


Article

Comparative Analysis of Three Governance Modes for Resource-Based Urban Sustainability in China Based on Residents' Perception: An Empirical Study of Pingdingshan City, Henan Province, China

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Abstract: With the continuous improvement and deepened reform of institutional mechanisms in resource-based cities (RBCs) in China, mining areas have become significant urban brownfields with typical geological hazards that cause serious pollution and other disasters like landslides and subsidence. Therefore, the governance of mining areas becomes a grant challenge for local governments to sustain urban development, and different governance approaches could result in diverse effects on urban sustainability, which have not been studied in current research. In the last twenty years, the governance model of mining areas in RBCs in China can be classified into government governance model (GGM), joint governance model (JGM), and market governance model (MGM). Based on the traditional theories, we innovatively propose a structural measurement and mechanism analysis of mine management efficiency from the perspective of residents' perceptions by designing structural equation modeling (SEM) for spatial distribution issues. The main objective is to disclose the comparative advantages of three different mine governance models and the prerequisites and considerations for the application of the three governance models in the institutional environment with Chinese characteristics, in addition to the answers of pros and cons of the three types of governance models. We find: (1) the GGM plays a necessary, positive, and effective role in guiding the governance process, and has a high level of resident satisfaction in relation to the public interest of the masses, but a problem is that the favorable groups in the implementation process mainly include the middle and senior officers. (2) The JGM as a transition and supplement to the GGM, and many large serious governance problems that cannot be solved by the GGM are reasonably solved by JGM. Lastly (3), the MGM is very different from the above two governance models, as it just concentrates on the governance of storage, transportation, and public lands within mining areas that are directly relevant to enterprises' benefits. It indicates the urgent reforming needs of current governance models for efficient governance by integrating government, enterprise, and local communities.

Keywords: mining area governance; residents' perceptions; structural equation modeling; comparative institutional analysis; geologic hazards; environmental pollution; resource-based city (RBC)



Citation: Li, X.; Yang, Y.; Meng, Q. Comparative Analysis of Three Governance Modes for Resource-Based Urban Sustainability in China Based on Residents' Perception: An Empirical Study of Pingdingshan City, Henan Province, China. *Sustainability* **2021**, *13*, 13658. <https://doi.org/10.3390/su132413658>

Academic Editor: Carlos Rodríguez Monroy

Received: 29 October 2021
Accepted: 8 December 2021
Published: 10 December 2021

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1. Introduction

In accordance with the framework of ecological civilization construction, resource-based cities (RBCs) governance becomes a key issue influencing the modernization in terms of China's governance system and regional sustainability. As a special type of urban governance, the governance of RBCs in China consists of diverse stakeholders, including governments, mining enterprise, local communities, miners, and other social organizations.

These stakeholders negotiate and cooperate to solve the conflicts to maximize the efficiency of RBCs governance. As a government-led market economy, China's RBCs governance structure is unique, i.e., the government and the market are simultaneously engaged in the mechanism of resource development and allocation often in a cooperative and complementary approach. From the perspective of transaction cost economics, RBCs (mining area) governance in China can be generally categorized as government governance model (GGM), joint governance model (JGM), and market governance model (MGM), the three models of RBCs governance typically bear different transaction costs.

GGM means that governments dominate the process of mining sites and subsequent development and utilization activities. In JGM, a government will grant the treatment subject and its right as a whole to enterprises, such as state-owned or private enterprises, who will be in charge of the mines' resource transformation, including the abandoned mines and the subsequent development and operation activities [1]. For instance, after the government completes certain indispensable processes, the rest harnessed and reinstated processes will be completed by qualified companies that are selected from the market. Another different model is MGM, in which the government and enterprises work together by means of dividing their own working scope to jointly control the mining areas of RBCs. Wicksell considered that the efficiency of financial resource allocation must be achieved via political procedure [2]. China's market institution, led by the socialist system with Chinese characteristics, is different from the Western market institution in mechanisms. Any mineral resources in China typically belong to the state and can only be legally exploited by state-owned enterprises, which will have influence over the governance of mining areas. Moreover, according to the mechanism of residents "voting with their feet" in Tibet's model [3], communities and residents as victims of environmental pollution and beneficiaries of governance, have the direct understanding of the effectiveness of different models, and their feedback can be more specific and reasonable; in other words, residents' feedback on the efficiency of governance is conducive and practicable to advancing the governance system. Inspired by this, we conducted an extensive questionnaire survey of residents in the mining areas to identify diverse effects of different governance systems based on the feedback from local residents.

Current research methods for resource-based city-related issues are mainly a single statistical modeling or analysis with a focus on a certain issue. For example, the socio-spatial structure in the transformation of resource-based cities was studied using factor analysis [4], or linear regression method was used to investigate the relationship between government efficiency and resource dependence [5]; other methods mainly are exponential or quadratic function analysis of input-output models coupled coordination models based on panel data [6], or Kuznets curve analysis of environmental change trends based on panel data [7,8]. Some also used DEA (Data Envelopment Analysis) [9–11] or SBM (Slacks Based Model) to analyze urban environmental efficiency [12]. However, most of these methods can only inductively analyze certain dimensions of the complicated issues of governance efficiency, and their empirical results can hardly explain the interaction between diverse factors (e.g., social, economic, cultural factors) in addition to sustainability and justice issues. In summary, in order to fill the knowledge gaps of previous studies and reflect the comparative advantages of the three governance systems more practicably and objectively, we adopt a questionnaire to the comparative advantage analyses of the three governance models in the context of different social systems from the perspective of residents' perceptions, by which we can explore the game process of different governance systems in the process of resource-based urban transformation by establishing a structural equation (SEM) model from a more network-like perspective more interactively and systematically. The game process of resource-based city transformation is explored.

In actual governing process, a local government-led model is often progressively evolving to a market-based one as the effects of market economy become significant. However, it is difficult to analyze the key issues of social return, economic efficiency, and the equity issues in the process of applying the three governance models. Using the local

residents' responses, it can be practicable to analyze the three governance models and then compare their efficiency in social, economic, justice; on the other hand, it is important to explore and understand the negotiation processes of different governance systems in the city transformation process, including the distribution characteristics of three governance models applied to the mining areas governance. Therefore, drawing on the theoretical viewpoint of transaction cost economics and combining the political system and the market system with Chinese characteristics, this research conducts in-depth study about the social rate of return, efficiency in solving internal conflicts, and efficiency in capital investment, which are used as the primary indicators of the governance effectiveness of RBCs. In other words, we apply a comparative institutional analysis that is conducive to assessing which institutional governance system is more effective in mining areas, so as to improve or refine the governance system for other RBCs. We also recognize that it is also very important to perform an ecological civilization system advocated in China, for building a modern society for this time being, in which people live in harmony with nature. In addition, this study will provide insight into the reformation of RBCs governance system for government regulation, market regulation, and public participation [13]. After introducing the basic background of our empirical study area of PingDingShan (PDS) City, this study is organized as below: Section 1 provides an overview of the main content of the text, in Section 2, we concisely summarize a literature review, and in Section 3, we provide the data source and its characteristics and the designed structural equation model (SEM) for path analyses of causal relationship between observed/latent variables and governance efficiency among the three models of GGM, JGM, and MGM. We summarize the geography of each governance model in PDS City in Section 4 and detail the results in Section 5. At last, we discuss this study in Section 6 and summarize a conclusion in Section 7.

PDS City was one of the first RBCs of New China (Figure 1), and it was established as a "new coal city" with industrialized mass production [14]. The city's geographical location makes it an important node for the construction of the Huaihe River basin eco-economic belt. The surface subsidence, ecological landscape destruction, freshwater pollution, harmful PM_{2.5} and PM₁₀ are the most notable issues. The washing process will cause a large amount of dust, slag, sewage, and gangue waste with atmospheric precipitation into rivers and lakes and other surface water bodies. In addition, leachate into the soil and groundwater pollution and contaminated water can directly or indirectly endanger the human body and harm the entire ecosystem [15,16], which poses severe threats to the health and safety of communities in addition to obvious environmental pollution. Other environmental pollutions caused by the former improper or rough exploitation and previous one-sided pursuit of economic benefits have seriously affected the sustainable development and ecological security of the city, the living environment of the residents, and the contradiction between population, resources, environment, and the society [17]. The cave-in formed by coal mining significantly induces landslides and mudflows, destroying a large amount of arable land and vegetation, and posing a direct threat to buildings and public facilities [18]. Coal mining stimulates the urban economy, but the mortality rate of residents in PDS city decreased first and then increased, which indicates that environmental deterioration caused by coal mining has a significant impact on public health [19]. As one of the first cities in China to carry out resource-based urban governance, PDS City has nearly 30 years of practical experience in mine governance, which was set up as a representative for resource-based city governance. Therefore, a series of mine governance evolutions such as geological disaster management, reclamation management, landscape regeneration, ecological restoration, etc., have been applied to improve the compliance rate of waste gas emission, but the reclamation rate of collapsed land and the compliance rate of discharged wastewater are still below the ideal value [20]. Therefore, it is needed to compare and analyze the three types of mine governance systems to understand and disclose the effectiveness and applicability conditions of each model, which becomes an urgent topic not only for PDS City but also for other similar resource-based cities in China and other countries.

