

A Brief Analysis on Emerging Economies Roles, Contributions, Challenges in Environmental Governance: Based on the Case of China and India

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Abstract: With the rapid advancement of industrialization and urbanization, environmental issues have become a major challenge restricting global sustainable development. The main research objective of this article is to explore how China and India play a role in environmental governance as two emerging economies, in terms of economy, policy and regulations, technological innovation, international cooperation, and social humanity. Adopting case study as methodology, this article provides a detailed description of the development status of the above-mentioned aspects in both countries, including measures, achievements, and limitations. Finally, a discussion is proposed to briefly analyse the causes of the current environmental governance context in both countries. Research has found that both countries have made significant efforts to balance environmental issues caused by rapid economic development and promote sustainable development. However, in terms of achievements, China has been more notable. In addition to reflecting on the current situation of environmental governance in China and India, this article can also provide reference ideas for environmental governance issues worldwide.

Keywords: Emerging economies, environmental governance, environmental protection, pollution prevention, green innovation.

1. Introduction

Nowadays, more and more developing countries emerge on the international stage as vital contributors to global affairs. The reasons behind this can be related to the rapid economic growth of the developing countries, which are also known as the so-called emerging economies. Thanks to their progressive improvement and expansion on an economic scale, there is an inevitable increase on their discourse power. Against the backdrop of profound adjustments in the global economic landscape and increasingly severe global environmental issues, emerging economies, as important forces in the global economy, have received widespread attention from the international community for their role and contribution in the environmental governance system. Climate change, air pollution, water scarcity, and loss of biodiversity not only threaten the human living environment, but also pose a severe challenge to the stable development of the global economy and society. Faced with this global challenge, countries are strengthening environmental governance and exploring the construction of a

more equitable, effective, and collaborative global environmental governance system. As representatives of emerging economies, China and India also face severe environmental problems in their development process. However, both governments attach great importance to environmental protection and have taken a series of positive measures to strengthen environmental governance, achieving significant results. China has effectively improved environmental quality and provided valuable experience for global environmental governance by implementing measures such as ecological civilization construction, promoting green and low-carbon development, and strengthening environmental supervision and law enforcement [1]. India has continuously improved its environmental governance capabilities by strengthening environmental legislation, promoting clean energy, and implementing an environmental public interest litigation system, setting an example for developing countries [2].

This article aims to analyse in depth the roles played by China and India, two representative emerging economies, in the environmental governance system, and explore how they contribute wisdom and strength to global environmental governance through economic reconstructing, policy formulation, technological innovation, international cooperation, as well as humanity factors including public awareness or social customs. Moreover, this article would also discuss the reasons behind the situations, and the challenges and trends that two countries need to tackle with. Firstly, this article will review the policy frameworks and practical experiences of the two countries in environmental governance and explore how they can promote the improvement of the environmental governance system through policy innovation. Secondly, this article will analyze the performance and contributions of the two countries in international environmental governance cooperation and explore how they can work together with other countries to address global environmental challenges. Finally, this article will focus on the progress and achievements of the two countries in environmental governance technology innovation and explore how they can improve the efficiency and effectiveness of environmental governance through technological innovation.

Through the research in this article, it is hoped to gain a more comprehensive understanding of the important position and role of emerging economies such as China and India in the global environmental governance system, and provide useful references for building a more fair, effective, and collaborative global environmental governance system. At the same time, it is also expected that this study can stimulate more academic discussions and practical explorations on environmental governance in emerging economies, and jointly promote the progress and development of global environmental governance.

2. Comparative Case Study and Analysis

As two representative countries, China and India are selected as case and make comparison with each other.

2.1. Case of China

China has demonstrated exemplary role in environmental governance, but there are still shortcomings.

2.1.1. Economic Restructuring and Industry Upgrading in China

Before the supportive impact according to the fast-growing economy, it is inevitable that challenges have been brought. An increasing in energy consumption and widespread environmental damage was caused by economic growth [3]. In the early stages of economic development, China needed a large amount of natural resources as support, which led to excessive exploitation and consumption of resources, resulting in environmental damage such as deforestation and overexploitation of water resources. At the same time, with the acceleration of industrialization and urbanization, the emissions

of pollutants such as exhaust gas, wastewater, and solid waste have significantly increased, causing serious air pollution, water pollution, and soil pollution. Therefore, resource depletion, ecological imbalance, and environmental pollution have become important challenges facing China's environmental governance. China needs to seek a solution that can meet its development needs while balancing sustainable development.

China is committed to building a green, low-carbon, and circular economic system, and reducing pollutant emissions through measures thus promoting green and low-carbon development. However, the green economic transformation adopted by China has greatly promoted its environmental governance. In the green economy system, the effective utilization and recycling of resources are emphasized, aiming to develop a circular economy model to convert waste into resources, reduce natural resource consumption and environmental pollution. For example, measures such as improving resource utilization efficiency and promoting clean production technologies can be taken to reduce pollution emissions during the production process. The green economy transformation advocates the use of renewable and clean energy sources such as solar and wind power to reduce dependence on traditional fossil fuels. By developing sustainable energy, reducing greenhouse gas emissions, and mitigating the impact of air pollution and climate change on the environment. In addition, the transformation of green economy requires accelerating the transformation of industrial structure, optimizing and upgrading traditional industries, and developing emerging industries. By phasing out high polluting and high energy consuming industries and encouraging the development of low polluting and low-energy green industries, we can reduce the generation of pollutants from the source. Thanks to the vigorous green industry development, green industries such as energy conservation, environmental protection, and clean energy cultivating new economic growth points.

