

Exploration of Green Development and Sustainable Economic Paths from the Perspective of Environmental Economics

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Abstract. The purpose of this paper is to explore in depth the theoretical foundations, economic impacts and practical strategies of green development and sustainable economic paths from the perspective of environmental economics. The study elucidates the central role of environmental economics in promoting green transition, analyses the multi-dimensional impacts of green development on economic growth, employment, technological innovation and social welfare, and explores the effectiveness of environmental economic policies such as green taxes and carbon trading. Further, the article explores specific strategies for implementing sustainable economic pathways in different economic sectors, and assesses their contribution to enterprise competitiveness and industrial upgrading. Through case studies of green development at home and abroad, the article verifies the effectiveness and sustainability of the application of environmental economics theories in practice. Finally, the article discusses the challenges and future opportunities, and proposes policy recommendations and research directions based on the perspective of environmental economics, with a view to providing references for promoting green development and building a sustainable economic system.

Keywords: Environmental economics; green development; sustainable economic pathways; environmental economic policies.

1. Introduction

As global environmental problems become increasingly serious, green development and sustainable economic paths have become a global consensus. As a discipline that studies the interrelationship between environment and economic development, environmental economics plays a key role in promoting green transformation. The purpose of this paper is to explore the green development and sustainable economic path under the perspective of environmental economics, and to clarify its conceptual framework, theoretical foundation and practical strategies. Green development is not only related to ecological balance and environmental protection, but also an important way to achieve long-term stable economic growth. By analysing the economic effects of green development and the effectiveness of environmental economic policies, this paper seeks to provide theoretical support and empirical references for the construction of a greener and sustainable economic system. At the same time, exploring sustainable economic paths in different economic sectors is of great significance in enhancing the competitiveness of enterprises and promoting industrial upgrading.

2. Theoretical Foundations of Environmental Economics

2.1. Neoclassical Resource Allocation Theory

Neoclassical resource allocation theory is one of the important theoretical pillars of environmental economics. It mainly analyses the efficiency of the market mechanism in resource allocation and provides a theoretical frame of reference for environmental economics. According to neoclassical economics, under the condition of perfectly competitive market, the price mechanism can guide the resources to achieve the optimal allocation, i.e. to reach the Pareto optimal state. However, in the allocation of environmental resources, due to the public nature of environmental resources and externalities and other characteristics, the market mechanism is often unable to play a full role, and therefore requires government intervention and policy regulation.

2.2. Coasean economics

Coasean economics is also one of the core theoretical foundations of environmental economics. Coasean economics emphasises the role of clear property rights in determining the efficiency of resource allocation. The Coase Theorem states that when transaction costs are zero or very low, the market mechanism can lead to an optimal allocation of resources regardless of how initial property rights are defined[1]. However, in the real world, transaction costs are often not zero and may be very high, so the definition of initial property rights has an important impact on the efficiency of resource allocation. In environmental economics, the Coase theorem directs economists' attention to the property rights of environmental resources and how to improve the efficiency of resource allocation through changes in the property rights system.

2.3. Microeconomics and welfare economics

Microeconomics and welfare economics also provide an important theoretical foundation for environmental economics[2]. Microeconomics is concerned with the economic behaviour and economic decisions of individual economic units and how these affect market equilibrium and resource allocation. Welfare economics, on the other hand, is concerned with the maximisation of social welfare, and is based on the theory of marginal utility to analyse the impact of different economic policies and institutions on social welfare. In environmental economics, the theories and methods of microeconomics and welfare economics are widely used to analyse issues such as the use of environmental resources, pollution control and ecological protection.

2.4. Theory of Environmental Resource Values

The theory of the value of environmental resources is also one of the important theoretical foundations of environmental economics. It holds that environmental resources are scarce and valuable and should be included in cost-benefit analyses for economic decision-making. The theory of environmental resource value emphasises reasonable pricing and compensation for environmental resources to reflect their true economic value and social costs [3]. This helps to guide enterprises and individuals to pay more attention to environmental protection and resource conservation in their production and consumption processes.

In summary, the theoretical foundations of environmental economics include neoclassical resource allocation theory, Coasean economics, microeconomics and welfare economics, as well as the theory of environmental resource value. These theories complement and support each other, and together constitute the theoretical framework and research methodology of environmental economics.