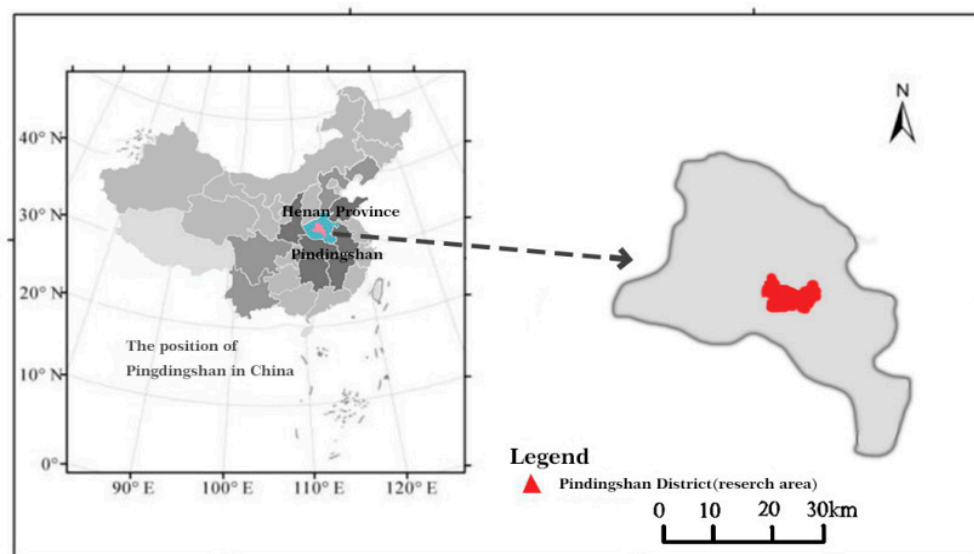


Figure 1. The urban areas of PDS City.

2. Literature Review

2.1. Resource-Based Urban Governance

As a complicated system project, RBCs governance is characterized by great difficulties, long time span and capital consumption. Scientists have been studying the governance of RBCs for a long time, and most of them have studied the technological development and ecological restoration in the process of urban governance from a macro perspective. Before 2000, most attention was paid to issues such as sustainability, the design of sustainability indicators, and the development of socio-environmental systems [21–23]. The development of theories such as urban ecological resilience after 2000 [24], ecological restoration and ecosystem identification [25], and the importance of ecological memory retention for future ecosystem development were explored [26]. The research topics of resource-based urban governance have been gradually shifted to how to increase the sustainability of coal-based cities and at the same time maintain coal mining and ecological balance including the carrying capacity of land resources, the sustainability of mineral resources, and environmental carrying capacity [27–29].

Research on the governance of coal resource cities in China started in 1980s [30], and initially it focused on the governance and sustainability of environmental pollution in mining areas from a technical perspective [31,32]. Early focuses include damaged land reclamation, ecological environment reconstruction techniques, and the use of the ecological footprint method to analyze the ecological environment of RBCs [33–36]. Recently, more studies emphasize ecological damage mechanism, ecological compensation methods, and ecological restoration legal system [37,38]. Currently, the spatial reconstruction of RBCs, the institutional optimization of the restoration, the study of the landscape reconstruction model after governance, and governance of RBCs are mostly studied [39–41]. An obvious research trend is from land reclamation to ecological restoration and then to landscape regeneration, especially focusing on the technical process and ecological sustainability of ecosystem restoration of urban mines, analyses on the reform and innovation of financial payment methods, tax supervision system, and other institutional management systems. These research theories provide a basis for further comparison of mine governance in different models.

2.2. Comparative Institutional Analysis

In accordance with Ronald Harry Coase argument in *The Problem of Social Cost*, negotiation is not necessarily more effective than government intervention for the existence of transaction costs [42]. From a macro perspective, within different political systems, there

are significant differences in GMG, JMG, and MGM in terms of spontaneous adaptation, coordinated adaptation, incentive strength, administrative control, and contract law [43]. In general, it is self-evident that government has a significant advantage in coordination and administrative control, while the market is more advantageous in adaptation, incentive strength, and contract law. Nevertheless, they cannot be generalized and applied to all RBCs without any second thought. In aligning with what Coase has stated, all the problems of the mining area governance in RBCs are negative externalities that could be uniformly eliminated with intense government regulation or tax reforms, but a more chaotic and counterproductive situation might be incurred thereof [42]. This explains why a comparative institutional analysis should be carried out, i.e., taking the underlying transaction costs into consideration, it can be judged whether government regulation, taxation, negotiation or any other political or market systems can yield positive effects regarding the net social output [44]; while under different environmental conditions, the effectiveness of a governance model can be assessed in particular conditions only with a careful comparative institutional analysis [45,46]. In other words, as a complex system in which significant transaction costs operate as an important factor, an efficient and suitable model could be identified for RBCs governance under different scenarios by conducting comparative institutional analysis. As a complex system with significant transaction costs, especially in the Chinese system, where the system plays a dominant role, the governance process is influenced by the system to different degrees at different stages, a comparative system analysis can summarize the most efficient or suitable governance model in different environments, so as to arrive at a governance model applicable in different realistic environments and achieve the goal of improving governance. The purpose of improving the effectiveness of governance and saving the cost of governance.

2.3. Governance Effectiveness

The effectiveness of RBCs governance is often substituted with efficiency or performance. Transaction cost economics embraced by Williamson carries out a discrete structural analysis on governance systems from the perspective of new institutional economics, whereas Douglas North examines the influence of political systems on transaction costs [47]. Greif combines game theory with governance systems to further investigate the dynamic evolution of politics and markets in their interaction process and the influence of endogenous forces imposing upon them [48]. Chinese scholars have mainly studied governance at political structure basis, including the level of economic development [49], government administration system [50], public finance system [51], etc. From the view of public administration, Yu Keping argues that governance, as a public event, essentially is a process in which the governing entity uses public authority to maintain public order and maximize public interest so as to meet public demands [52]. Other researchers consider city governance system as an organism composed of elements such as governance subjects, governance objects, and governance tools (including governance institutions, mechanisms, and technologies), as well as other institutional factors [53]. The goal of modernization, efficiency, democratization, and legalization concerning city governance has explicitly set forth an expectation for a highly efficient and low-cost manner, and the essence, by and large, resides in maximizing the governance effectiveness. It hence requires not only the improvement of governance capacity, but also the overall institutional environment and the synergistic cooperation of all participants [54].

Although the available literature shows that the RBCs mine governance has undergone continuous exploration in China, there is not a comprehensive study of governance models. In recent years, some non-profit organizations also participate in the process of market governance [55]. Based on our survey and review of governance development, we propose three basic mine governance models of GGM, JGM, MGM. We also recognize that the governance of RBCs in China can be divided into three major actors: local governments of RBCs, local state-owned enterprises, and non-profit organizations. Based on the institutional environment with Chinese characteristics, the system constitutes the policy

framework of mine governance process, which is also the driving force for the change of mine governance policy. Local state-owned enterprises are more involved in the process of local governance of resource-based cities, and they are not only the pillar industry of RBCs, but also the dominant player in the economic field. The JGM, as a transitional institutional model, is a government-led model carried out jointly with local state-owned enterprises. The three governance models emerge at different stages of the environmental governance process in RBCs, and due to the differences in the dominant parties and the differences in the institutional and environmental contexts in which each emerges, the different governance models have their own governance advantages and focus. Given the evolution of globalization, the improvement of social systems and social efficiency, this study focuses on the governance efficiency and comparative institutional advantages under different environmental conditions. Below, we will analyze the evolution of the three governance models at a local scale in the context of the case sites.

3. Data and Method

3.1. The Geography of Mining Areas in Pingdingshan City

PDS City has the typical geographical characteristics of “Build a city along resources mining”, the spatial integration nucleus of the city has expanded and changed morphologically after the reform and opening up, but the nucleus is still in the old city that constitutes the integration of urban space [56]. There are 12 mining areas in the city (Figure 2). Mining has aggravated the deterioration of the geological environment, and one of the most serious hazards is the collapse of mine pits [57,58]. In 1992, remote sensing data showed that there were at least 23 collapses formed by mining in Pingdingshan City, most of which are nearly east-west spreading, 500~3000 m wide and 22.5 km long, with a maximum collapse depth of 4 m, and the large and small collapses are integrated and unstable. The collapse area is about 80.13 km, and the stable area is about 1.5 km. The collapse area is distributed in a belt pattern, mainly in the No.9, No.5, No.6, No.4, No.3, No.7, No.1, No.2, No.10, No.12, No.8, and other mines, with a total area of about 50 km² [59]. As of 2017, the total area of ground collapse area is 88.76 km², and the maximum collapse depth of the collapse center is 12.3 m. The collapse areas are 20.29 km² between the 11th mine and the 7th mine; 13.96 km² between the 5th mine and the 2nd mine; 49.88 km² between the 1st mine and the 8th mine; 4.63 km² between the 8th mine and the north of the construction road, 4.63 km² [60]. It can be seen that the collapse area shows a trend of yearly expansion, in addition to the 127 geological hazard points found in the area, including 10 landslides, 28 cave-ins, 49 mining collapses, 28 ground cracks, and 12 unstable slopes [61]. In Pingdingshan mining area, only the gangue mountains discharged from the mines and coal processing belong to China Ping Coal Shenma Group amounted to 26, with a stockpile of nearly 294 million m³, covering an area of 86,000 m² [16], of which 77.5% was arable land [59]. Gangue caused by waste water, as well as gangue spontaneous combustion generated by nitrogen oxides, sulfur oxides, hydrogen sulfide, etc. seriously endanger the health of the surrounding residents, so that the incidence of respiratory diseases in the surrounding areas of the population is significantly higher. Gangue mountain pile also seriously impedes the public safety of residents, which is unstable and can easily cause landslides and other hazards [62]. Additionally, more than 60 years of resource extraction has resulted in 230 square kilometers of collapsed areas and the destruction of 22,400 hectares of land, in addition to a significant drop in the groundwater level and seepage in the area of 280.37 million square meters. It is estimated that the government needs to invest at least 1 billion yuan (\$155.4 million) just to repair the damaged geological environment, and the burden of environmental pollution management and ecological restoration is even heavier [63]. The limited growth of income and the rapid growth of rigid expenditures have led to outstanding contradictions between local financial revenues and expenditures.

