, people will choose to participate in governance. The governance cost of the government will be reduced. In addition, big data is a fuzzy dataset. But big data is also a potential research material. It brings opportunities and challenges to today's governance actions. And it has promoted the process of urbanization and changed the distribution mode of materials [8]. For individuals, big data has also changed their understanding of health [9]. This is inseparable from ecological and environmental governance. Humans must be a part of the ecosystem. For researchers, big data is not entirely a quantitative analysis method. The black box problem of big data needs to be solved by qualitative analysis. This makes mixed research possible. This possibility has been explored and improved. For example, in some research on companies [10], this study will also provide a qualitative understanding of attention allocation based on big data.

In general, the contributions of this study mainly include three aspects. First, this study provides quantitative and qualitative evidence for understanding China's ecological and environmental governance. These materials and analysis results are helpful for people to understand how China realizes the transformation of its economic development mode. Second, this study can help people understand the rules of action of the Chinese government, including the advantages and limitations of the Chinese administrative model. It will help people to further improve the government's working mode and work efficiency. Third, this study provides a reference for researchers on how to deal with big data. This article attempts to interpret big data from the perspective of attention allocation. This approach gives full play to the characteristics of big data while incorporating the limited rationality of human beings into the information transmitted by data. In this way, people can better feel the relationship between nature and society and understand the discrete power of natural and social development.

Focusing on the research objectives and questions, the researchers organized the research work into four parts. First, researchers need to extensively study and discuss the general theory of big data and government attention distribution, and propose the basic norms for big data collection and analysis. Second, according to the research plan, the researchers will take the big data published by the government as the scope of material collection. This can avoid ethical disputes and establish a bottom-up perspective. Third, researchers choose to use an intuitive and low-level hybrid research method to analyse big data (including text and numbers), which can avoid the omission and distortion of materials by researchers and special research methods to the greatest extent. Fourth, the researcher reintroduces the analysis results into the history of China's city development to explore the development process of the Chinese government's model of ecological and environmental governance. In this way, this research can ensure the unity of logic and history.

2. Materials and Methods

2.1. Materials. This study selects J City in Northeast China as a case for in-depth research. There are some reasons for choosing J City as the research object. First of all, J City is a famous city in Northeast China, with a rich history, culture, and natural resources. In terms of city size, J City is the second-largest city in the J Province of China. By the end of 2020, the resident population of J City was about 3.5 million. In recent years, J City has insisted on the city construction and development orientation of an Ecological Liveable City. Moreover, the development of J City has integrated more ecological and environmental governance content. However, J City is a heavily industrial city. At the same time, after entering the 21st century, the relative development speed of Northeast China is low. In Northeast China, the development strategies and public policies of many cities have fallen behind the times. This is similar to the situation in many parts of the world. One of their common features is the limitation of the governance model. J City has an important chemical industry in China. On the one hand, this has caused economic dependence; on the other hand, it has also caused environmental pollution. Heavy industry breaks the relationship between nature and society. In history, the ecological and environmental governance model of J City can be summarized into three periods. The first is the period of pollution control and environmental restoration. The second is the period of coordinated development of the ecological environment and industrial economy. The third is the modern era led by the construction of tourism culture and the transformation and upgrading of heavy industry. Therefore, J City is fully typical. Through an in-depth study of the evolution process of ecological and environmental governance in J City, this study can put forward a new and scientific governance model.

2.2. Methods. In terms of research methods, this study integrates two theories.

The first is big data analysis. The validity of data represents the science of research. Through big data collection and statistics, this study can provide visual results. At the same time, the big data analysis method has the unique advantage of integrating multiple factors. It can directly and effectively evaluate the complex ecological environment. In this regard, there have been some research results. For example, people can integrate big data to scientifically evaluate the ecological quality of their environment [11, 12]. Even so, people can use big data to realize real-time management of cities [13]. It can be predicted that big data will improve human cognitive ability in another dimension. It allows human attention to enter the interior from the exterior of various events. It can be said that the big data method is not only the telescope of human society but also the microscope of human society.

