

The Impact of Environmental Protection Industry on Economic Development

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Abstract. This study investigates the impact of the environmental protection industry on economic development, with a focus on sustainable practices and green technologies' contributions to economic growth. The environmental protection industry, integral in mitigating pollution and conserving natural resources, plays a pivotal role in sustainable economic development. The research utilizes case analysis to demonstrate the environmental protection industry's effect on GDP, regional development, and its variance in influence between developed and developing countries. Through comprehensive analysis, the paper reveals that investments in environmental protection not only foster job creation and GDP growth but also contribute to long-term economic sustainability by promoting energy efficiency, reducing healthcare costs, and stimulating innovative technologies. The study underscores the importance of integrating environmental sustainability into economic policies to balance growth with ecological preservation. Moreover, the paper delves into the social implications of environmental protection, emphasizing its significance in reducing environmental inequality and enhancing community well-being. Through case studies, including Morocco's renewable energy ambitions and Inner Mongolia's wind power industry, the study illustrates the tangible benefits of environmental protection efforts on employment, energy transition, and economic development.

Keywords: Sustainability; economic development; inequality; environmental industry; Inner Mongolia.

1. Introduction

The environmental protection industry, pivotal in mitigating pollution and preserving natural resources, plays a crucial role in sustainable economic development. In recent decades, heightened global awareness regarding environmental degradation and climate change has spurred significant investments in green technologies and sustainable practices. This shift not only aims to address ecological challenges but also to foster economic growth through the creation of new industries, job opportunities, and innovative technologies. The industry's expansion contributes to a diverse economic base, reducing dependency on environmentally harmful sectors. Moreover, investments in environmental protection can lead to long-term cost savings for businesses and governments by reducing waste, improving energy efficiency, and decreasing healthcare costs associated with pollution-related illnesses. Thus, the environmental protection industry is at the intersection of ecological sustainability and economic resilience, offering a path towards a balanced and sustainable future.

The study of the environmental protection industry's impact on economic development holds profound significance for multiple reasons.

Firstly, it provides insights into how sustainable practices can be integrated into economic policies to achieve growth without compromising environmental sustainability. This is essential for formulating strategies that balance economic expansion with ecological preservation, ensuring long-term sustainability.

Secondly, understanding the economic benefits derived from environmental protection helps to counter the narrative that environmental regulations are detrimental to economic performance. By showcasing successful green growth, the study can encourage businesses and policymakers to adopt more sustainable practices, leading to innovation, competitiveness.

Furthermore, this research can inform global efforts to combat climate change by highlighting the economic opportunities in transitioning to a low-carbon economy. It underscores the potential for environmental protection to drive technological advancements, energy efficiency, and renewable energy adoption, contributing to global environmental goals.

Lastly, the study has social implications, as it emphasizes the role of environmental protection in improving public health and quality of life. By demonstrating the economic advantages of reducing pollution and preserving natural resources in long-run, it advocates for policies that prioritize both economic and environmental well-being, leading to more equitable and sustainable development outcomes.

This paper will use the method of case analysis to show the impact of specific environmental protection industry and its related industries on economic development. Analyze how much GDP this industry accounts for and to what extent it drives regional development and use specific examples and data to show its impact on regional GDP, per capita disposable income, living standards, unemployment levels and inflation. Then, the above analysis method is used to show the differences between developed countries and developing countries in the face of environmental protection industries, and to analyze to what extent environmental protection is beneficial to developed countries and to what extent environmental protection is beneficial to developing countries. Finally, the short- and long-term effects in different situations are analyzed [1].

The primary objectives of researching the impact of the environmental protection industry on economic development include:

To quantify the economic contributions of the environmental protection industry, including job creation, GDP growth, and investment opportunities. This involves assessing the direct, indirect, and induced economic impacts of environmental goods and services.

To examine the effectiveness of environmental policies and regulations in promoting sustainable economic growth. This includes assessing the role of government incentives, subsidies, and regulatory frameworks in fostering an environment conducive to green industry development.

To explore how innovations in green technology contribute to economic development. This involves identifying breakthrough technologies in renewable energy, waste management, water conservation, and pollution control that drive industry growth and competitiveness.

To evaluate how the growth of the environmental protection industry contributes to the mitigation of environmental challenges, such as climate change, air and water pollution, and biodiversity loss. This includes measuring improvements in environmental quality and resource efficiency resulting from industry activities.

To investigate the social implications of the environmental protection industry's growth, including its impact on public health, quality of life, and social equity. This includes studying how the industry's development affects communities, particularly in terms of access to clean air, water, and green spaces.

