

Interaction Between Environmental Policies and Economic Growth: Lessons from Developing Countries

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Abstract: As a developing country and the second largest economy in the world, China's rapid industrialization and urbanization have brought remarkable economic development to China, but they have also caused serious environmental problems, including air pollution, water shortage and ecological damage. This paper discusses the positive and negative effects of environmental policies on economic growth, and analyzes the pressure of economic growth on environmental policies. It mainly studies how China can achieve the purpose of protecting the environment while promoting economic growth, and summarizes the experience and lessons. Through the actual case analysis of environmental policies being implemented in various parts of China, suggestions for optimizing policies are put forward. It includes transparency of policy implementation, promotion of public awareness of environmental protection, popularization of environmental education, and promotion of green technology innovation. The purpose of this paper is to summarize the experimental experience so that China can achieve a win-win situation of economic growth and environmental protection, and provide better suggestions for policy making.

Keywords: Environmental Policy, Economic Growth, Environmental Protection, Policy making, Sustainable Energy.

1. Introduction

Environmental policy is the commitment of an organization or government to the laws regulations, and other policy mechanisms concerning environmental issues. And it is primarily concerned with how to manage the relationship between humans and the natural environment in a reciprocal manner. China's environmental policy has undergone a profound change from focusing on pollution control to pursuing ecological civilization and low-carbon travel. China's early environmental policies were mainly used to solve obvious environmental problems, such as the Law on the Prevention and Control of Water Pollution and the Law on the Prevention and Control of Air Pollution promulgated from the end of 1970 to the beginning of 1980, which mainly focused on pollution control and reducing the impact of environmental pollution on people's health. However, with the increasing complexity of environmental problems and the improvement of people's awareness of environmental protection, the policy has gradually changed to comprehensive governance, and actively promoted the development of green economy and ecological system construction. For example, Such policies as the Environmental Protection Law and the Strategic Plan for Ecological Civilization Construction not only set the legal framework for environmental protection, but also put forward specific

implementation strategies to achieve the effect of reducing pollution and improving resource utilization efficiency, promoting green technology innovation and achieving high-quality economic development.

The implementation efficiency of environmental policies in practice is not high, as Yanli Li and Yike Zhang's research suggests. These implementation challenges are revealed by the importance placed on economic growth incentives, the multi-level and fragmented governance structure, and other factors [1]. Furthermore, according to Francesco Ricci, environmental laws can create opportunities and encourage innovation [2]. Simultaneously, Jose Antonio noted that most developing country governments prioritize economic interests, which makes it difficult to enact environmental protection measures. This is the perspective of developing countries. However, the tendency of tension between advancing economic growth and preserving environmental quality can be reversed by assigning environmental policies to development-oriented organizations and integrating environmental protection concerns into the development agenda [3].

The main research scope of this paper is China as a developing country, aiming to summarize these research findings, make proposals for optimizing environmental policies, and develop more effective strategies to achieve coordinated development of economic growth and environmental sustainability.

2. Literature review

2.1. Environmental Policy and Economic Development

In recent years, the severity of environmental problems has attracted wide attention from society and economists. With the increasing severity of environmental problems, especially the externalities caused by pollution and excessive exploitation of natural resources, the necessity of environmental policies is more important [4]. The core of environmental policy is to correct environmental externalities, which are over-exploitation of natural resources and environmental pollution. Effective environmental policy can prevent the economic burden of these externalities on society and promote economic development. But high costs, technological challenges, consumption patterns and the complexity of institutional change are all factors that may affect the effective implementation and enforcement of environmental policies.

In the long run, appropriate environmental policies can enhance ecosystem quality, improve social welfare, and restore damaged ecosystems. These long-term advantages can enhance one's health, standard of living, and ability to sustain natural resources and future output. However, environmental consolidation can result in increased production costs and reduced economic growth in the near run [4]. According to the theoretical framework, environmental policy efficacy plays a major role in driving green growth in the context of green economic growth. Meanwhile, sustainable development and green growth go hand in hand. Effective environmental laws, energy efficiency, and the development of renewable energy sources are necessary for green growth [5].

Therefore, although environmental policies in the world will face many challenges, in the long run, the economic and social benefits brought by environmental policies are significant. Future research should further explore the cost-benefit relationship of environmental policies, and explore how to balance the short-term costs and long-term benefits of policies to promote the sustainable development of green economy.