The second is the attention allocation theory. The theory of attention distribution based on limited rationality is often used to study governance problems [14–16]. Understanding

the evolution of J City's governance model also needs to be based on the limited rationality of the government, the complexity of information, and the scarcity of attention. Because the government's attention allocation strategy and attention to certain matters can reflect the government's strategic thought and action line, and ultimately affect the development direction of the city. In fact, under the complex effects of multiple factors, such as domination, interaction, and concurrency, the attention allocation of local government governance activities is a dynamic change process, and the degree of attention allocation change and action change made by different local governments to the situation change is also very different. Therefore, from the perspective of attention allocation, exploring city development can better reflect the behavioural logic of government governance and enhance the reliability of the analysis.

In general, according to the characteristics of big data and the theory of attention allocation, researchers hope to adopt alow-level strategy to expand a hybrid research method. In the process of gaining a preliminary understanding of J City, because the focus of the discussion is to find the problems in J City and explain the particularity (including history and present) and representativeness of J City as a heavy industrial city, descriptive analysis is adopted. Based on the preliminary understanding of J City, the researchers found that J City is still in the transition stage from management to governance. It is at this transitional stage that people can fully understand why ecological and environmental governance can represent the modern governance model and why governance is superior to management. In such a complex situation, the government cannot take all matters into account, so there will be a problem of attention scarcity and attention allocation. To solve this problem, the researchers used priority perspective and quantitative methods to trace the historical development of J City. Finally, a general development process is given by integrating logic and history. The following picture is a visual research design (see Figure 1).

3. Results and Discussion

3.1. Basic Characteristics of Governance Problems in J City

3.1.1. The Citation of Governance According to Law Lacks Local Characteristics. In terms of governance by law, according to the information of China's authoritative legal website (https://www.pkulaw.net/), it can query the legal content of a certain aspect. This study finds that, in addition to national laws and provincial regulations, the governance characteristics of J City also come from local regulations and normative documents related to environmental protection by 2021 (see Table 1).

This study collects the text data of 376 environmental punishment decisions published on the website of the ecological environment department of J City from April 7, 2015 to February 5, 2021 (see Figure 2).

The difference in the proportion of governance citations shows that the degree of localization of governance in J City is not high. This result is reflected in that although J City can independently formulate some new local regulations and normative documents, they cannot be widely used in governance actions. At the same time, it also reflects that J City, as a heavy industrial city, is still in the stage of environmental restoration rather than construction. Therefore, local regulations and normative documents in J City are difficult to use directly to control pollution. J City still needs heavy industry, especially the state-owned industrial sector, to promote economic growth.

3.1.2. Unfairness Reflected in Punishment Results. The ecological environment department of J City released a document on February 25, 2021. This document is about the list of 70 key pollutant discharge enterprises in J City in 2021. The study compared 70 enterprises with 376 environmental punishment decisions. The results show that the matching rate is less than 5%. Therefore, most of the objects of environmental punishment are not key pollutant discharge enterprises, but individuals or other not key pollutant discharge enterprises.

Since 2019, the world economy has suffered from the impact of COVID-19. In order to prevent data distortion caused by this impact, the study added some new evidence.

The ecological environment department of J City publishes the list of sampling inspections in each quarter in the "pollution source supervision" column on the website. The study compared sample inspection lists from 2017 to 2021. The results show that the inspection times of key pollutant discharge enterprises account for only 7% to 22% of the total inspection times. This is an unfair result of punishment. In general, J City ignores heavy industrial enterprises in terms of ecological and environmental protection. However, J City needs heavy industrial enterprises in terms of the economy. In particular, J City is difficult to deal with state-owned heavy industrial enterprises. And it reflects a mechanism loophole in the governance of J City.

3.1.3. People's Willingness to Participate in Governance Is Not High. In China, conceptual innovation is abundant. In order to promote people's participation in governance and strengthen the degree of democratization, J City has established some organizations. For example, J City has built a platform of people talking (PPA). The function of this platform is to collect people's livelihood information and resolve contradictions. And this platform includes five specific contents (see Figure 3).