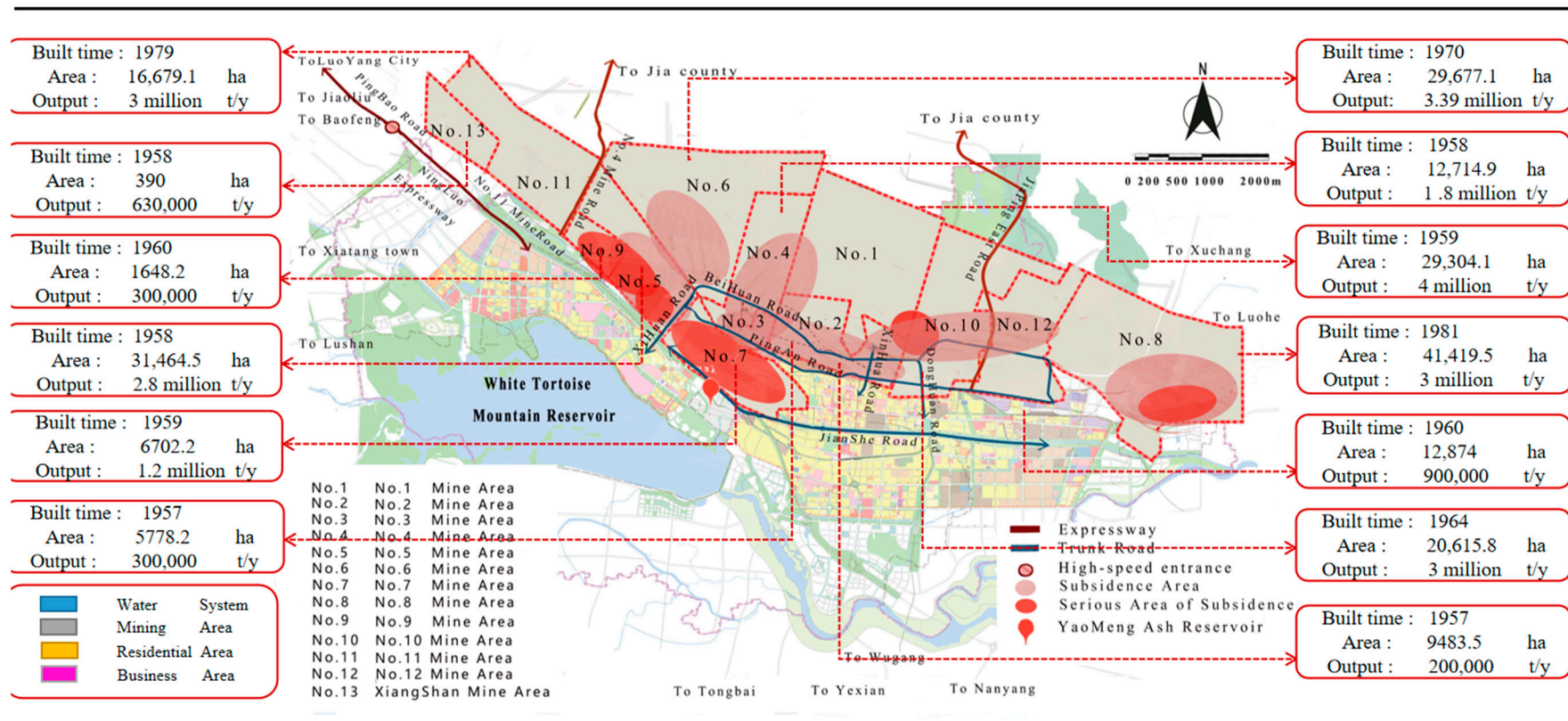


Figure 2. Mining distribution, built year, occupied area, and yield of PDS City.

3.2. Data Sources and SEM Method

There are two main data sources: one is the information provided by relevant units, and the other is face-to-face interviews and questionnaires. Among them, the interviewees are mainly employees of local state-owned enterprises and government departments in PDS City, including some retirees. In addition to the above-mentioned personnel, the respondents include unit personnel and residents of the relevant regions, such as mining areas and their annex areas. In the 1000 questionnaires, the demographic characteristics including men and women, age, occupation, residence time in PDS City, education level, household registration, and monthly income of the respondents are summarized in Table 1. According to the needs of the study, most of the questionnaire respondents are concentrated in the factory mine, and their population distribution characteristics and age can reflect the reality of the residents in the mine and its vicinity more intuitively. We designed the questionnaire using the 5-point Likert scale method [64]. Using the data of the second and third parts of the questionnaire, we develop a structural equation model (SEM) to test the path relationship between variables in three different governance modes, and the relationship between variables is analyzed and verified by AMOS 22.0 and SPSS 26.0.

Table 1. Demographic characteristics of sampled interviewees.

	Variable	%
Gender	Male	68.7
	Female	31.3
Age	0–20	0
	21–30	15.4
	31–40	35.4
	41–50	35.9
	51–70	5.6
The length of residence	0–5 years	0.5
	6–10 years	1.5
	10–15 years	10.3
	15–20 years	4.1
	More than 20 years	83.6
Level of education	High school and below	20.5
	College	34.4
	Undergraduate course	44.6
	Graduate student or above	0.5
Professional	Worker in a coal mining enterprise	94.4
	Personnel of government agencies/institutions	1.5
	Students	0
	Teachers	1
	Farmers	1.5
	Business/Service personnel Freelance/Retired	1 0.5
The locals	Yes	72.3
	No	27.7
Household register	Agricultural registered permanent residence	5.6
	Non-agricultural household	94.4
Monthly income	0–3000	51.3
	3000–5000	40.5
	5000–7000	6.7
	7000–10,000	1
	More than 10,000	0.5

Based on the analysis of mining governance projects in PDS City from 2004 to 2020, as well as previous research and field interviews, the residents' perception of urban con-

struction, land use type, public interest, favorable groups and pollution compensation are taken as exogenous latent variables, and the governance efficiency of the government/mixed/market governance model as endogenous latent variables, with a total of 26 observed variables. The three measurement indicators are social gain, internal conflict, and financial advantage. Based on this indicator system, the corresponding structural equation model is constructed, namely, the structural equation model of governance efficiency of government/hybrid/market governance model in Pingdingshan City. The first step after constructing the model is to hypothesize this structural equation model: Hypothesis A: urban construction has a significant positive impact on government/mixed/market governance model; Hypothesis B: land use has a significant positive impact on government/mixed/market governance model; Hypothesis C: public interest has a significant positive impact on government/mixed/market governance model; Hypothesis D: favorable groups have a significant positive impact on government/mixed/market governance model; Hypothesis E: pollution compensation has a significant positive impact on government/mixed/market governance model. Based on the hypotheses, structural equation modeling was developed for the original path structure of the three different governance models (Figure 3).

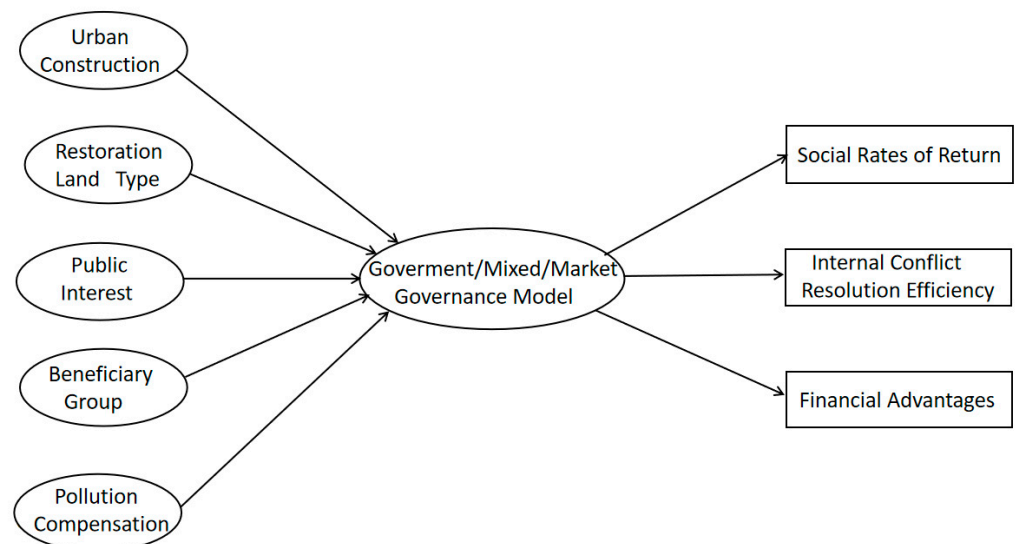


Figure 3. Original path structure of the three governance models.