3. Economic Analysis of Green Development

As a new economic development model, green development has wide and far-reaching economic effects. This study provides an in-depth analysis of the positive impact of green development on economic growth, and finds that through the promotion of clean energy, energy conservation and emission reduction, and other green measures, it not only reduces environmental pollution, but also stimulates new economic growth points and promotes the optimisation and upgrading of the economic structure. At the same time, green development has significantly contributed to employment growth, especially in green industries and technological innovation, providing more diversified career choices for workers. In terms of technological innovation, green development has promoted the research and development and application of environmentally friendly technologies, accelerating industrial technological progress and transformation and upgrading [4]. In addition, green development has significantly enhanced social welfare, achieving a win-win situation for both economic and social benefits by improving environmental quality and protecting people's health. Therefore, green development is not only an inevitable requirement for environmental protection, but also an effective way to achieve sustainable economic development.



Figure 1. Economic analysis of green development

4. Exploration of Sustainable Economic Pathways

In exploring sustainable economic pathways, this study focuses on the differentiated strategies and practices of different economic sectors. The agricultural sector has reduced the use of chemical fertilisers and pesticides and improved the efficiency of resource utilisation through the promotion of eco-agriculture and recycled agriculture models, achieving a harmonious symbiosis between agricultural production and the ecological environment. The industrial sector, on the other hand, has actively adopted cleaner production technologies, optimised its energy structure, promoted the construction of a green manufacturing system, reduced energy consumption and emissions, and enhanced the competitiveness of enterprises. In the service sector, emerging industries such as green finance and green logistics have been developed to provide strong support for the development of green economy. In addition, this study also analyses in depth the far-reaching impact of sustainable economic paths on enterprise competitiveness and industrial upgrading. Through the implementation of green development strategy, enterprises can not only respond to the market demand for green products and enhance their brand image and market share, but also make breakthroughs in technological innovation and management upgrading to strengthen their core competitiveness. At the same time, the flourishing development of green economy also promotes the optimisation and upgrading of industrial structure, and promotes the transformation of the economy from the traditional mode of high pollution and high energy consumption to the sustainable mode of low carbon, environmental protection and high efficiency. To sum up, the exploration of sustainable economic paths is an important way to achieve green development, which requires us to actively promote green concepts and technologies in all economic sectors and to promote the coordinated development of the economy and the environment.

5. Application of Environmental Economics to Green Development Policy

5.1. Environmental economics perspectives on policy design

Policy design is the primary link in green development policy, and environmental economics provides policymakers with a scientific basis for decision-making through its unique theoretical framework and analytical tools. Environmental economics stresses the internalisation of environmental externalities, i.e., the scarcity and value of environmental resources are fully taken into account in policy design, and the costs of environmental pollution and ecological damage are incorporated into the cost-benefit analysis of economic activities through economic means. This principle guides the formulation of economic incentive policies such as environmental taxes and emissions trading, which aim to guide enterprises and individuals to reduce pollution emissions and conserve resource use through market mechanisms. Environmental economics focuses on the trade-off between long-term benefits and short-term costs. When formulating green development policies, the balance between the long-term ecological benefits of the policies and the short-term economic costs must be fully considered. Environmental economics provides tools such as cost-benefit analysis

and life-cycle assessment to help policymakers quantify the advantages and disadvantages of different policy options, so as to choose the optimal option that can effectively protect the environment and promote economic development.

5.2. Environmental economics approaches to policy assessment

Policy evaluation is an important part of testing policy effectiveness and optimising policy design. Environmental economics uses a series of quantitative analysis tools to objectively and scientifically assess the implementation effects of green development policies. Among them, Environmental Impact Assessment (EIA) and Environmental-Economic Impact Assessment (EEIA) are two commonly used assessment methods; EIA mainly focuses on the direct impacts of policy implementation on the natural environment and ecosystems, while EEIA further extends to the broader impacts on the economic system and social welfare. In the assessment process, environmental economics also focuses on data collection and analysis [5]. Through the establishment of environmental economic models and the use of econometric methods, key indicators such as environmental changes, economic growth, employment status, technological innovation, etc. before and after the implementation of policies are quantitatively analysed in order to assess the actual effects and potential impacts of policies. In addition, environmental economics emphasises the dynamic and continuous nature of policy assessment, i.e., policies should be assessed and adjusted periodically after implementation in order to adapt to new economic situations and environmental changes.

5.3. Application of environmental economics to specific policy instruments

The application of environmental economics in green development policies is also reflected in the design and implementation of specific policy instruments. The following are some common policy instruments and their environmental economics applications:

(1) Environmental taxes

Environmental taxes serve as an economic incentive to induce enterprises and individuals to reduce pollution emissions by raising the cost of polluting behaviour. Environmental economics provides the theoretical basis for the design of environmental taxes, including the determination of tax rates, the selection of taxable objects and the use of tax revenues. Through the implementation of environmental taxes, the win-win effect of environmental protection and increased fiscal revenue can be achieved.