This study collected 953 data points from the message board of the J City website from January 2020 to March 2021 (see Figure 4). This time frame is the maximum that can be obtained by this study. Because China's local government information disclosure system is not perfect. This study found that people in J City are most concerned about construction. However, there are a lot of complaint messages. This proportion is about 50%. Second, people pay attention to the traffic problems in J City. In the total number of messages, the number of environmental protection information ranks third. People can directly see that among the subdivided types of environmental protection messages,
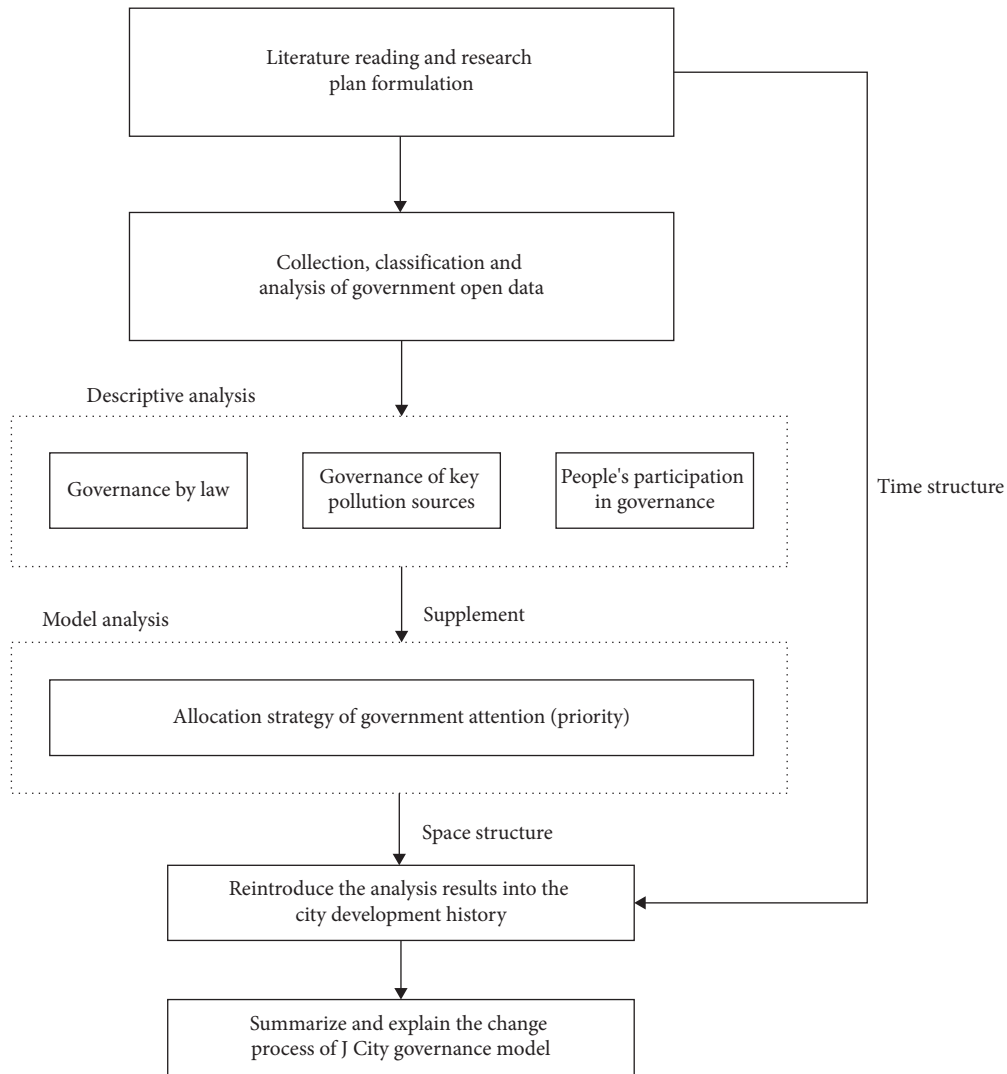
Figure 1: Research design.

Table 1: Themes of ecological and environmental governance in J City.