For example, we design hypothesis A to examine whether there is a significant positive effect of urban construction on government governance models. As shown in Figure 3, urban construction is representative as X and the government governance model is representative as Y . The single arrow indicates the “influence” (i.e., causality). In the equation, X is a necessary and insufficient condition for Y , which means that urban construction as part of the government governance model has a certain influence on the government governance model. If the path value is positive, the urban construction process perceived by the residents has a positive significant impact path influence on the government governance model; if the path value is negative, it means a negative significant impact path influence.

4. Evolution and Spatial Differentiation Caused by Three Governance Models in PDS

PDS City has numerous contradictions and obstacles for advancing governance merit, lying in the lingering effects of the initially planned economy. It is deeply influenced by the notion of “path dependence”, which was pervasive and led by the so-called widely applied policy to resource exploration of “hasten water flow”, “value production with ignored life”, and “governance after production” [65]. Therefore, the lands in downtown mostly were used for industrial and mining management, and the whole city’s economic structure singly and severely depended on coal industry. As one of the first batch of

RBCs in China, the earliest governance team was established in 1991, and its very first governance project was the reclamation of the YaoMeng Ash Reservoir (located in Miaohou Village, Zhanhe District). To enhance the governance system of RBCs, PDS government has gradually transitioned from a government-led governance system to government-market integrated systems; since 2000, it has completed the integration of state-owned mining enterprises led mainly by local governments, finishing the closure of the shaft of small mining enterprises, carrying out ecological restoration projects, such as the treatment of collapsed land, gangue mountain relocation, and transformation, and the beautification efforts concerning mine ecological environment. With all the above efforts, the hazardous ecological and environmental issues have been primarily alleviated.

From about 2010, a market-led governance system played increasing roles. A particular prevalent principle implemented by enterprises was the “whoever mines must govern”, which was a preventive mechanism for mining and treating its containment and pollution at the same time. With the progressive dynamics of RBCs governance institution and the continuous game of participants, it indicated that the governance system is gradually transitioning to a market economy system and will eventually move towards a demand-induced system [66]. From the “sustainable development strategy” of integrated governance of mountains, water, fields, forests, lakes, grasses, and soils to the notion of “lucid water and lush mountains are invaluable assets”, and progressively to the “carbon neutrality” goal [67], China is attaching paramount importance to the environmental pollution control and ecological restoration of RBCs, as the damage of resource exploitation on the environment of RBCs has been significantly recognized. It is self-evident to effectively switch and choose one of the three governance models of RBCs and when and where to apply it locally, so that the stakeholders are able to improve the effectiveness and implementation of the governance system. After 30 years’ of the three governance models, it is the time to spatially examine the distribution of governance areas in PDS City and characterize their effects.

4.1. Government Governance Model

In the context of nationalization of natural resources in developing countries, the characteristics of the government-led market economy system in the governance process of resource-based cities in China are particularly obvious. The government, as an intrinsic participant and dominant player in the economic system, especially the local government, has an absolute advantage in institutional arrangement and coordination of local finance and regulation of market demand. In terms of institutional arrangements, the government was the first to repair and manage the more prominent geological environmental problems left over from the planned economy that affect and threaten people’s lives and property safety and cause serious damages to the ecological balance by means of mine environmental management.

Coal mining in PDS City has been about 70 years. In the 1980s and 1990s, the government first invested in the treatment of ground cracks, ground subsidence, and ground settlement formed during mining, and did not carry out systematic restoration and treatment. It was only between 2000 and 2012 that the government began to systematically restore and manage the subsidence area as the area expanded and depth increased, and the hazard worsened. The government successfully transformed many places into fish ponds, and others were restored into arable land or forest land by the government according to geologic conditions, such as the mining areas of five mines, eight mines and ten mines. In addition, the government also transformed some parts into ecological parks or mine site parks, such as the southern mining area of seven mines (Figure 4).

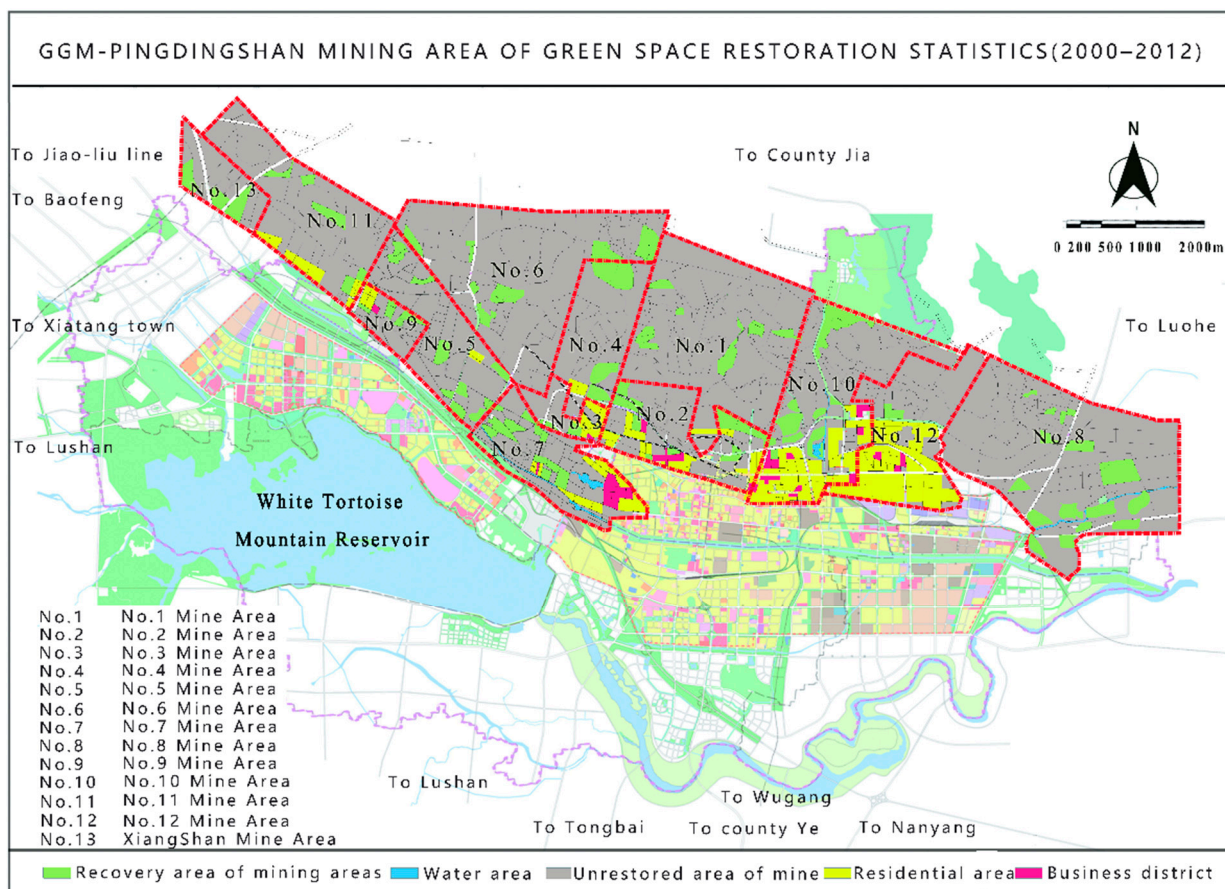


Figure 4. Spatial distribution of GGMs in PDS City.

The coal gangue hills along the main road (e.g., JianShe road, PingAn road, BeiHuan road) seriously threaten pedestrian safety and damage the environment, which seriously risk the production safety of all the enterprises in this area that had been relocated and transformed (Figure 2). Part of the vacant land after relocation was transformed into construction land by the enterprises, for example the No. 2, No. 3, No. 4, No. 9, and the No. 11 mine (Figure 4). Another part within this production area was transformed into a small playground for employees' recreation, and the coal mining collapsed land outside the production area was transformed into arable land or forest land after restoration and treatment, where farmers cultivate or engage in breeding and planting for economic development.

4.2. Joint Governance Model (Government-Enterprise)

The PDS Ecological Park is a representative demonstration of the JGM. It is an urban mine site park based on the subsidence land caused by seven previous mines. This ecological park was initially funded by a local state-owned enterprise (PDS Tianan Coal Mining) for land reclamation and treatment in an early stage, and later it was planned and partially funded by the PDS government. Under the JGM model, the PDS government began to realize that the abandoned mining ruins, alleys, and tracks, which need to be treated as industrial cultural heritage, can play an important role of cultural tourism in the process of transformation and development of RBCs sustainable development. According to this concept, the governance of RBC systematically integrated the urban renewal and transformation and mining heritage cultural parks, mining landscape cultural parks, or geological science parks, etc., which significantly improve the PDS' urban brand.