2.2. New energy technology and sustainable development

As a core driver of economic development, energy has a profound impact on the environment and climate. At present, the global attention to clean energy and sustainable development is increasing. Researchers have carried out profound discussions on how to effectively promote energy transition and carbon dioxide emission reduction. In order to attain sustainable energy development, Poul

Alberg Østergaard suggested several important adjustments, such as cutting emissions, switching to renewable energy sources from fossil fuels for power generation, and enhancing energy efficiency [6]. Global integration of renewables is being propelled by these trends. Even though the share of renewable energy in the world has increased to 29% in recent years from 18% in 2009, fossil fuels still account for more than 70% of the electricity market [7]. Therefore, challenges in the global energy sector remain, especially in terms of technology integration and policy implementation.

Research has indicated that the advancement of renewable energy is primarily driven by considerations such as energy security, cost reduction, emissions reduction, global warming, and climate change [8]. In addition, Khoie thinks that renewable energy is crucial for lowering greenhouse gas emissions and improving energy security, but there are technical issues with its integration with the power industry [9]. Economic policy uncertainty affects how successful environmental policies are at the policy level. Policy instability can also cause policy makers to overlook environmental issues, which lowers the quality of the environment. To produce long-term environmental advantages, clean energy policies must overcome the obstacles presented by policy uncertainty [10].

Thus, while clean energy use is critical to mitigating CO₂ emissions and supporting environmental sustainability, its long-term benefits remain subject to policy uncertainty.

3. Case Analysis

Shenzhen is the most representative city, and many new energy vehicle companies are located in Shenzhen. According to the contents of the 14th Five-Year Plan [11], the Shenzhen government has formulated a series of policy goals and key tasks for the promotion of new energy vehicles and the construction of charging infrastructure. The policies aim to boost the market share of new energy vehicles, improve charging infrastructure, promote technological innovation and establish a sound safety supervision mechanism.

3.1. Policy analysis and Attractiveness

The policy goal of the new policy mentioned that by 2025, Shenzhen plans to increase the proportion of new energy vehicles registered to reach 60% [11], with a total number of 1 million. The number of new energy vehicles in the private sector is also expected to reach 780,000 [11]. Large-scale market demand provides a broad market space and growth potential for new energy vehicle companies. By entering the Shenzhen market, companies can gain significant sales opportunities and position auto brands in this fast-growing market. According to policy incentives, government departments will invest in the construction of 43,000 public and private network fast charging piles and 790,000 basic network slow charging piles to improve the function and layout of charging infrastructure [11]. A perfect charging infrastructure is a key factor in the development of new energy vehicles. Shenzhen has invested heavily in the construction of charging infrastructure and promoted intelligent charging technology, providing a good charging support environment for new energy vehicle companies. This reduces operating costs and improves the ease of use of new energy vehicles, which in turn attracts more companies to invest in Shenzhen. In addition, the policy mentioned that Shenzhen will also provide policy protection for new energy automobile enterprises from the aspect of financial expenditure, through direct funding, loan discount, risk compensation and other ways to support key enterprises in the new energy automobile industry chain. At the same time, the state financial subsidy policy will be implemented to enterprises, and the incentive policies for the construction and operation of charging facilities will be studied and formulated. In addition, the policy content of safety supervision will be improved, and the key enterprises of the new energy automobile industry chain will be supported through direct funding, loan discount, and risk compensation. Such financial support and incentives reduce the financial burden on firms and lower barriers to market entry. Policy

incentives for the construction of charging facilities also help to enhance the market competitiveness of new energy vehicle companies, attracting them to establish production and research and development bases in Shenzhen. We will support research and development and innovation in key areas and core links of new energy vehicles, and promote technological progress and product upgrading.

Government support for technological innovation and R&D provides NEV companies with the necessary resources and platforms to make technological breakthroughs and product upgrades. As a science and technology innovation center, this policy support enhances Shenzhen's attractiveness as a base for R&D and innovation.

3.2. Analysis of the impact of government subsidy mechanism on new energy enterprise vehicles

Take BYD as an example, through the analysis of BYD's financial results in the first quarter of 2023:

Both operating revenue and operating costs increased significantly in January-March 2023 compared to the same period in 2022. The detailed data are as follows in Table 1 [12]:

Table 1: Byd Co., LTD. 2023 Q1 Earnings Statement (Part) [12]:

Title	Jan-Mar(2023)	Jan-Mar(2022)	Rate of Charge	Cause of Charge
Operation Revenue	120,173,608,000	66,825,185,000	79.83%	This is mainly due to the increase in sales of new energy vehicles.
Operating Costs	98,706,595,000	58,537,865,00	68.62%	This is mainly due to the increase in sales of new energy vehicles.

This growth is mainly due to the increased sales of new energy vehicles, which is closely related to the Shenzhen government's policy to promote the use of new energy vehicles in the public and private sectors. The policy has stimulated market demand through subsidies, promotional activities and infrastructure construction, thereby increasing the company's sales revenue in the field of new energy vehicles.