China's economic development initially caused a certain degree of damage and pollution to the environment, but with the promotion of green economy transformation and the strengthening of environmental governance, significant achievements have been made in environmental governance. The transformation of green economy not only promotes the efficient utilization of resources and the development of sustainable energy, but also promotes the optimization and upgrading of industrial structure and the improvement of environmental protection laws and regulations. In the future, China will continue to adhere to the concept of green development, strengthen environmental governance, and achieve sustainable economic and environmental development.

2.1.2. Rules and Regulations in China

In recent years, the Chinese government has shown its strong support by introducing a series of environmental protection laws and regulations, such as the Environmental Protection Law and the Air Pollution Prevention and Control Law, providing a solid legal foundation for environmental governance [4]. Firstly, the Environmental Protection Law stipulates the responsible institutions for environmental supervision and management at various levels at the institutional level. Specific supervisory institutions include the environmental protection department of the State Council, the environmental protection department of local people's governments at or above the county level. It also clarifies the responsibilities and roles of the state in managing the environment, as well as the legal responsibilities and accountability procedures for illegal acts that harm the environment. To ensure the effective implementation of environmental protection work.

At the citizen level, the government has increased daily propaganda, emphasizing that all units and individuals have the obligation to protect the environment and the right to supervise and report acts of pollution and environmental destruction. At the same time, the government advocates the concept of green consumption, promotes recycling, and encourages reducing the damage caused by daily life to the environment. At the social level, China has adopted economic and technological policies and measures that are conducive to conserving and recycling resources, protecting and improving the

environment, and promoting harmony between humans and nature, to coordinate economic and social development with environmental protection.

As for the environmental pollution and other public hazards that have already been caused, relevant government departments will impose penalties in accordance with the law and take measures to control and restore them. For enterprises, institutions, and other producers and operators, they also have responsibilities to fulfil, such as conducting environmental impact assessments, obtaining pollutant discharge permits. For illegal discharge of pollutants and other behaviors, they need to pay legal responsibilities, including fines, detention, and other punishment measures. In addition to a relatively complete punishment mechanism, the Chinese government has also proposed a reward mechanism, including financial subsidies and social incentives for units and individuals who have made significant achievements in protecting and improving the environment.

2.1.3. Technologies and Innovation in China

Innovation is not just a simple concept about upgrading and improving. Innovation encompasses the transversion from product to the process of applying the product, to marketing, and ultimately, the completion of organizational innovation that can cover the old industry chain. China's current green innovation is in a flourishing stage, covering multiple fields such as renewable energy, environmental protection technology, green buildings, and green transportation. In recent years, China has made significant achievements in promoting green innovation, with increasing cooperation between the government, enterprises, and research institutions to jointly promote the research and application of green technologies. At the same time, consumers' demand for environmentally friendly products is constantly increasing, further promoting the development of green innovation. Also, in terms of policy support, the Chinese government has introduced a series of policy measures to encourage green innovation, including financial support, tax incentives, providing a favorable policy environment for green innovation. In addition, China actively participates in international green innovation cooperation and works with other countries to promote the development of global green innovation.

An outstanding example of green innovation in China is how China has filled the funding gap for environmental protection technologies such as carpet technology through new financing methods [5]. Firstly, China is fully capable of helping to provide and expand low carbon technologies and cultivating new industrial chains for emerging and developing economies. As a major trading partner of many countries around the world and one of the fastest green transformation countries in the global supply chain, China has set financing targets for itself at different stages and established special loan tools in relevant banks to support technological innovation, technological transformation, and equipment updates. China's journey of green innovation has begun, with commercially viable technology in its early stages, innovative green financial products, and clear signs of changing investor preferences. Through new mechanisms, China is not only able to expand its innovation chain, but also more likely to build a broader innovation ecosystem.

2.1.4. International Cooperation

China actively participates in the construction and reform of the global environmental governance system and works together with other countries to address environmental challenges. By carrying out environmental governance international cooperation projects with multiple countries, China has jointly promoted the global environmental governance process as an inevitable player.

China actively participates in relevant conferences and forums on global environmental governance, such as the China Japan Korea Environment Ministers' Meeting and the Forum on Promoting Global Ecological Civilization Construction (Erhai Lake). At these meetings, China and other countries jointly discuss environmental policies, share governance experiences, and promote

regional and global environmental cooperation. China has signed and implemented multiple international environmental agreements, such as the Paris Agreement, the Montreal Protocol, and its Kigali Amendment.

