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The Impact of Environmental Regulation on Economic Growth in Resource-Based Cities

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Abstract
In China, resource-based cities face the dual challenge of improving the ecological environment while fostering economic growth. Globally, policy-driven development is pivotal in reshaping these cities. Amid tightening resource constraints and ecosystem degradation, the Chinese government has intensified efforts towards ecological civilization construction. This study focuses on environmental regulation as a key policy instrument, assessing its efficacy in resource-based cities. It concludes that environmental regulation spurs economic growth through four channels: restructuring industries, fostering technological innovation, attracting foreign direct investment (FDI), and labor supply.

Key words: Resource-based cities; Environmental regulations; Economic growth

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1. INTRODUCTION
Since China's reform and opening up, resource-based cities have been vital suppliers of energy and raw materials, driving national economic growth and employment. However, prolonged resource extraction has led to economic downturns, environmental degradation, and rising unemployment and poverty. While efforts since 2001 have aimed at sustainable development and transforming depleted cities, resource-based cities remain crucial for national resource and energy security amid global uncertainties. Historical legacies and limited endogenous development impede transformation efforts. The 14th Five-Year Plan for Promoting High-Quality Development of Resource-Based Areas emphasizes coordinated development and security, necessitating robust environmental regulations. These regulations, governing enterprise conduct and market operations, are indispensable for curbing pollution, safeguarding the environment, and fostering high-quality economic development. Sustainable development remains a priority for local governments and academia, aligning with economic growth and environmentally friendly habitats. Consequently, studying the impact of environmental regulations on economic growth in resource-based cities holds significant importance, charting pathways for their transformation and development.

2. LITERATURE REVIEW
The interplay between environmental regulations and economic growth remains a focal point of scholarly discourse both domestically and internationally. Extensive research has delved into various facets of this relationship, including the nexus between environmental regulations and economic growth, the mechanisms through which environmental regulations influence economic growth, and the differential impacts of diverse environmental regulations on economic growth. Concurrently, the issue of economic development in resource-based cities commands significant attention from scholars worldwide, with particular emphasis on the transformation and growth trajectories of these cities.

Given the distinctive characteristics of resource-based cities, government intervention, particularly through environmental regulation, emerges as a pivotal driver

in facilitating their transformation and advancement. In recent years, scholars have undertaken extensive investigations into the ramifications of environmental regulations on the economic growth of resource-based cities. Research on environmental regulatory policies in these cities predominantly centers on three key dimensions:

1) Facilitating Economic Growth: Scholarly consensus suggests that environmental regulations play a constructive role in fostering economic growth within resource-based cities. For instance, Zhang Juan's analysis of 33 resource-based cities in China illustrates a significant positive correlation between industrial pollution control measures and both total GDP and per capita GDP (Zhang, 2017). Similarly, Zhao Mingliang et al. (2023) observed a positive impact of environmental regulations on the green total factor productivity of 113 resource-based cities in China (Zhao & Feng & Sun, 2023). Additionally, Xue Yawei et al. identified an "inverted U-shaped" relationship between environmental regulations and the green development of 95 prefecture-level resource-based cities in China (Xue & Zhang, 2023).

2) Understanding Transmission Mechanisms: Scholars have conducted comprehensive inquiries into the pathways through which environmental regulations exert influence on the economic growth and total factor productivity of resource-based cities. These mechanisms include:

• Environmental regulations prompting the exit of outdated production capacities, thereby fostering innovation among industries affected by such regulations and driving economic growth through innovation-driven compensatory effects (Zhang, 2017).

Environmental regulations escalating the costs associated with obsolete production capacities, consequently facilitating the transition of production factors from the less efficient secondary industry to the tertiary sector, thus generating new focal points for economic growth in resource-based cities (Zhang, 2017).

• Environmental regulations stimulating enterprise innovation and technological advancements through the promotion of green production processes and market competition dynamics, thereby serving as intermediaries in fostering economic growth within resource-based cities (Zhao & Feng & Sun, 2023).

• Environmental regulations facilitating the optimization of industrial structures via industrial transfer and substitution effects, leveraging the industrial foundations of resource-based cities to promote sustainable development (Zhao & Feng & Sun, 2023; Xue & Zhang, 2023).