2. Conceptual Analysis

2.1. Difference between Economic Development and Economic Growth

The economic development refers to process where increases in real per capita output and incomes are accompanied by improvements in standards of living of the population and reductions in poverty, increased access of goods and services that satisfy basic needs, improved gender equality, increasing employment opportunities and reduction of unemployment, and reductions of serious inequalities in incomes and wealth [1]. However, the economic growth refers to that an increase in the potential output of the economy through an increase in the quantity/quality of resources, represented by an outward shift of a country's production possibilities curve (PPC) or a rightward shift of long-run aggregate supply curve (LRAS). So, there is a significant difference between economic development and economic growth.

2.2. The Current Types of Environmental Protection Industry

The environmental protection industry contains many sub-industries, mainly including the following ten.

(1) Environmental technology development involves the innovation and application of environmental technology, such as sewage treatment, waste treatment, soil remediation, etc.

(2) Environmental pollution prevention and control: including technologies and methods to reduce the discharge of pollutants and control pollution sources.

(3) Environmental engineering design and construction: Responsible for the planning and implementation of environmental protection projects to ensure that the project results reach the expected targets.

(4) Environmental protection equipment and instruments: production and sales of mechanical equipment and testing tools for environmental protection treatment.

(5) Environmental information and consulting services: Provide services related to the collection, analysis and management of environmental data.

(6) Renewable resource utilization includes the recovery and reprocessing of by-products and waste generated in production into useful raw materials.

(7) Production of recycled products: The conversion of recycled materials into products with different functions and uses.

(8) Cleaner production technology: Improve the production process to improve efficiency, reduce energy consumption and pollution emissions.

(9) Critical environmental protection related industries: Develop technologies and key components to solve environmental problems.

(10) Environmental protection products and services: including environmental protection materials, environmental protection chemicals and environmental protection technical services.

3. The Impact of Environmental Protection Industries on Inequality

Environmental inequality is one of factor that it makes the inequality in population to be sharper. Environmental inequality means that communities with lower levels of income and education are often more impacted by air, water and noise pollution, as well as climate change. So are the elderly, children and other vulnerable groups. Environmental inequality can exacerbate the distribution of wealth in several ways, leading to a cycle where the poor become poorer and the rich gain more advantages.

Wealthier communities often have better access to clean water, air, and land. Poorer communities, especially in developing countries, frequently live in areas with higher pollution levels, affecting their health and reducing their ability to work or gain education, thus limiting their economic opportunities.

Climate change disproportionately affects poorer regions and communities. Extreme weather events like hurricanes, floods, and droughts can devastate the economies of these areas, destroying homes, infrastructure, and agricultural land. The wealthy, on the other hand, have more resources to recover from such events or can move to less affected areas [2]. In additionally, environmental inequality leads to health disparities, where people in less affluent communities face greater exposure to pollutants, leading to higher rates of diseases like asthma, cancer, and heart disease. This not only affects the quality of life but also imposes financial burdens due to medical costs and lost workdays, further entrenching poverty [3].

Areas with environmental issues often see lower property values, reducing the wealth of residents. Additionally, these areas are less attractive to investors, leading to fewer job opportunities and economic development, perpetuating the cycle of poverty. Children growing up in polluted or hazardous environments may face developmental challenges and have lower educational outcomes, limiting their future employment opportunities and potential for upward mobility.

The financial burden of mitigating environmental damage or adapting to changing conditions often falls more heavily on poorer communities. They may lack the resources to invest in cleaner

technologies or infrastructure improvements, leading to a widening gap between them and more affluent areas that can afford such investments [2].

Environmental degradation can force people to migrate, often leading to loss of livelihoods and increased competition for resources in new areas. This displacement can result in economic instability and increased poverty for the affected populations.

By addressing environmental inequality, not only can we improve health and quality of life for disadvantaged communities, but we can also work towards a more equitable distribution of wealth. Policies that focus on sustainable development, environmental justice, and equitable access to resources are critical in this regard.

One notable example of environmental inequality exacerbating wealth distribution issues is the case of Flint, Michigan, in the United States. In 2014, the city's water source was switched to the Flint River as a cost-saving measure, without proper treatment to reduce corrosiveness. As a result, lead leached from old pipes into the water supply, exposing residents to high levels of lead and other contaminants [4].

Flint, a city where a significant portion of the population lives below the poverty line and which has a large minority community, faced severe public health crises due to the contaminated water. The exposure to lead and other toxins particularly affected children, leading to health and developmental issues that could have long-term economic impacts.