(2) Subsidies

In contrast to environmental taxes, subsidies are an economic incentive for environmentally friendly behaviour. Governments can encourage enterprises and individuals to invest in environmental protection projects and adopt clean energy by providing financial subsidies and tax incentives. Environmental economics analyses the mechanism by which subsidy policies affect different market players and the impact of factors such as the scale and manner of subsidies on the effectiveness of the policies.

(3) Emissions trading

Emissions trading is a market-based environmental management tool that achieves the goal of pollution reduction by allowing enterprises to buy and sell emission rights in the market [6]. Environmental economics provides theoretical support for the establishment and operation of the emissions trading market, including the initial allocation of emission rights, the determination of trading prices and market regulation. An emissions trading system can motivate enterprises to take the initiative to reduce emissions, optimise resource allocation, and promote technological innovation and industrial upgrading.



Figure 2. Emissions trading

Environmental economics plays an important role in the design, assessment and implementation of green development policies. Through its unique theoretical framework and analytical tools, environmental economics provides policymakers with a scientific basis for decision-making and effective policy tools, and strongly promotes the exploration and practice of green development and sustainable economic pathways.

6. Case studies on Green Development

6.1. Domestic Case: Zhejiang Province's "Five Waters" Campaign

(1) Case background and measures

Since 2013, Zhejiang Province has implemented the "Five Waters" campaign, which focuses on sewage treatment, flood prevention, water drainage, water supply protection and water conservation, with the aim of comprehensively improving the quality of the water environment and promoting sustainable economic and social development. This action promotes the protection and management of water resources through government-led, market-operated and public-participation approaches and the comprehensive use of administrative, economic and legal means.

(2) Environmental economics analysis

From the perspective of environmental economics, the "Five Waters" initiative has effectively used environmental and economic policy tools. Through the establishment of special funds and the implementation of measures such as emissions trading, the cost of polluting behaviour has been raised, and enterprises have been incentivised to reduce pollutant discharges. The Government has increased investment in and subsidies for environmental protection projects, guiding social capital into the environmental protection field and promoting the development of green industries. The action also focuses on raising public awareness of environmental protection, and through publicity, education and public participation, it has formed a favourable atmosphere for the whole society to work together to protect water resources.

(3) Effectiveness and Sustainability Assessment

After several years of endeavour, the "Five Waters" campaign has achieved remarkable results, with the quality of the water environment in Zhejiang Province significantly improved and the ecological environment effectively protected. From an economic point of view, although the cost of environmental management has increased in the short term, in the long term, a good ecological environment provides strong support for economic development and promotes the prosperous development of green industries such as tourism and eco-agriculture. At the same time, the action has also enhanced the community's awareness of environmental protection and sense of responsibility, laying a solid foundation for the continued promotion of green development.

6.2. Foreign case: wind energy development in Denmark

(1) Case background and measures

Denmark is a global leader in the field of wind energy, and its share of wind power generation in the country's total power generation is among the highest in the world. The Danish Government has actively promoted the development of the wind energy industry by formulating a series of preferential policies, providing research and development support and building sound infrastructure. In addition, Denmark has established a sound electricity market mechanism to ensure that renewable energy sources, such as wind energy, are prioritised for access to the Internet and reasonably priced.

(2) Environmental economics analysis

The success of wind energy development in Denmark is due to the intelligent use of environmental economics. By providing economic incentives such as tax breaks and subsidies, the Government has lowered the investment costs of wind energy projects and increased their economic efficiency. Denmark has established a sound carbon trading market and levied a carbon tax on fossil energy, which has increased the cost of using fossil energy and further promoted the development of renewable energy such as wind energy. In addition, Denmark also focuses on technological innovation and industrial upgrading, by increasing investment in research and development, training professionals and other ways to continuously improve the competitiveness of wind energy technology and industrialisation level.

(3) Effectiveness and Sustainability Assessment

The rapid development of the wind energy industry in Denmark has not only provided the country with a clean, renewable energy supply, but also promoted economic growth and increased employment. At the same time, the development of wind energy has also effectively reduced greenhouse gas emissions and environmental pollution, making a positive contribution to the fight against global climate change. From the perspective of environmental economics, Denmark's successful experience in wind energy development is highly exemplary and replicable, providing valuable lessons and references for other countries and regions.

Analysing successful cases of green development at home and abroad, it can be seen that environmental economics plays an important role in promoting green development and sustainable economic paths. By comprehensively applying environmental economic policy tools, strengthening technological innovation and industrial upgrading, and raising public awareness of environmental protection, we can effectively promote the realisation of green development and the exploration of sustainable economic paths. In the future, we should continue to deepen the research and application practice of environmental economics and contribute more wisdom and strength to global green development.