• Environmental regulations raising the threshold for foreign investments and eliminating polluting foreign enterprises, thereby enhancing the quality of foreign investment utilization and driving high-quality development within resource-based cities (Zhao & Feng & Sun, 2023).

• Regions with stringent environmental regulations boasting superior ecological environments, conducive to the accumulation of human capital, thus fostering the growth of resource-based cities through enhanced human capital development (Xue & Zhang, 2023).

In sum, the literature underscores the multifaceted interplay between environmental regulations and economic growth, particularly in the context of resource-based cities, providing valuable insights into the mechanisms driving their transformation and sustainable development.

3. THE IMPACT MECHANISM OF ENVIRONMENTAL REGULATIONS ON ECONOMIC GROWTH IN RESOURCE-BASED CITIES

3.1 Current Situation of Environmental Regulations and Development of Resource-Based Cities in China

The inception of China's environmental protection industry dates back to the 1970s, marked by the inaugural National Environmental Protection Conference in Beijing. Over the span of more than 50 years, China's environmental regulatory landscape has evolved significantly. Initially characterized by exploratory efforts in industrial pollution prevention preceding the era of reform and opening up, it transitioned into a paradigm of combined prevention and control during the early stages of reform. Subsequently, in the 1990s, the focus shifted towards a holistic approach encompassing both pollution prevention and ecological preservation. Notably, since the 18th National Congress of the Communist Party of China, there has been a pronounced shift from a stance of "protecting while developing" to one of "adhering to ecological priority," signifying a series of strategic transformations within the environmental regulatory policy framework.

This evolution in policy conceptualization reflects a progression from the conventional "pollution prevention and control view" to the contemporary "ecological civilization view." It has culminated in the establishment of a comprehensive, three-dimensional environmental regulation policy apparatus, incorporating administrative directives, market incentives, and public participation mechanisms. Furthermore, there has been a discernible enhancement in the legal framework governing ecological environment protection, with ecological civilization enshrined in the constitution. Presently, China's environmental legislation encompasses a spectrum of protective measures, including specialized laws addressing

environmental pollution prevention, natural resource conservation, and resource recycling.

The delineation of governmental, corporate, and public responsibilities pertaining to ecological preservation has become more explicit, accompanied by a substantial reinforcement of environmental law enforcement mechanisms. Consequently, a management system tailored to the exigencies of China's ecological environment protection endeavors has been instituted.

Despite concerted efforts by Chinese governments and relevant agencies over the past decade to facilitate the transformation of resource-based cities, several challenges persist in their economic trajectory. Foremost among these challenges is the phenomenon of disparate economic development. Certain resource-based cities find themselves hamstrung by constraints such as geographical, infrastructural, and environmental limitations, thereby evolving into enclaves of development with varying degrees of isolation.

Furthermore, inadequacies in economic development are manifest in recurrent geological disasters stemming from mining activities, along with attendant ecological degradation and environmental pollution. Moreover, mining regions in some resource-based cities grapple with antiquated production and residential infrastructure, as well as deficient public service provisions. Notably, the quality of economic development warrants improvement, as certain resource-rich areas exhibit a proclivity towards industry dominance and a corresponding "resource dependence" syndrome. Statistical evidence underscores the conspicuous convergence of industries among resource-based cities, indicative of the challenges inherent in effecting industrial transformation and upgrading.

3.2 Transmission Mechanism

3.2.1 Environmental Regulation's Impact on the Economic Growth of Resource-Based Cities through Industrial Transformation

Environmental regulation predominantly influences economic growth through two primary channels: the rationalization effect of industrial structure and the upgrading effect of industrial structure.

Firstly, the rationalization effect of industrial structure operates in several ways. According to Porter's innovation compensation hypothesis, moderate environmental regulation intensity can stimulate corporate innovation behavior. This stimulation leads to enhanced production efficiency, reduced corporate costs, and enables enterprises to adjust and optimize their own structure. Consequently, this fosters the transformation and upgrading of the entire industry's industrial structure. Moreover, environmental regulations create disparities in comparative advantages between different industries. Strict environmental regulations elevate the prices of polluting production factors, compelling polluting enterprises to either cease operations or transfer production, thereby redirecting resources into clean and low-carbon industries. Rigorous formal environmental regulations can eliminate pollution-intensive backwardness and excess production capacity, thus catalyzing a new momentum for industrial structure adjustment. Additionally, environmental regulations promote the coordination between industries and the redistribution of production factors through their impact on factor allocation and production costs. This reduces the degree of resource mismatch caused by monopolies and capital deepening, alleviating the imbalance of economic development, enhancing overall social benefits, and fostering economic growth.