Number	Local regulations	Normative documents
1	River management	No-waste city
2	Greening problem	No straw burning
3	Protection of water and land resources	No fuel vehicles
4	City garden management	Air pollution control
5	Protection of forest	Water pollution control
. . . . . .	. . . . . .	. . . . . .

the number of complaint messages is the largest. This proportion is about 68%. In contrast to this phenomenon, people put forward a lot of suggestions in the messages of traffic themes. This proportion is about 44%. The results show that people in J City have some dissatisfaction with construction and environmental protection. In addition, people's willingness to participate in construction and environmental protection is not high. The problem is that the governance tools of J City, like the PPA, do not give people enough rights. However, they have prematurely emphasized

the responsibility of people to participate in governance. When the economic development model is bound by state-owned heavy industry, people cannot put forward suggestions.

3.2. The Evolution of Governance Attention Allocation. J City is a typical heavy industrial city in Northeast China. Before China's economic reform and opening up, J City had an important position. However, with the reform and opening-
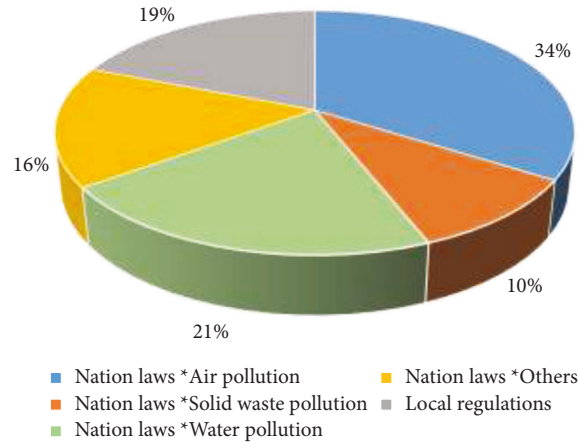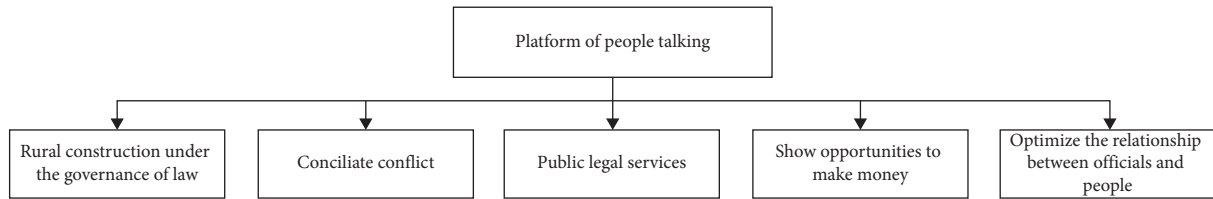
Figure 2: Localization degree of punishment citation.

- Nation laws *Air pollution
- Nation laws *Solid waste pollution
- Nation laws *Water pollution
- Nation laws *Others
- Local regulations

Figure 3: Platform of people talking in J City.

- Suggestion
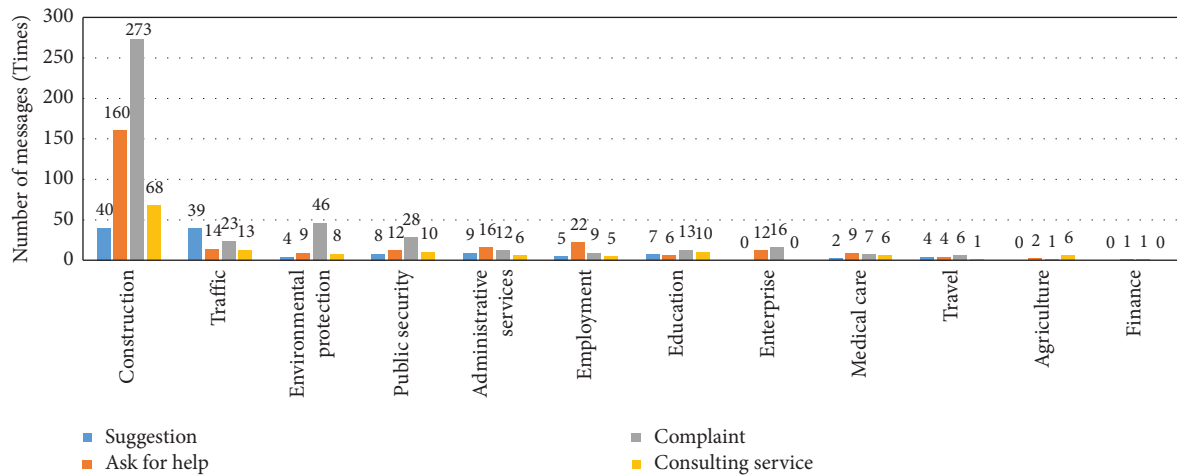- Ask for help
- Complaint
- Consulting service