4.3. Market Governance Model

In 2006, the Guidance on the Gradual Establishment of Mining Environment and Ecological Restoration Mechanism has explicitly clarified the specific tasks of RBCs governance [68]. In 2009, in order to galvanize the enthusiasm of enterprises to invest efforts into governance, the former Ministry of Land and Resources and the financial department of Henan Province issued a series of measures and rules on the ecological restoration and governance deposit. These new governance-related rules include, for example, in accordance with the general principle that “whoever destroys will be responsible for management and restoration; and whoever manages will benefit from it”. The former ministry further defined the liabilities and obligations regarding geological disasters and ecological and environmental pollutions caused by mining enterprises. In 2013, the Notice of the State Council on the Issuance of the National Sustainable Development Plan for Resource-based Cities (2013–2020) explicitly stipulated the full internalization of costs for ecological and environmental restoration [69]. As the improvement and implementation of these series of standards and rules, the large state-owned mining enterprises in RBCs in China have changed their working mode from merely “a stopgap manner” when carrying out ecological restoration work, or simply “using the advantage to complement the disadvantage” to market economy driven approaches, which have made the MGM operate in a steady course.

As the city government clearly required, unconditional treatment and restoration should be applied for all licensed mining areas. In PDS, its MGM mostly resides in the production sectors, and the enterprises have transformed the waste dump and subsided lands according to actual local conditions into small parks for miners, where their families and other city residents live nearby. Moreover, with respect to the mining areas that are still in mining processes, a so-called “dual-tracking operating system” is applied, namely, “mining and at the treating” or “restoration within the mining area, while compensation outside the area”.

Different mining companies in PDS City applied different governance models (Table 2 and Figures 4–6). The GGM purposely targeted the public areas with small but serious subsidence. The JGM is mainly applied to the public zone with large areas. The MGM is widely used in the inner zones of the mine. As the evolution of policies, the transaction costs based on the institutional design of different periods have changed fundamentally, rendering the spatial distribution of the three governance models somewhat different.

Table 2. Spatial distribution characteristics of three governance models.

Governance Model	Governance Spatial Location Distribution	Governance Area	Characteristics of Governance
I GGM	Edge of mine	Small	Scatter Point
II JGM	Edge of mine	Larger	Face Shape
III MGM	Inside of the mine	Medium	Point, Block

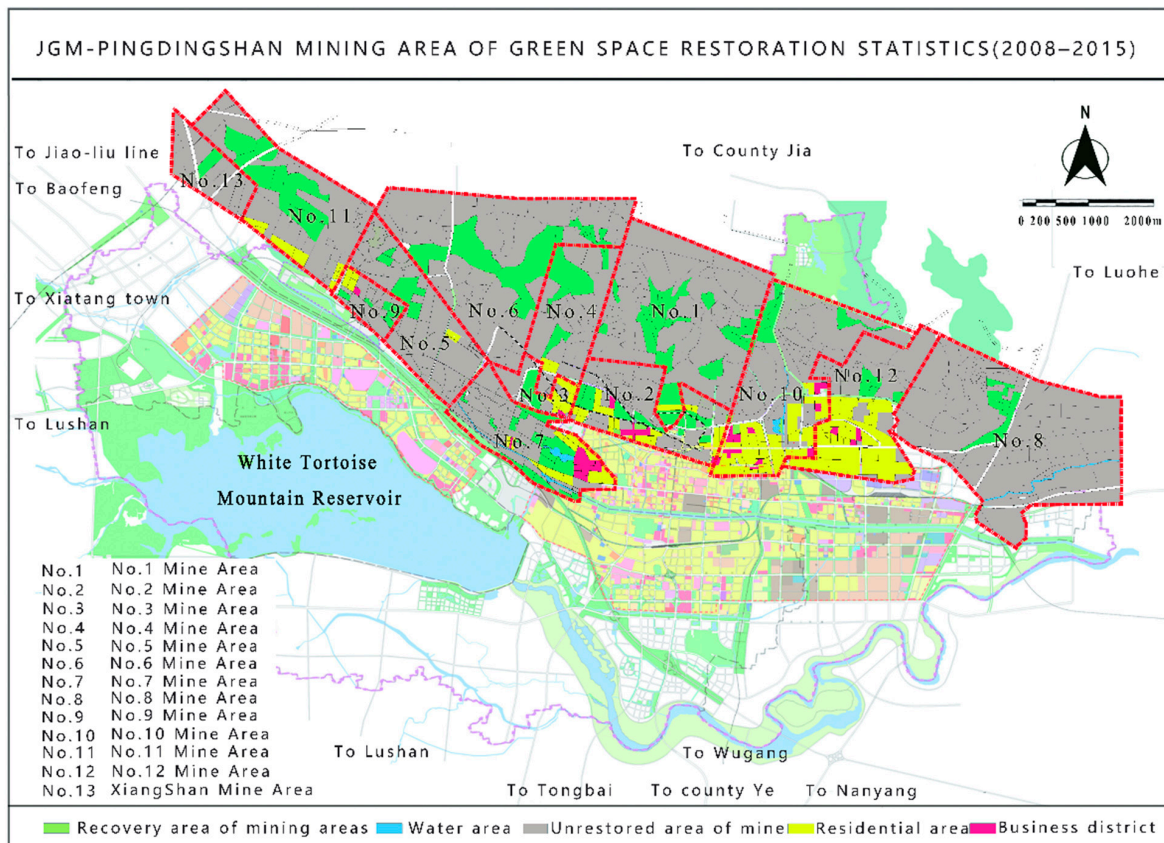


Figure 5. Spatial distribution of JGM in PDS City.

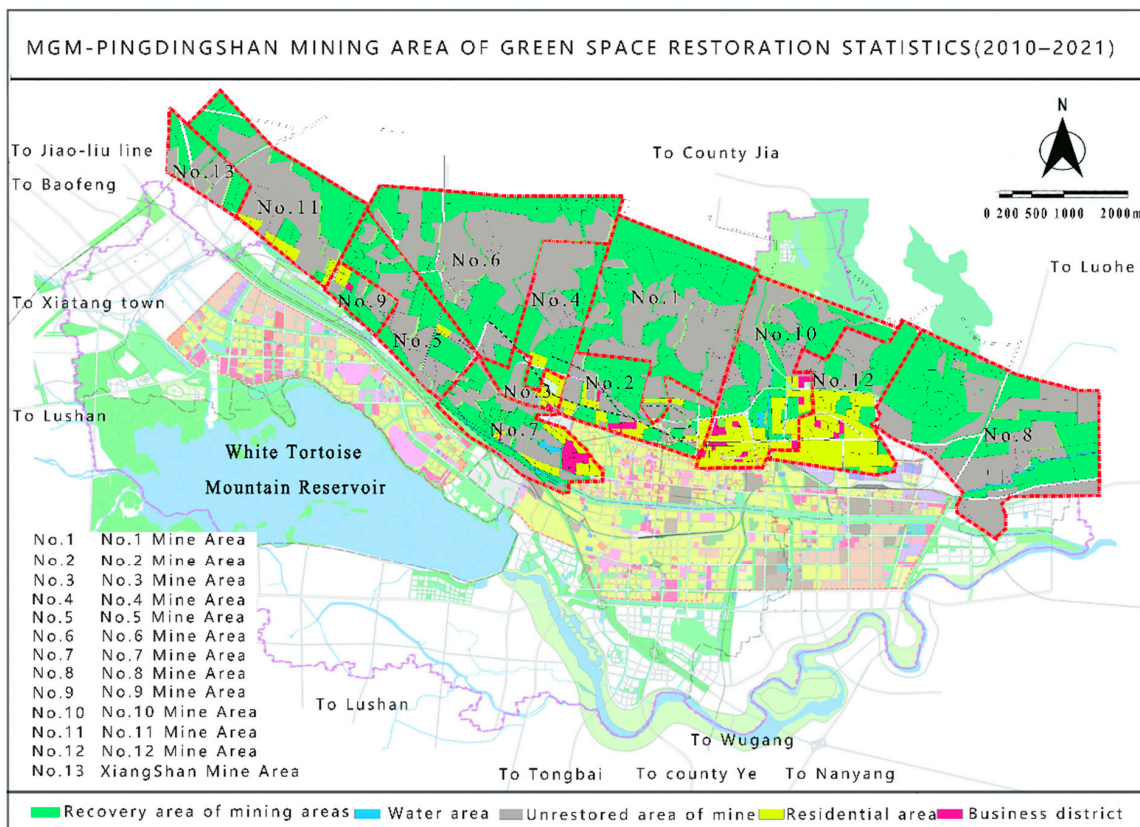


Figure 6. Spatial distribution of MGMs in PDS City.

5. Resident Perception Measures under the Three Governance Models

The effective rate of the questionnaire among 1000 questionnaires was 97.5%, which is above 90%, indicating that the questionnaire is valid. We then used Cronbach's alpha to check the internal consistency for urban construction, land use type, public interest, favorable groups, and pollution compensation, with values greater than 0.7 for all. In addition, the values of Kaiser-Meyer-Olkin (KMO) are all greater than 0.6, and the significance value are all less than 0.01, indicating that the reliability and validity of the scale are good, the quality of the observed data is good, and the model quality meets the requirements.