Since 2005, BYD has made a strategy to raise the sales price to 49,800 within five years [13]. This pricing strategy aims to win market share by offering a product that is cost-effective. The actual effect also proved that this strategy did help BYD gain a significant market share in the Chinese market. Policy support from the Shenzhen municipal government has increased the attractiveness of new energy vehicles, especially in terms of subsidies and financial incentives, which provides a good market environment for BYD's cost-effective strategy. Government subsidies reduce consumer purchasing costs, allowing BYD to achieve a win-win situation that ensures price competitiveness and profitability.

The policy has promoted the growth of demand in the new energy vehicle market, and operators will adjust the price of vehicles appropriately according to the low and peak seasons of sales. This flexible way can maintain the competitiveness of different market environments and ensure product sales. At the same time, the operators take into account the particulation of the market environment in Shenzhen and adjust the promotion strategies according to the policy support and market demand in different regions, for example, gift package delivery and price discount, because the implementation of the policy makes these promotion strategies more effective, and the promotion of the policy increases the interest of consumers in new energy vehicles and stimulates the purchase.

4. Discussions

The new energy vehicle market is expanding at a rapid pace, and Shenzhen is also facing double pressure -- on the one hand, economic growth has promoted the demand and sales of new energy vehicles, but this growth has also brought new environmental challenges. The implementation of new energy vehicles has indeed led to the reduction of carbon emissions from vehicle exhaust, which is beneficial to the reduction of air pollution in the city. However, the policy of new energy vehicles is still in the initial stage, although the effectiveness is not significant, and fossil energy vehicles are still the first choice of many people. In order to protect the economic development, the government will also have reservations about the implementation of this policy, how to coordinate the contradiction is still a problem that needs to be solved. Besides, BYD's infrastructure construction and power supply require a lot of resources and energy, and it will still produce a lot of carbon emissions in the process of power generation, which will undoubtedly offset the environmental benefits brought by new energy vehicles. Therefore, policymakers need to promote the development of new energy vehicles while ensuring that the power supply is green and the environmental impact of charging facilities is minimized.

Under the existing environmental and economic policies, Shenzhen needs to continuously adjust and optimize the relevant policies for new energy vehicles. Although the policy advocates vigorously building charging infrastructure, it is necessary to ensure that the energy sources of these facilities are renewable, such as promoting the construction of solar power piles to reduce dependence on traditional electricity. Encourage the end of innovation, especially in power batteries and power systems, improve battery recycling technology and reduce resource consumption in the production process, and further reduce the environmental impact of the full life cycle of new energy vehicles.

Economic growth and environmental protection require comprehensive coordination of reasonable policies, so Shenzhen's policies should not only focus on the promotion of new energy vehicles, but also consider how to achieve win-win results in promoting economic growth and minimizing environmental burden.

In recent years, due to the promotion of environmental protection awareness, public awareness of environmental protection has been improved to a small extent, but it is still necessary to encourage public participation through further environmental education, so that the policy can be more effectively promoted and implemented, and achieve the role of improving social support for environmental protection. Moreover, the promotion of new energy vehicles as green technology is also an important part of pollution reduction, especially air pollution control, which not only reduces a certain amount of carbon emissions, but also lays the foundation for the green transformation of the economy.

Technological innovation and the application of green energy are essential for environmental improvement and sustainable economic development. Experience shows that the improvement of policy transparency, the enhancement of public awareness of environmental protection, the implementation of environmental education, and the promotion of green technology are the keys to improving the effectiveness of the policy. Adjusting and optimizing the policy according to the actual situation will be an ongoing step, and the implementation effect of the policy should be strictly monitored and evaluated.

5. Conclusion

This paper summarizes the relationship between environmental policy and economic development in dealing with pollution problems in recent years. By reviewing the evolution of relevant laws and regulations, we can see that China has made significant progress in environmental protection from early pollution control policies to the current comprehensive treatment strategy. The continuous

optimization of policies not only improves the efficiency of resource utilization, but also promotes the innovation of green technology, ecosystem construction and economic growth.

Nevertheless, this study also reveals challenges in environmental policy implementation, such as the contradiction between economic growth and environmental goals, and the fragmentation of policy implementation, which are undoubtedly manifestations of the inadequacy of the existing policy framework. Future research should focus on improving the efficiency of environmental policy implementation, including improving policy transparency, raising public awareness of environmental protection, and promoting green technologies.

However, the research direction of this paper is still limited and not comprehensive. Future research and practice should continue to explore and optimize environmental governance strategies to ensure that policy measures are effectively implemented to cope with changing environmental issues and promote economic development.

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