Figure 3. Wind energy development in Denmark

7. Challenges and Opportunities

7.1. Challenges faced

(1) Conflict of interest and difficulty of coordination

The implementation of green development often involves multiple subjects of interest, including the Government, enterprises and the public. There are differences and even conflicts in the interests

of different subjects, such as the trade-off between the pursuit of economic benefits and the assumption of environmental responsibility by enterprises, and the public's concern about the improvement of environmental quality and the increase in the cost of living. These conflicting interests increase the difficulty of policy implementation and coordination and require the establishment of a more effective mechanism for coordinating interests.

(2) Insufficient technological innovation and capital investment

Green development relies on the dual drive of technological innovation and financial investment. However, some of the current green technologies are still inadequate in terms of maturity and economy, making it difficult to promote their application on a large scale. At the same time, the long investment return cycle and high risk of green projects have led to a lack of willingness of social capital to invest and a large funding gap. The lack of technological innovation and capital investment has become an important factor constraining green development.

(3) Inadequate policy and regulatory system

Although countries have introduced a series of policies and regulations on green development and sustainable development in recent years, overall there are still problems such as an inadequate system and insufficient implementation. Some regulations lack specific implementation details and supporting measures, making it difficult to effectively implement them; at the same time, the regulatory mechanism is not perfect, making it difficult to effectively punish violations. The inadequacy of the policy and regulatory system limits the in-depth promotion of green development.

(4) Increased international cooperation and competition

In the context of globalisation, the exploration of green development and sustainable economic paths requires the joint efforts of the international community. However, as different countries and regions differ in their stages of development, resource endowments and technological levels, international cooperation faces many challenges. At the same time, as global attention to green development continues to grow, international competition is becoming increasingly fierce, and the question of how to achieve a win-win situation in cooperation and competition has become an urgent issue.

7.2. Opportunities Ahead

(1) Technological progress and industrial upgrading

With the continuous development of science and technology, green technology is gradually maturing and showing great potential. Technological innovations in the fields of new energy, energy conservation and environmental protection, and resource recycling continue to emerge, providing strong support for green development. At the same time, the widespread application of green technologies will promote the transformation and upgrading of related industries and improve the overall greenness and sustainability of the economic system.

(2) Market Demand and Consumption Upgrade

With the increase in public awareness of environmental protection and the change in consumer attitudes, there is a growing demand for green products and services. Consumers' increased preference for green, low-carbon and environmentally friendly products has provided a broad market space for the development of the green industry. In addition, the trend of consumption upgrading has prompted enterprises to pay more attention to the environmental performance and sustainability of their products, promoting the popularity of green production methods.

(3) Policy guidance and financial support

In order to address environmental issues and promote sustainable development, Governments have introduced a series of policy measures and financing arrangements in support of green development. These policies not only provide economic incentives such as tax concessions and subsidies for green projects, but also broaden financing channels through the establishment of green funds and green bonds. The strengthening of policy guidance and financial support has provided a strong guarantee for the in-depth promotion of green development.

(4) International cooperation and experience sharing

In the face of global environmental problems and the challenges of sustainable development, the international community has been cooperating more and more closely in exploring paths to green development and a sustainable economy. Countries are deepening their exchanges and cooperation in green technologies, policies and regulations, market mechanisms and other areas, providing each other with valuable experience and lessons learned. Through international cooperation and experience-sharing, countries can jointly address challenges, share opportunities and promote the process of global green development.

The exploration of green development and sustainable economic paths from the perspective of environmental economics faces many challenges and contains great opportunities. Only by fully understanding and properly addressing these challenges and opportunities can we promote the in-depth implementation of green development and the successful exploration of sustainable economic paths.

8. Conclusions and Recommendations

This study provides an in-depth exploration of the theory and practice of green development and sustainable economic paths from the perspective of environmental economics, revealing the key role of environmental economics in promoting green transformation. It is found that green development not only promotes economic growth, employment increase and technological innovation, but also significantly improves social welfare. In the future, we should continue to deepen the research on environmental economics, optimise the design of green economy policies, and strengthen international cooperation to jointly address the challenges in green development. It is recommended that the government increase green investment, improve the policy system, and guide the flow of social capital to green industries; at the same time, enterprises should actively embrace green transformation, enhance competitiveness, and achieve sustainable development. In addition, it is necessary to strengthen environmental education, raise public awareness of environmental protection, and form a favourable atmosphere for the whole society to participate in green development.

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