5.1. General Information

We used the 5-point Likert score (from 1 to 5, with 5 being the highest value) method to refine and analyze the questions in the questionnaire. In Figure 2, the structural equation model was constructed with five direct paths of Urban construction (A), Restoration land type (B), Public interest (C), Beneficiary group (D), and Pollution compensation (H), in addition to the twenty-six indirect paths (Figure 7). The structural equation path diagram was established in Figure 7, using GGM as an example. The governance approaches using GGM (I), JGM (II), and MGM (III) are brought into this structural equation modeling for validation, respectively. Details of the changes in the indices of residents' perceptions of the three modes of governance were summarized in Table 3.

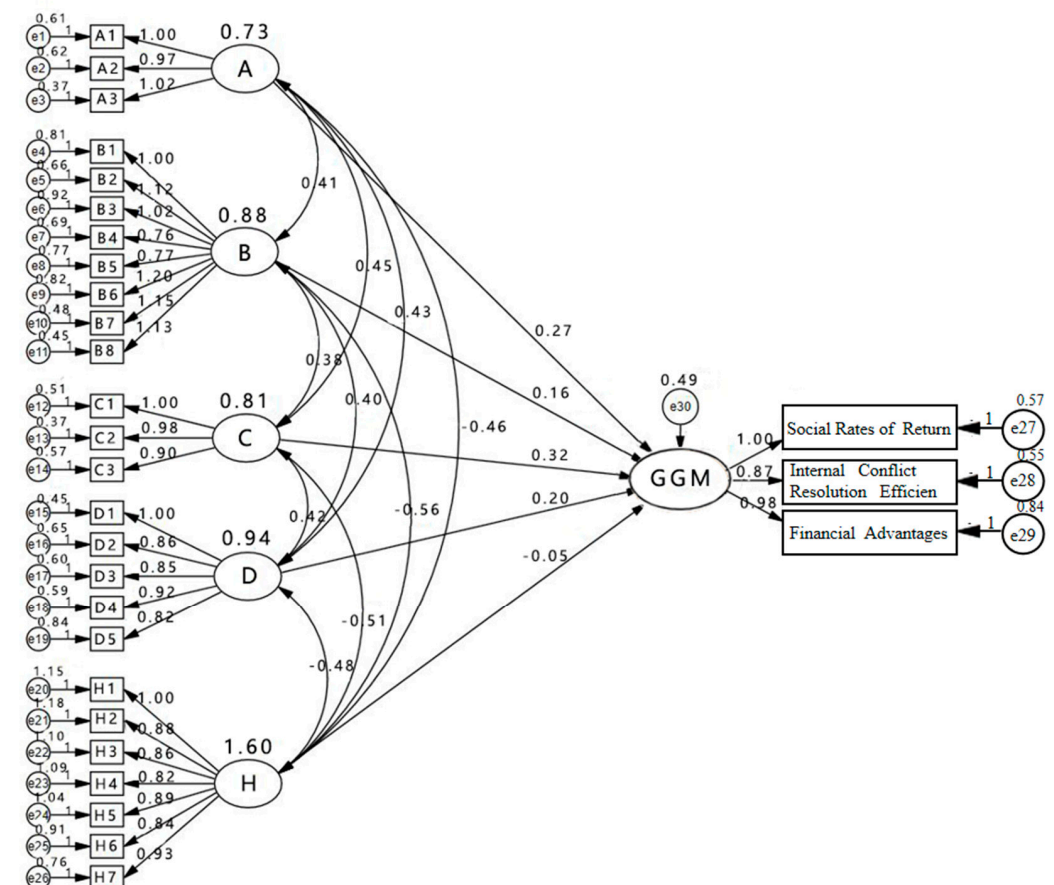


Figure 7. The path structure of the structural equation of the GGM (I).

Table 3. Indices of Three Governance Models Based on Residents' Perception.

			Model I-GGM		Model II-JGM		Model III-MGM	
Exogenous Latent Variables			Mean	Std	Mean	Std	Mean	Std
Urban construction	X1	Urban residential buildings	3.94	1.16	2.8	0.946	2.41	1.386
	X2	Urban public buildings	3.83	1.144	3.67	1.481	2.95	1.035
	X3	Urban municipal buildings	4.17	1.067	3.01	1.404	2.43	1.376
Restoration land type	X4	Residential land	2.85	1.301	2.23	1.084	1.73	1.19
	X5	Public administration and public service land	3.79	1.326	2.3	1.217	1.99	1.482
	X6	Commercial service facility land	3	1.36	2.32	1.11	2.87	1.396
	X7	Industrial land	3.54	1.099	2.35	1.095	4.34	1.1
	X8	Logistics and warehousing land	3.48	1.136	2.3	1.133	3.97	1.168
	X9	Transportation facilities land	3.9	1.442	2.55	1.199	4.49	0.995
	X10	Public utility land	3.75	1.282	2.4	1.166	4.46	1.147
	X11	Greenfield	3.86	1.249	2.42	1.194	4.33	1.188
Public interest	X12	Energy, transportation, water conservancy, and other infrastructure	3.88	1.149	3.37	1.071	3.38	1.375
	X13	Science and technology, education, culture, sports, tourism, and resource conservation	3.92	1.068	2.63	0.991	4.22	1.079
Beneficiary group	X14	Renovation of old cities with concentrated dangerous houses and poor infrastructure	3.96	1.107	1.73	1.049	3.28	1.236
	X15	Senior government and enterprise leaders	3.89	1.182	3.13	1.445	3.1	1.448
	X16	Mid-level leaders	3.74	1.162	3.07	1.353	3.14	1.329
	X17	Junior professional technician	3.76	1.135	2.79	1.476	3.13	1.4
	X18	Individual service providers, workers, farmers	3.79	1.176	2.7	1.462	2.99	1.465
	X19	People in poverty and lacking employment security	3.96	1.214	3.33	1.639	3.12	1.469
Pollution compensation	X20	Cultivated land subsidence	3.21	1.662	2.4	1.219	2.32	1.156
	X21	Road damage	3.46	1.56	2.47	1.161	2.39	1.193
	X22	Housing damage	3.52	1.511	2.38	1.267	2.35	1.192
	X23	Coal gangue occupies an area	3.14	1.47	2.46	1.207	2.4	1.154
	X24	Wastewater treatment	3.37	1.516	2.38	1.218	2.34	1.177
	X25	Plant damage	3.57	1.43	2.22	1.141	2.38	1.182
	X26	Soil erosion	3.83	1.465	2.42	1.291	2.41	1.23
Governance efficiency	Endogenous latent variables							
	Y1	Social rates of return	3.74	1.257	3.09	1.326	2.78	1.689
	Y2	Internal conflict resolution efficiency	3.75	1.15	3.21	1.257	2.66	1.478
	Y3	Financial advantages	3.92	1.346	3.28	1.388	2.15	1.553

Note: All these factors are perceived by residents.

Based on the calculation results of the original model, the indices were corrected, and the fit indices of the corrected model CMIN/DF (Chi-square/Degrees of freedom), GFI (Goodness of Fit Index), CFI (Comparative Fit Index), etc., all reached the ideal standard. The structural equation model fit results are good.

5.2. Path Analysis

The standard error (S.E.), critical ratio value (C.R.), and significance (p) are within the range of the fitness index as seen in Table 4. To make the standardized paths more visual, the results of the (STD) standardized paths calculated for the three models of the three governance models were organized into bar charts for comparative analysis (Figure 8).

Table 4. Results of the efficiency path analysis of the three governance models.