Figure 4: Statistics of people's messages to government departments in J City.

up, the relative development speed of J City in Chinese cities is becoming slower and slower. There is an important law in China's administration. It refers that in the official government report, the order of contents represents the importance of contents. Therefore, this study collected the statistical yearbook of J City from 1998 to 2017. This study constructs a simple mathematical model. It is referred in the following equation. This model can make the government's attention allocation visible.

$$\text{Degree of importance} = 1 - \frac{\text{Location of content}}{\text{Total number of content categories}}. \tag{1}$$

After calculation, this study gives a linear simulation of the attention allocation of J City government (see Figure 5). The lack of data represents the disappearance of the column, which proves that the J City government did not report this work in a certain year. Isolated points represent the sudden emergence of a work. For the sake of picture clarity, the degree of importance of the last content is set to 0.05 in this study. In addition, some special cases are found in the calculation process of this study. There are some discrete works, just like welfare and charity, legal aid, and ethnic minorities, etc.

In the recent report, food safety, consumer rights and interests' protection, resources, and the environment and basic organization construction have been shown. Among
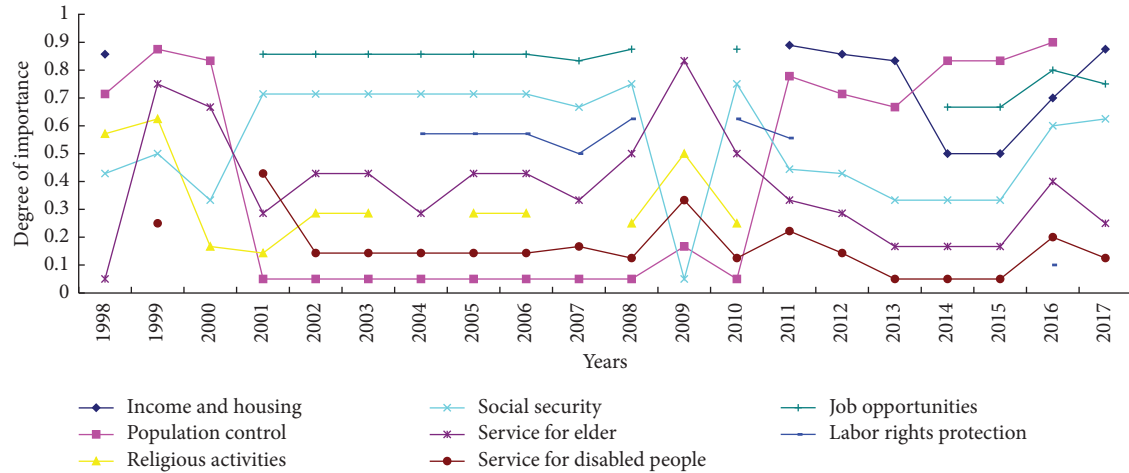
Figure 5: Evolution process of governance attention in J City.

them, because food safety and consumer rights protection are not continuous, it cannot affect the allocation of government attention. This is an important shortcoming of the report of the J municipal government. This study analyses three governance models in J City in different periods. Before 2000, J City implemented the traditional administrative leading governance with population control as the theme. During this period (1997–1998), large-scale layoffs occurred in China's state-owned enterprises. From 2001 to 2008, J City used job opportunities as the theme of the governance model. After 2011, the governance model of J City entered the stage of multiple synergies. The main governance contents of this stage include family wealth, population control, increasing job opportunities, and ecological and environmental governance. In the last five years, J City has gradually taken ecological and environmental governance as its model. However, due to the impact of COVID-19, this data has not been given. It emerged as a part of the multiple synergy governance models. From the perspective of the historical process, this evolution process from economy to ecology is enough as evidence.