The crisis in Flint underscores how environmental decisions can disproportionately impact impoverished communities, leading to worsened health outcomes and financial burdens. While wealthier areas might have the resources to test and filter their water or even move to another area, the residents of Flint had fewer options available. The long-term effects of the water crisis not only involve health care costs and lost economic productivity but also decreased property values and diminished educational opportunities for affected children, perpetuating a cycle of poverty and limiting economic mobility [4].

This example illustrates how environmental inequality can deepen the wealth divide, affecting not just the current generation but potentially future generations as well.

4. The Impact of Environmental Protection Industries on Energy

With the development of environmental protection industry, the share of clean energy is increasing, while fossil energy continues to decrease. In the coming decades, clean energy will play a more important role in the global energy mix. This will have a profound impact on the global energy supply and demand relationship and the balance of resources.

With the gradual reduction of fossil energy, the demand for clean energy is growing rapidly, and the production, management and service in the energy field will face new challenges. Taking solar power generation as an example, with the continuous maturity of solar technology and the gradual reduction of costs, solar power generation will gradually become the main source of energy. However, due to the instability of solar energy, solar power needs to be stored, and the research and development of energy storage technology needs to be strengthened. Therefore, the development of environmental protection industry will promote the research and application of energy sources such as fuel cells and energy storage technology [5].

Morocco's ambitious goal to shift towards renewable energy, aiming to generate 52% of its power from renewable sources by 2030, is rooted in its current heavy reliance on imported energy, with 90% of its energy needs being met from external sources. The nation's strategy involves tapping into the significant renewable energy potential of the Western Sahara, targeting 20% of its energy mix from solar, another 20% from wind, and 12% from hydropower [6].

The Western Sahara, a territory with contested sovereignty, is considered to have high potential for renewable energy production, contributing significantly to Morocco's targets, with projections indicating it could provide up to 47% of wind and 32% of solar energy for Morocco by 2030 [6]. However, this plan has sparked controversy and allegations from Saharawi organizations, who argue

that the installation of solar and wind farms in the Western Sahara infringes upon international humanitarian laws that safeguard civilian populations in occupied territories. They assert that Morocco's renewable energy projects in the region are not only a breach of these laws but also detrimental to peace initiatives, viewing the expansion of green energy production as a means for Morocco to legitimize its presence in the territory.

The situation escalated in November 2020 when the exploitation of Western Sahara's natural resources was cited as a trigger for armed conflict, thereby ending a ceasefire brokered by the UN in 1991 that had laid the groundwork for a referendum on the independence of the local Saharawi people. This issue has garnered attention at an international level, including from the African Union and the African Commission on Human and Peoples' Rights, and was also recognized in a 2015 judgment by the General Court of Justice of the EU concerning trade agreements between the EU and Morocco [7].

Morocco's endeavors in renewable energy are not only significant on a regional scale but also have implications globally, as the country seeks to position itself as a renewable energy leader and attract international investment. This includes plans to export renewable power to Europe and Africa, highlighted by the existence of two electricity cables to Spain and proposals for an undersea connection to the UK. With substantial support from international donors, notably Germany, Morocco has secured significant funding for its climate and renewable energy projects, emphasizing the complex.

5. How does Economic Growth Target Affect Corporate Environmental Investment?

The relationship between economic growth targets and corporate environmental investment is multifaceted and can manifest in various ways, depending on several factors including government policies, market demands, and societal expectations. Here are some key points to consider:

5.1. Regulatory Environment

When economic growth targets set by governments emphasize sustainability and environmental protection, they often implement regulations that encourage or mandate corporate investment in environmentally friendly practices and technologies. This can include tax incentives for green investments, penalties for excessive pollution, or requirements for environmental impact assessments for new projects.

5.2. Market Pressures

Companies may also respond to market demands and pressures related to sustainability. As consumers become more environmentally conscious, businesses that invest in eco-friendly practices can gain a competitive edge. This consumer-driven demand can lead companies to allocate more resources to environmental initiatives, even if such investments are not explicitly mandated by economic policies [8].

5.3. Cost Savings and Efficiency

In some cases, environmental investments can lead to long-term cost savings for corporations. For example, investing in energy-efficient technologies can reduce operational costs over time. When economic growth strategies prioritize efficiency and innovation, companies might be more inclined to invest in these environmentally beneficial technologies.

5.4. Reputational Benefits

Corporations may invest in environmental initiatives as part of their corporate social responsibility (CSR) strategies to enhance their reputation among consumers, investors, and other stakeholders.

This can be particularly important in economies where growth is closely tied to international trade and investment, as global partners may favor companies with strong environmental credentials [8].