		Model I-GGM				Model II-JGM				Model III-MGM				
		S.E.	C.R.	<i>p</i>	STD	S.E.	C.R.	<i>p</i>	STD	S.E.	C.R.	<i>p</i>	STD	
	<--	Urban construction	0.056	4.873	***	0.230	0.056	4.041	***	0.174	0.048	−5.453	***	−0.201
	<--	Restoration land type	0.041	3.789	***	0.146	0.042	3.759	***	0.147	0.060	6.670	***	0.236
	<--	Public interest	0.050	6.408	***	0.289	0.054	5.787	***	0.262	0.064	−5.770	***	−0.214
	<--	Beneficiary group	0.041	4.856	***	0.192	0.032	1.029	0.303	0.038	0.046	0.396	0.692	0.013
	<--	Pollution compensation	0.029	−1.782	0.075	−0.065	0.042	7.324	***	0.300	0.066	6.683	***	0.267
X1	<--	UC	—	—	—	0.737	—	—	—	0.796	—	—	—	0.848
X2	<--	UC	0.048	20.401	***	0.725	0.058	28.474	***	0.838	0.029	20.322	***	0.667
X3	<--	UC	0.046	22.117	***	0.819	0.056	30.210	***	0.901	0.039	23.331	***	0.786
X4	<--	RLT	—	—	—	0.721	—	—	—	0.848	—	—	—	0.822
X5	<--	RLT	0.046	24.074	***	0.792	0.034	31.149	***	0.810	0.037	25.196	***	0.722
X6	<--	RLT	0.048	21.448	***	0.707	0.032	28.764	***	0.769	0.032	22.519	***	0.663
X7	<--	RLT	0.039	19.742	***	0.652	0.031	31.053	***	0.808	0.035	27.855	***	0.777
X8	<--	RLT	0.040	19.226	***	0.635	0.033	27.553	***	0.748	0.035	31.452	***	0.845
X9	<--	RLT	0.051	23.671	***	0.779	0.034	31.043	***	0.808	0.042	28.906	***	0.798
X10	<--	RLT	0.045	25.564	***	0.840	0.033	30.447	***	0.798	0.033	28.499	***	0.790
X11	<--	RLT	0.044	25.716	***	0.845	0.035	29.138	***	0.776	0.040	24.329	***	0.704
X12	<--	PI	—	—	—	0.782	—	—	—	0.766	—	—	—	0.753
X13	<--	PI	0.041	23.983	***	0.820	0.044	23.438	***	0.848	0.058	24.785	***	0.875
X14	<--	PI	0.041	21.952	***	0.733	0.043	20.491	***	0.695	0.052	23.026	***	0.769
X15	<--	BG	—	—	—	0.821	—	—	—	0.775	—	—	—	0.759
X16	<--	BG	0.037	23.485	***	0.721	0.035	28.323	***	0.815	0.037	25.990	***	0.786
X17	<--	BG	0.036	23.835	***	0.730	0.036	35.759	***	0.974	0.039	23.307	***	0.716
X18	<--	BG	0.037	24.848	***	0.756	0.036	33.434	***	0.924	0.040	26.228	***	0.792
X19	<--	BG	0.039	20.968	***	0.656	0.042	29.931	***	0.851	0.040	32.199	***	0.961
X20	<--	PC	—	—	—	0.762	—	—	—	0.787	—	—	—	0.810
X21	<--	PC	0.039	22.593	***	0.717	0.036	25.929	***	0.766	0.036	27.495	***	0.780
X22	<--	PC	0.038	22.700	***	0.720	0.038	30.102	***	0.860	0.035	29.606	***	0.823
X23	<--	PC	0.037	22.162	***	0.705	0.036	29.138	***	0.839	0.034	29.823	***	0.827

Table 4. Cont.

			Model I-GGM				Model II-JGM				Model III-MGM			
			S.E.	C.R.	<i>p</i>	STD	S.E.	C.R.	<i>p</i>	STD	S.E.	C.R.	<i>p</i>	STD
X24	<--	PC	0.038	23.392	***	0.740	0.037	26.277	***	0.774	0.036	26.739	***	0.764
X25	<--	PC	0.036	23.569	***	0.745	0.035	26.169	***	0.772	0.036	27.178	***	0.773
X26	<--	PC	0.036	25.629	***	0.803	0.040	25.945	***	0.766	0.037	27.608	***	0.782
Y1	<--	GGM/ JGM/ MGM	—	—	—	0.801	—	—	—	0.739	—	—	—	0.910
Internal conflict resolution efficiency	<--	GGM/ JGM/ MGM	0.038	22.809	***	0.764	0.050	18.447	***	0.723	0.029	21.987	***	0.674
Y3 Financial Advantages	<--	GGM/ JGM/ MGM	0.045	21.925	***	0.731	0.053	16.748	***	0.632	0.031	23.556	***	0.716

Note: Spaces in the table are non-standardized coefficients, set fixed parameter 1; *** $p < 0.001$.

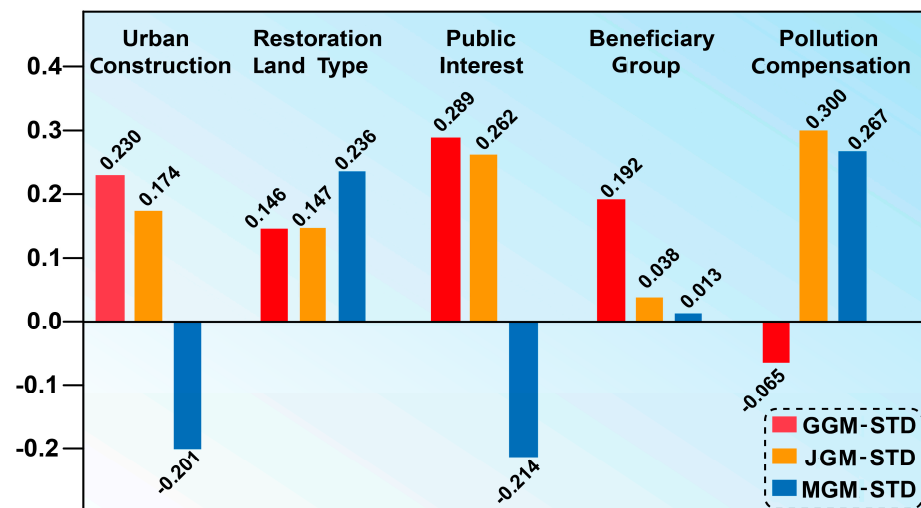


Figure 8. Histogram of standardized paths for the three governance models.

According to the SEM modeling results, they showed the direct paths A, B, C, D, and H with the standardized coefficients of 0.23, 0.146, 0.289, 0.192, and -0.065 , respectively. For GGM governance, residents' perceptions have positive path effects on urban construction, restoration land type, public interest, and favorable groups; but residents' perception showed a negative path effect on pollution compensation. The standardized path value of public interest is 0.289, indicating that government governance has a higher perceived satisfaction of residents in terms of public interest. The load factor of 0.820 for the public benefits of science and technology, education, culture, sports, tourism, and resource conservation (X13) indicates that these items involving the improvement of the quality of public life have the greatest impact on the lives of residents. Residential buildings (X1), public buildings (X2), and municipal buildings (X3) are the three significant factors in urban construction, where the load factor of municipal buildings (X3) is 0.819, indicating that the role of the government is more obvious in solving the urgent problems of the public such as road collapse, house collapse, and destructions of public facilities.

The rehabilitation of urban roads and bridges in municipal buildings, the treatment of water supply and drainage, sewage discharge, and especially the renewal of urban utilities such as road greening, street lighting, and environmental sanitation around mining areas have improved the urban environment to a great extent, and these aspects are also reflected in the perception degree of residents. The load coefficients of 0.840 and 0.845 for public facility land (X10) and green space (X11) among the restored land types indicate that the government mainly focuses on public land restoration. However, the most significant factor among the beneficiary group is the top cadres and managers of large enterprises (X15) with a coefficient of 0.821, which indicates that the GGM in China is clearly "top-down" and government-driven. Furthermore, the government has a negative path effect on pollution compensation, in which the load coefficients of soil erosion (X26), arable land collapse (X20), plant destruction (X25), and sewage treatment (X24) are 0.803, 0.762, 0.745, and 0.740 respectively. Therefore, residents got less satisfaction from the GGM in these pollution compensation, which could be caused by the single source of government funding and insufficient funds.

The direct path values of the JGM/Model 2 (Table 4) in urban construction (A2), restoration of land type (B2), and public interest (C2) are 0.174, 0.147, and 0.262, and the residents show positive satisfaction, and the residents recognize the contribution of the three aspects from the joint governance of government and enterprises. The load coefficients of municipal buildings (X3), land for public administration and public services (X5), industrial land (X7), land for transportation facilities (X9), and science and technology, education, culture, sports, tourism, and resource conservation (X13) are 0.901, 0.810, 0.808, 0.808, and 0.848, respectively; the residents recognize the roles of these five observed variables in mine

governance. However, the path value of the beneficiary group in JGM is 0.038, which is not only low but also insignificant. This is mostly caused by the unclear interest relationship between government and enterprises. The direct path value of pollution compensation is 0.3, which is positive and very significant. The load coefficient of the observation variable housing damage (X22) and gangue hill occupation (X23) is larger, which is 0.860 and 0.839. Residents get satisfaction from the compensation of housing damage and gangue hill relocation, which typically need huge investment. Therefore, the joint government-enterprise mode to a large extent makes up for the lack of funds due to the broken capital chain of government single investment.

The direct path values of the MGM in urban construction and public interest are -0.201 and -0.214 , indicating a negative path effect, and residents are less satisfied in these two aspects. The maximum load coefficients of 0.848 and 0.875 for urban residential buildings (X1) and science and technology, education, culture, sports, tourism, and resource conservation (X13) indicates that the focus of the MGM is opposite to the GGM and JGM. The main focus of the MGM is on the exploitation of internal enterprises with less attention on public interest. The direct path value of the land type restored by the MGM is 0.236, and logistics and storage land (X8), transportation facility land (X9), and utility land (X10) are the three significant factors in the land type restored, with standardized paths of 0.845, 0.798, and 0.790, respectively. It mainly includes the transformation of a large amount of abandoned lands into construction and arable lands led by enterprises. This shows the most obvious governance effect and economic benefit, from which the residents get satisfaction. The direct path value of 0.267 for pollution compensation in the treatment process led by enterprises indicates the fact that under the constraints of the policy system, state-owned enterprises undertake the task of solving the loss of surrounding farmers' arable lands and raising the employment of local residents in the treatment process. Therefore, the residents' satisfaction is obvious. With a direct path value of 0.013 for the beneficial group, the significance of residents' satisfaction is less significant and it is clear that residents are not very clear about the process of dividing the benefits under the market governance model.