3.2.1. Population Control: The Administrative-Led Governance Model. Before 2000, reducing the population growth rate was one of the most important national policies. In J City, population control has become the top priority of the government. This work involves a lot of political factors rather than economic factors. Therefore, under the special performance guidance, local governments are subject to strict assessment. Moreover, population control has also become a reward for local governments. So, local governments often express it in the report in the form of reaching the standard, exceeding the quota, and so on. Population control was the theme of J City in this period. But with the advent of the 21st century, this work has becomes less and less important. For example, there is a statement in the 1999 report of J city. The result of J City government statistics is that the natural population growth rate is 4.28‰ lower than the plan. In addition, the report emphasizes that the population control department of J city has won honours.

However, in the 2001 report of J City, this expression has changed. According to the statistics of J City government, the natural population growth rate is 4‰ lower than the plan required by the superior department. In the 2003 report of J City, this kind of expression has changed again. In this report, J City only proposed that they had completed the requirements of the superior department. In addition, J City has no more expressions. To sum up, the above process shows that population control has been completed. J City governance no longer needs to create political performance through population control. This represents the end of the administrative-led governance model. J City must turn its attention to economic work in order to deal with the high unemployment rate.

3.2.2. Job Opportunities: The Economic-Led Governance Model. From 2001 to 2008, the governance of J City emphasized the provision of more job opportunities. In this way, they can ensure the social stability of J City. During this period, the governance of J City reflected its economic characteristics. First, J City pays more attention to people's basic demands for a better life, emphasizing that people's lives are the fundamental goal of city development. Second, the governance of J City is integrated into China's reform and opening-up strategy to a greater extent. Officials in J City can pay attention to emancipating the mind. Moreover, they began to use some new methods to solve social problems. At this time, J City implemented some new public policies. Third, J City pays more attention to the role of the market mechanisms. J City began to use market tools to promote city construction and adjust city development with market methods. Fourth, J City has effectively promoted the progress of labour security supervision, vocational skills training, and other work. Fifth, J City has activated the long-term mechanism of the social security system in the process of city development. Therefore, the governance of J City has reduced the level of social risk. It is worth noting that during this period, "labour rights protection" appeared in the governance of J City. This proves that the market itself has the problem of "market failure". Due to the lack of social

forces, J City returns to the administrative-led governance model for a short time. This brief retrogression shows the lack of resilience in the governance of J City. Moreover, it indirectly leads to some city problems. For example, getting old before getting rich, having fewer children, and population loss, etc.

3.2.3. Multiple Synergy: The Ecosystem-Led Governance Model. After 2011, the governance model of J City changed from economic dominance to ecosystem dominance. Moreover, this governance model reflects the characteristics of multiple synergies. During this period, the problems of income and housing, population, and employment became the key areas of the development of J City. At the same time, ecological and environmental governance have become new leading factors. This ecosystem is embodied as a logically closed loop. In the first place, income and housing levels affect family fertility strategies and training strategies in terms of population. Second, fertility strategies and training strategies affect the distribution of family investment in all aspects of children, which affects the employment quality of future generations. Third, the level of employment quality affects the level of income and housing. Importantly, under this logical framework, the concept of fewer and better children in the family planning era is deeply rooted in the hearts of the people. Not only does "fewer children" weaken the effect of population on economic growth, but also it merges with the triple trend of high-quality population outflow and population aging under "better children," which poses a challenge to city development.