Secondly, the upgrading of industrial structure unfolds in two main ways. Firstly, as environmental regulations tighten, societal awareness of environmental protection and green production intensifies, leading consumers to gravitate towards green and environmentally friendly products. Enterprises must adapt by altering their production methods and adjusting their product structures to better align with and cater to changing market demands. This demand-side impact fosters the upgrading of industrial structure, thereby propelling urban economic growth. Secondly, environmental regulations contribute to the enhancement of the urban environment, facilitating the development of tertiary industries such as high-end services, real estate, and tourism. This continual optimization and upgrading of the industrial structure provide vital support for economic growth.

Overall, environmental regulation plays a pivotal role in shaping the industrial landscape of resource-based cities, driving both rationalization and upgrading processes that ultimately fuel economic growth.

3.2.2 Environmental Regulation's Impact on Economic Growth in Resource-Based Cities Through Technological Innovation

Environmental regulations exert an indirect influence on the economic trajectory of resource-based cities via technological innovation. This impact is characterized by two main dynamics: the positive "innovation compensation effect" and the negative "compliance cost effect." The former, rooted in the neoclassical economics paradigm, posits that environmental regulations escalate pollution control and compliance costs for enterprises, thereby constraining productive investments, innovation endeavors, and organizational management initiatives. Consequently, corporate innovation is hindered, engendering an indirect "regression" effect on economic growth. Conversely, proponents of the "innovation compensation effect," typified by the revisionist school led by Porter, adopt a dynamic research perspective. They contend that environmental regulations can spur enterprises to bolster technological innovation, refine management practices, recalibrate product manufacturing, innovate product lines, internalize heightened regulatory costs, and trigger an "innovation compensation effect."

This phenomenon propels economic growth through advancements in product design, operational processes, and technological frameworks.

3.2.3 Environmental Regulation's Influence on Economic Growth in Resource-Based Cities Through Foreign Direct Investment (FDI)

Since the advent of China's reform and opening-up policies, Foreign Direct Investment (FDI) has emerged as a cornerstone driving force behind the nation's remarkable economic ascent. Scholars widely espouse the notion that FDI fosters regional economic expansion via "spillover effects," delineated across three key dimensions. Firstly, foreign investment compels domestic enterprises to embark on technological innovation to withstand market competition, thereby enhancing managerial efficacy and, consequently, augmenting productivity to propel economic growth. Secondly, FDI infusion heralds the introduction of cutting-edge technology and operational expertise, triggering a demonstrative effect on indigenous enterprises. This enables domestic firms to enhance production techniques and managerial proficiency through emulation and learning, catalyzing high productivity and driving economic growth. Lastly, the migration of skilled technical and managerial personnel from foreign enterprises fosters a surplus of human capital, enriching the talent pool and conferring benefits to the broader economy.

In the context of evolving environmental regulations in resource-based cities, these regulations directly impact FDI, serving as a screening mechanism and a regulatory constraint. This, in turn, influences the economic trajectory of resource-based cities indirectly. One school of thought suggests that stringent environmental regulations escalate the operational costs for foreign enterprises, precipitating an exodus of FDI and stymieing economic growth. Conversely, an alternate perspective posits that environmental regulations, by ameliorating the ecological landscape, impose screening criteria on foreign investments through environmental compliance costs. Consequently, this steers foreign enterprises towards tertiary sector investments or prompts enhancements in investment quality, thereby elevating the caliber of foreign direct investment and fostering economic growth.