5.3. Comparative System Analysis of the Three Models

The above results showed the residents got different satisfaction from different governance systems, and different governance systems treated the mining areas differently. Governments have various revenue sources but their public expenditure on mine area governance is limited due to many other investment demands in RBC. Government-led governance is policy-dominated and funding concentrated, and residents' satisfaction with the effectiveness of governmental governance ranks the first. This result is corroborated by the fact of residents' high recognition and acknowledgement regarding the government's governance efficiency in urban construction, public interest, and beneficiary group. It showcases that GGM features the characteristics of centralization, high efficiency, and significant achievements. The seventh and eighth mine in PDS City are typical results of the GGM, which were mainly invested by government for the restoration and treatment and control. The seventh mine has been successfully turned into ecological parks after a series of reclamation and construction, while the eighth mine has been restored to nearly 0.67 km^2 of arable lands, and some of the arable lands that were difficult to restore into lands were developed into fish ponds.

Recognizing the limited single source of government funding and the huge demands of investment into mine area treatment, governments began to take advantages of the market economy, and considered market-induced investment. As a transitional form in the process of institutional transformation, the JGM, besides its financial advantages in compensation for pollution treatment and control, is hence mainly driven by government policies. On the other hand, the role of local state-owned enterprises has not been fully played, and mutual prevarication might happen from time to time, which thereby improves the governance efficiency of mine areas.

The advantages of MGM governance mainly reside in the prevention and treatment of pollution in the process of its own mining, addressing the loss of arable lands and providing employment for mine personnel; however, MGM is easily subjected to policy constraints. The working priority of MGM aims to solve the problem of rather limited land, especially the waste dump so as to alleviate and expand lands for enterprise's own construction, thereby its endeavors into urban construction and public interest are comparatively less. Both JGM and MGM have made up for the shortcomings of the governmental counterpart, relieving the pressure borne by the government in the entire RBC governance process. Therefore, in the whole governance process of PDS City, only the seventh and eighth mine were mainly governed by the government, but all the other mines have gone through the process of JGM and MGM governance.

6. Discussion

The governance of mining areas in RBC is characterized by heavy tasks, slow progress, and high transaction costs, and it typically falls into path dependence. The governance of mining areas has not yet been fully marketized, given a large amount of negative externality cost in the mining area governance process. Governance is a dynamic equilibrium, and the three models of GGM, JGM, and MGM are complementary, and there are multiple equilibrium states in the game process. Their complementarity is mainly reflected in the mutual complementation of financial systems, while the differences are in the evolution of the governance system caused by the imperfection of collaborative governance between government, enterprise, residents, and other stakeholders. Governance process is a complex and dynamic process. Residents often hold high satisfaction with the governance efficiency of the government, which reflects not only the efficiency and superiority of the government-led governance in the current Chinese institutional system, but also reflects the insufficiency of the interaction process between government and market. If the government wants to completely transform itself into an induced system model, that is, to completely hand over the later governance tasks to the market, further improvements in various institutional norms and more flexible and safe market environments are needed. Moreover, local governments and local state-owned enterprises are the main governance participants, but the local state-owned enterprises must face the challenges of multiple pressures of pollution control, enterprise transformation and upgrading, and local employment. On the one hand, government needs to understand its limitations in promoting the governance process independently and continuously due to increasing investment and the pressure of institutional transformation. Therefore, some local governments adopt the "one size fits all" approach in the ecological governance process of RBCs, forcibly shutting down polluting enterprises or relocating the masses. However, with significant conflicts of interest but without follow-up supports, the interest coordination mechanism is not provided, the communication channels are not smooth, and as a result, some survival crises of local residents and businesses and even social contradictions occur.

The governance of public issues is complex and difficult with high coordination. Due to its authority in coordination and administrative control, the government sometimes has an absolute advantage in the process of solving public interests and urban construction issues involving the justice and effectiveness of public management and internal conflicts. Our empirical study showed that JGM is most effective in the governance of pollution compensation problems with a large amount of funds involved, which reflects the complementary effects of the government and the market in resource allocation. The MGM is mainly applicable to the internal business of enterprises, and the governance is less difficult especially for the restoration areas that can be used for construction and cultivated lands. However, this governance model still takes local state-owned enterprises as participants, and a systematic market mechanism with community participation has not been considered, and its advantages in social and cultural aspects are not significant. Its social rate of return is mainly reflected in sharing the employment and the compensation of the occupied land resources, which was conducted according to related policy.

Opportunistic behavior exists in the governance process of the GGM, JGM, and MGM. The control authority is typically in the hands of top leaders and heads of large enterprises, and supervision should be further strengthened. For example, various democratic supervision measures should be improved, coordination awareness among various departments should be promoted, and a sound interest coordination mechanism should be established. It is suggested that the cooperation between government and enterprises should be promoted around common interests, and the sharing of resources in RBCs should be promoted, which is more conducive to the construction of a mechanism for balancing interests, so that the cooperation between government and enterprises can develop in a benign and complementary direction.

Although the role of community has been recognized, community stakeholders' participation in all the governance models needs to be emphasized, because they are the key to thriving local sustainability. It can also be seen from the investigation process that the government and the public have a different ideological understanding, and most often the two sides have different opinions on compensation standards; although it makes the governance process complex, but the government should greatly consider it seriously for justice in mine area governance. Since China's reform and opening, communities show an increasing sense of participation in local governance and development. It is necessary to further guide and safeguard the public's right to know, choose, participate, and control green environmental protection. Currently, with the further deepening of China's supply-side structural reform, in order to form a more systematic and complete governance system, it is necessary to introduce more detailed and clear governance rules that could meet the social expectations of mine areas' treatment, restoration, and economic revitalization, such as the seven stages for stakeholders engagement process [70].

7. Conclusions

Existing literature is mostly about the sustainable development capacity of case sites or the transformation efficiency and development [71,72], and current studies rarely analyze the governance efficiency of different models in the process of mine governance in resource-based cities from the perspective of institutional development. From a multidimensional perspective and empirical evidence based on surveys, this paper draws out the applicable governance models in different situations, and the strengths and weaknesses of the systems corresponding to the governance models, and provides a novel insight into resource-based cities for further reform and sustainable development.

Integrating structural equation modeling and spatial analysis, this study modeled three governance models based on a comprehensive questionnaire survey. Transformed urban features in point, area, and block show different spatial distribution in distance to the edge of the mining area. Our modeling discloses that there are significant differences in the efficiency of the three governance models in terms of social benefits of governance, resolution of internal conflicts, and financial advantages of governance, with the highest overall efficiency perceived by residents being the government governance model, followed by the mixed governance model, and finally the market governance model.

The GGM has a high level of satisfaction in avoiding significant losses and personal safety of residents, especially for the mining hazards of land subsidence, housing damage, destruction of public facilities etc. GGM also is effective in governance of science, education, culture, health, tourism, and resource protection, and others related to the public interest of the communities. In those scenarios, as a special governance model with dedicated funds, the governmental model has notable governance effectiveness. However, its problems are also significant in the implementation process for example, the most beneficiary groups are typically the top and middle management while local enterprises and residents are much less involved, which may incur bureaucracy and opportunism.

As a transition and supplement to the governmental model, the JGM is characterized by government-led governance and joint funding resources from both governments and enterprises, while the governance mainly focuses on the crucial issues of subsidence, urban

public facilities construction, and pollution compensation. These are the most hazardous issues to the public interest. Moreover, because of more abundant funds from government-enterprise alliance, problems demanding large investment that cannot be solved by GGM governance have been reasonably resolved using the joint model. It is notable that top and middle management could be the typical beneficiary groups, but local residents could be much less considered.

MGM is apparently different from GGM and JGM. It pays less attention to the issues relating to public and community interest. MGM focuses on the storage, transportation, and public land management in the mining area, as well as removal of waste dump areas and the restoration of lands around a mine. Therefore, MGM's efforts could free up a large amount of available construction lands for the enterprise as well as arable lands. However, the enterprises shall face the responsibilities to compensate the local surrounding residents for destructing/destroying their lands to improve community satisfaction. The current MGM is still mainly limited by and dependent on the governance of local state-owned enterprises, and an updated comprehensive structure of market-based governance by involving private enterprises and community stakeholders could improve MGM's efficiency and its brand in local urban development.

Author Contributions: Y.Y. conceived the presented idea, proposed the related scientific problems and this paper's structure, verified the analytical methods, and revised and confirmed the manuscript; X.L. carried out a survey in Henan Pingdingshan city, wrote and completed the original manuscript; Q.M. and Y.Y. made a comprehensive revision of the paper. All authors have read and agreed to the published version of the manuscript.

Funding: This work was supported by the National Natural Science Foundation of China (No. 41971198).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Acknowledgments: We thank Henan Geological Environment Monitoring Institute, Pingdingshan Natural Resources and Planning Bureau, Pingdingshan Statistics Bureau and Pingdingshan Development and Reform Committee for their help. We sincerely thank Qing Liu for helping us to refine the manuscript. The authors also thank Qing Liu for their suggestions and comments on an earlier version of this paper.

Conflicts of Interest: The authors state that there are no conflicts of interest.

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