5.5. Financial Markets

The growing emphasis on sustainable finance and the rise of ESG (Environmental, Social, and Governance) investing can influence corporate behavior. Companies in economies targeting growth through sustainable development may find it easier to access capital if they demonstrate a commitment to environmental stewardship [8].

5.6. Technological Innovation and Transition

Economic growth targets that focus on innovation and technological advancement can spur investments in green technologies. This can lead to the development of new products and services that reduce environmental impact, such as renewable energy, electric vehicles, and sustainable materials.

5.7. Potential Conflicts

It's important to note that not all economic growth targets are aligned with environmental sustainability. In some cases, aggressive growth objectives can lead to increased resource extraction and pollution, unless specific measures are put in place to mitigate environmental impact. In such scenarios, corporate environmental investment might be deprioritized in favor of short-term economic gains.

6. Case Study: The Impact of Inner Mongolia Wind Power Industry on Inner Mongolia's Economic Development

The gross domestic product (GDP) of Inner Mongolia reached 1,688.2 billion yuan in the first three quarters of 2023, up 7.2 percent year on year, according to Wang Chuanjing, deputy director of the statistics Bureau of the Inner Mongolia Autonomous Region, at a press conference on economic performance in the first three quarters of 2023 on Oct 20 [9].

From the perspective of industrial structure, the added value of the primary industry was 82.3 billion yuan, an increase of 7.4%. The added value of the secondary industry was 837.7 billion yuan, up 8.2 percent year on year. The added value of the tertiary industry was 768.2 billion yuan, up 6.3 percent year on year [10].

With its vast territory, Inner Mongolia has the unique conditions to build a large renewable energy power generation base with concentrated wind power and solar energy. According to the data, Inner Mongolia has 57 percent of the country's wind energy resources, and the technology can be developed to reach 1.46 billion kilowatts [10]. In recent years, with the continuous increase of wind power installed capacity, Inner Mongolia's wind power generation has also maintained sustained rapid growth. In 2022 alone, the wind power generation of industrial enterprises above designated size in the region reached 101.99 billion KWH, which is the first time that the wind power generation in the region exceeded 100 billion KWH, an increase of 8.8 percent over the previous year (see Fig. 1).

To promote high-quality development in Inner Mongolia, The State Council on Oct. 16 issued a guideline on supporting the construction of a major demonstration project for a new power system in Inner Mongolia. This initiative will further encourage Inner Mongolia to carry out new energy microgrid applications, providing strong support for Inner Mongolia's energy transformation and sustainable development.

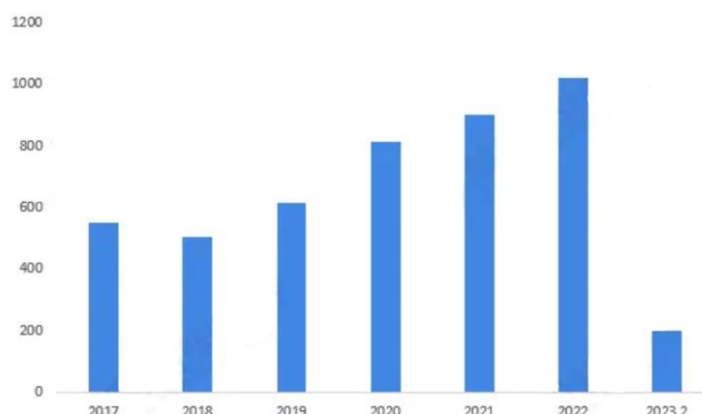


Fig. 1 Wind power generation in inner Mongolia Autonomous Region from 2015 to 2023 (unit: billion KWH)

Located on the northern edge of China, the Inner Mongolia Autonomous Region is a region with vast territory and diverse geographical features. The following geographical features make Inner Mongolia an ideal location for wind power generation:

Most of Inner Mongolia consists of vast grasslands, plains and plateaus, which provide ample space for the construction of large wind farms. The topography of these open areas reduces ground friction and contributes to an increase in wind speed, thus improving the efficiency of wind power generation. Inner Mongolia, especially its western and northern regions, has ideal wind resources due to its unique geographical location and topography [8]. The average wind speed in these areas is high and the wind is consistent, which is very suitable for wind power generation. Most areas of Inner Mongolia belong to the temperate continental climate, with four distinct seasons, especially strong wind in winter and spring, and rich wind energy resources. The population density of Inner Mongolia is low, which means that the human factor is relatively small in the site selection and construction of wind farms, which is conducive to the promotion and development of wind power projects. In view of the huge potential of wind energy, the government of Inner Mongolia has given policy and financial support and encouragement to wind power generation, further increasing the potential of wind power development in the region.