3.2.4 Environmental regulation affects the economic growth of resource-based cities through labor supply

Full employment is an important goal of the government's macroeconomic policy. However, in recent years, with the strengthening of environmental regulations, some manufacturing enterprises with severe pollution have gradually shut down, reducing the demand for low - and medium-sized employees, resulting in a contradictory situation of "difficult employment and recruitment". At present, Chinese governments at all levels have introduced relevant policies on environmental regulations, which not only alleviate environmental problems but also have an impact on the labor demand of enterprises, thereby affecting regional economic growth. There is no consensus in the academic community on the relationship between environmental regulations and employment. Based on existing theoretical research, most scholars believe that environmental regulations will affect employment through cost effects, factor substitution effects, demand effects, and other factors. The economy of resource-based cities has distinct industrial structure characteristics, with resource-based industries accounting for a large proportion of the total urban economy. Most resource-based cities have relatively unbalanced industrial structures, mainly relying on the secondary industry. With the development of the economy, most growth oriented resource-based cities rely mainly on the secondary industry, with labor-intensive enterprises as the main focus. Due to factors such as industrial structure, factor endowment, and employment structure, the employment of resource-based cities is more susceptible to environmental regulations.

With the promotion of environmental regulation policies in resource-based cities, the contradiction between industrial pollution control and employment promotion in resource-based cities has become more prominent. Scholars believe that the impact of environmental regulations on regional employment mainly has the following three views: first, some scholars believe that strengthening environmental regulations will reduce labor employment. Government's overly strict environmental standards will cause high production costs for enterprises, leading to their deviation from effective scale, Or reduce the production scale of enterprises, reduce the demand for labor, and have an impact on urban economic growth; Secondly, some scholars believe that the environmental protection industry and related service industries belong to industries with high labor demand elasticity. When high standard environmental regulations promote the significant development of the environmental protection industry, these emerging industries will create more employment opportunities, improve the labor force structure of cities, and promote regional economic growth; Thirdly, some scholars believe that the impact of environmental regulations on labor employment is non-linear, and improving environmental regulations will have a first inhibitory and then promoting effect on employment. Environmental regulation is a mandatory constraint or incentive process imposed by the government on the environmental externalities of resource and energy enterprises. Although its long-term significance for the sustainable economic and social development of resource-based areas is obvious, in the short term, environmental regulation may suppress labor demand by suppressing the scale of energy and resource industries in resource-based areas, thereby constraining the local urban economic development.

CONCLUSION

The trajectory of resource-based industries follows an irreversible objective law: they rise, flourish, and eventually decline with the progression of resource development. Given the unique economic development structure of resource-based cities, there is an imperative for them to navigate a seamless transition in their economic landscape while concurrently enhancing the natural environment. This entails striking a delicate equilibrium between economic advancement and fostering a livable, business-friendly ecological milieu. As China's economic evolution ushers in a new normalcy, resource-based cities are confronted with the dual challenge of sustaining economic growth while safeguarding the environment. This discourse delves into avenues through which resource-based cities can pursue sustainable economic expansion from the vantage point of environmental regulation. It scrutinizes the impact of environmental regulation on the economic trajectory of resource-based cities, delineating its influence through industrial restructuring, technological innovation, Foreign Direct Investment (FDI),and labor supply.

Environmental regulation, aimed at curbing activities detrimental to the environment, stands as a pivotal instrument in environmental protection. Since the 18th National Congress, China has placed heightened emphasis on enhancing environmental standards and quality. Conventional economic wisdom suggests that an optimal intensity of environmental regulations is essential for catalyzing technological innovation. Striking this balance is crucial, as excessive regulation can lead to a "crowding out effect" while inadequate measures fail to spur innovation. Hence, solely relying on environmental regulations to steer the transformation and progress of resource-based cities proves insufficient. It is imperative to comprehend the intricate mechanisms through which environmental regulations shape the economic landscape of these cities. Tailoring regulatory policies to the specific resource endowments, sustainable development capacities, and socio-economic profiles of individual cities is paramount. Such targeted interventions yield a dual dividend: elevating environmental standards while propelling economic growth.

In essence, the journey towards sustainable economic growth for resource-based cities necessitates a nuanced understanding of the interplay between environmental regulations and economic dynamics. By adopting a judicious approach to regulation and embracing tailored policies, resource-based cities can chart a course towards a prosperous, environmentally sustainable future.

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