4. Conclusions

The rational allocation of governance attention comes from people's participation. After people's participation, management will become governance. Costs will fall. The political performance will improve. However, this participation is not a subjective product. It is limited by the time. Under the administrative-led governance model, it is difficult for people to participate in governance. Under the economic-led governance model, people began to participate in governance. But people are hampered by tradition. Only in the governance mode led by the ecosystem can people be liberated. This is a harmonious relationship between humans and nature. For ecological and environmental governance, it cannot appear independently. In fact, it is a special economic logic. And it serves the coexistence of humans and nature. It can be found that the economy and nature do not conflict. In J City, city development relies too much on heavy industry. However, this approach will be changed. It has experienced a process from singleness to multiple synergies. This is in line with the law of history. Overall, the government needs to be more open and inclusive. The governance system should guarantee people's rights. People's opinion can be produced, especially under the condition of information disclosure. The government's attention can be shifted to people's real needs.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

References

[1] P. Alexandrova, "Explaining political attention allocation with the help of issue character: evidence from the European council," *European Political Science Review*, vol. 8, no. 3, pp. 405–425, 2016.

[2] N. Frantzeskaki, D. Loorbach, and J. Meadowcroft, "Governing societal transitions to sustainability," *International Journal of Sustainable Development*, vol. 15, no. 1/2, pp. 19–36, 2012.

[3] G. George, E. C. Osinga, D. Lavie, and B. A. Scott, "Big data and data science methods for management research," *Academy of Management Journal*, vol. 59, no. 5, pp. 1493–1507, 2016.

[4] M. R. Haas, P. Criscuolo, and G. George, "Which problems to solve? Online knowledge sharing and attention allocation in organizations," *Academy of Management Journal*, vol. 58, no. 3, pp. 680–711, 2015.

[5] A. Manzoor, C. Patsakis, A. Morris et al., "CityWatch: exploiting sensor data to manage cities better," *Transactions on Emerging Telecommunications Technologies*, vol. 25, no. 1, pp. 64–80, 2014.

[6] R. W. Lake, "Big Data, urban governance, and the ontological politics of hyperindividualism," *Big Data & Society*, vol. 4, no. 1, Article ID 205395171668253, 10 pages, 2017.

[7] W. Fang, X. Z. Wen, Y. Zheng, and M. Zhou, "A survey of big data security and privacy preserving," *IETE Technical Review*, vol. 34, no. 5, pp. 544–560, 2017.

[8] J. Grayson, "Big data analytics and sustainable urbanism in Internet of Things-enabled smart governance," *Geopolitics, History, and International Relations*, vol. 12, no. 2, pp. 23–29, 2020.

[9] S. Holm and T. Ploug, "Big data and Health Research-the governance challenges in a mixed data economy," *Journal of bioethical inquiry*, vol. 14, no. 4, pp. 515–525, 2017.

[10] K. N. A. Arthur and R. Owen, "A Micro-ethnographic study of big Data-Based Innovation in the financial services sector: governance, ethics and organisational practices," *Journal of Business Ethics*, vol. 160, no. 2, pp. 363–375, 2019.

[11] F. He, L. Gu, T. Wang, and Z. Zhang, "The synthetic geo-ecological environmental evaluation of a coastal coal-mining city using spatiotemporal big data: a case study in Longkou, China," *Journal of Cleaner Production*, vol. 142, no. 142, pp. 854–866, 2017.

[12] X. Li, H. Zhang, J. Yu, Y. Gong, X. Guan, and S. Li, "Spatial-temporal analysis of urban ecological comfort index derived

from remote sensing data: a case study of Hefei, China," *Journal of Applied Remote Sensing*, vol. 15, no. 04, Article ID 042403, 2021.

[13] R. Kitchin, "The real-time city? Big data and smart urbanism," *Geojournal*, vol. 79, no. 1, pp. 1–14, 2014.

[14] Q. Meng and Z. Fan, "Punctuations and diversity: exploring dynamics of attention allocation in China's E-government agenda," *Policy Studies*, vol. 43, no. 3, pp. 502–521, 2022.

[15] L. He, L. Huang, and G. Yang, "Invest in innovation or not? How managerial cognition and attention allocation shape corporate responses to performance shortfalls," *Management and Organization Review*, vol. 17, no. 4, pp. 815–850, 2021.

[16] Z. Liao, J. Lu, Y. Yu, and Z. J. Zhang, "Can attention allocation affect firm's environmental innovation: the moderating role of past performance," *Technology Analysis & Strategic Management*, vol. 34, no. 9, pp. 1081–1094, 2022.