6.1. The impact of the wind power industry on fossil fuel use in Inner Mongolia

With a total investment of 4.7-billion-yuan, Inner Mongolia Energy Alukhorqin million-kilowatt wind storage base project officially started. As the third batch of national new energy large-scale wind power base construction projects approved by the National Development and Reform Commission and the National Energy Administration, after the project is put into operation, the average annual power generation hours are 2,791 hours, the online power is 2,791 billion KWH, the operating income is 749 million yuan, and the annual standard coal can be saved by 844,000 tons and the carbon dioxide emissions can be reduced by 3.34 million tons [8].

Inner Mongolia is a hot land for wind power development and construction, with 1.46 billion kilowatts of wind energy resources, accounting for about 57% of the country's total. In recent years, relying on the abundant wind energy resources granted by nature, Inner Mongolia has stepped up the construction of wind power projects and focused on building a whole industry chain base for wind power equipment manufacturing. According to the plan, during the "14th Five-Year Plan" period, Inner Mongolia should form an annual output of more than 8 million kilowatts of wind power machines and parts production capacity. Not long ago, the first batch of 216 fans of the 6-million-kilowatt demonstration project of Ulanqab wind Power Base was completed.

This is the first million-kilowatt national large-scale scenery base project in Ulanqab city, with an installed capacity of 1.2 million kilowatts and supporting the construction of 180,000 kilowatts / 2-hour energy storage power station. After the project is put into operation, it is expected to reduce the

annual standard coal consumption of 1.2 million tons, smoke emissions of 1,500 tons, sulfur dioxide emissions of 9,000 tons, and carbon dioxide emissions of 3 million tons.

6.2. Employment

The example of the wind power industry in Inner Mongolia providing direct employment to 47,065 people is a quintessential demonstration of the positive impact of the environmental industry on the job market [4]. This not only showcases the potential of the environmental sector in boosting employment but also reflects its crucial role in driving economic transformation and achieving sustainable development goals. The creation of job opportunities, skill training and knowledge transfer, economic growth and diversification, and the dual benefits of social and environmental well-being illustrate the substantial influence of such industries. Moreover, successful cases in the green sector can inspire more investments in green technologies and services globally, leading to an increase in green job opportunities. Overall, the wind power industry's contribution to employment in Inner Mongolia highlights the immense potential of the environmental sector in promoting employment, economic development, and environmental protection, bringing economic benefits to the local area while contributing to global sustainable development objectives.

7. Conclusion

The document explores the intricate relationship between the environmental protection industry and economic development, emphasizing the dual focus on ecological sustainability and economic resilience. It begins by establishing the significance of the environmental protection industry in promoting sustainable economic growth, highlighting its role in mitigating pollution, conserving resources, and fostering innovation and job creation. The document outlines the necessity of integrating sustainable practices into economic policies, debunking the notion that environmental regulations hinder economic performance, and showcasing the potential for green growth.

The analysis proceeds to examine various aspects of the environmental protection industry, including technological innovation, policy effectiveness, and the social implications of environmental protection efforts. It underscores the importance of the industry in addressing global challenges such as climate change, pollution, and biodiversity loss, while also improving public health and quality of life.

The document delves into the distinction between economic development and growth, illustrating how environmental protection initiatives contribute to a more holistic form of development that includes improved living standards and reduced inequality. It categorizes the environmental protection industry into sub-sectors like technology development, pollution prevention, and renewable resource utilization, among others.

A critical examination of environmental inequality reveals how it exacerbates wealth disparities, with poorer communities disproportionately affected by pollution and climate change. This section highlights the need for policies that prioritize sustainable development and environmental justice.

The impact of the environmental protection industry on energy is discussed, with a focus on the shift towards clean energy and the challenges and opportunities this presents. A case study on Morocco's renewable energy ambitions in the Western Sahara exemplifies the complex interplay between environmental initiatives and geopolitical considerations.

The document also addresses the relationship between economic growth targets and corporate environmental investment, exploring how regulatory environments, market pressures, and technological innovation influence corporate strategies towards sustainability.

A specific case study on Inner Mongolia's wind power industry illustrates the tangible economic benefits of environmental protection efforts, including GDP growth, job creation, and reductions in fossil fuel use and emissions. The document concludes by reinforcing the positive impact of the environmental protection industry on employment and economic development, advocating for increased investment in green technologies and practices.

Overall, the document provides a comprehensive analysis of how the environmental protection industry not only contributes to ecological preservation but also serves as a vital engine for sustainable economic development.

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