The signing of these agreements reflects China's commitment and contribution to global environmental governance. By promoting the green 'the Belt and Road' construction, China has strengthened cooperation with countries along the Belt and Road in the field of environmental protection. This includes jointly carrying out ecological protection projects, promoting clean energy cooperation, and strengthening environmental policy dialogue. China's conceptual frameworks, strategies, and practices support the high-quality development of the Belt and Road Initiative and serve as a powerful catalyst for improving international cooperation [6].

2.1.5. Humanity Factors

With the improvement of education level and the popularization of environmental protection propaganda, the environmental awareness of the Chinese public is gradually increasing. This change has prompted the government to pay more attention to the public's needs and expectations for environmental policies, and to formulate environmental policies that are more in line with public opinion. The Chinese government also focuses on environmental education and cultural heritage, promoting environmental knowledge and concepts through school education, media publicity, and other means. These measures help cultivate citizens' environmental awareness and sense of responsibility and promote the participation of the whole society in environmental governance.

Public activism and observation can relieve local governments of some of their oversight responsibilities while still enabling them to achieve their goals, provided they receive sufficient backing [7]. By lowering governance costs and increasing policy flexibility, public participation promotes cooperative equilibrium, particularly when long-term goals of reputational effects and environmental tax reform are accepted.

2.2. Case of India

The Indian government is also trying to adjust its complex condition by existing and novel means.

2.2.1. Economic Restructuring and Industry Upgrading in India

Indian government is also making efforts to adjust the industrial structure, promote the development of manufacturing and service industries, to reduce the pressure of agriculture on the environment. The Indian economy has achieved a leap from agriculture dominated to service dominated, and the proportion of added value in the service industry has significantly increased. This transformation helps to reduce direct pollution to the environment, as the service industry typically has lower resource consumption and emissions compared to the manufacturing industry. The rapid development of India's service outsourcing industry, especially software service outsourcing, has become an important driving force for the economy. This not only promotes economic growth, but also reduces dependence on traditional industries, indirectly promoting the maturity of environmental governance technology and related fields such as digital environmental monitoring. Although the proportion of manufacturing in India is not high, the government is actively promoting the upgrading and transformation of the manufacturing industry to improve resource utilization efficiency and reduce pollution. The Indian government encourages businesses to adopt more environmentally friendly production technologies and processes to achieve green manufacturing through initiatives such as 'Make in India', which intended to transform the manufacturing industry by improving the business environment, promoting manufacturing development through infrastructure and skills development, and ultimately through foreign direct investment in key target industries [8].

At the level of industrial upgrading, India has made significant progress in the research and application of green technologies, such as renewable energy technologies, energy-saving technologies, and environmentally friendly materials. The application of these technologies helps to reduce industrial pollution and energy consumption, promoting sustainable economic development. Moreover, the Indian government is increasing investment in green infrastructure, such as public transportation systems, green buildings, and renewable energy facilities. The construction of these facilities not only helps improve environmental quality, but also enhances the quality of life for residents.

Despite significant progress in environmental governance in India, environmental quality still faces challenges. This is mainly due to the environmental pressure brought about by India's rapid economic growth and the lagging infrastructure. India faces the same dilemma as China that there is an obvious conflict between the enlarging needs to developing and the damaging to the environment, thus making India a rapidly growing carbon dioxide emitting economy [9]. However, with the widespread application of green technology and the continuous improvement of green infrastructure, India's environmental quality is hopefully expected to be further improved.

2.2.2. Rules and Regulations in India

The Indian government has taken a series of legislative measures in environmental governance to address the issues of overexploitation and pollution. The principle of environmental protection is explicitly included in the Indian Constitution, and other provisions also indirectly involve environmental protection. The Indian government has also formulated multiple environmental policies and plans, such as the National Clean Air Program, aimed at reducing pollution and improving environmental quality. The Indian Ministry of Environment has also proposed a new waste management plan to eliminate the previously set time limit targets and fund innovative environmental concepts. At the same time, the Central Pollution Control Board (CPCB) of India is responsible for ensuring that states implement rules for handling various types of waste and developing management information systems for tracking electronic waste. The Indian government has also established a monitoring committee to oversee the implementation of environmental regulations and take follow-up actions to promote actions in various states.

Regardless of all the efforts and progress in environmental legislation, there is still a need to strengthen policy implementation and regulation to ensure the practical effectiveness of laws and regulations. For example, multinational corporations (MNCs) are frequently granted operating space by Indian governments, but the state often fails to evaluate the effects these corporations have on the local population [10]. Due to its complex legal environment, unstable policies, and frequent tax reviews, India also faces challenges when cooperating with multinational corporations. Multinational companies find it difficult to achieve expected profits in the Indian market, and even need to 'reverse subsidy' for a long time to gain market share. The protectionist policies implemented by the Indian government have also limited the production and operational efficiency of multinational corporations, exacerbating business risks and uncertainties.

2.2.3. Technologies and Innovation in India

India pays attention to the introduction of foreign advanced technology in environmental governance technology and carries out local innovation in combination with its own reality.

India has made significant progress in technological innovation in the field of clear energy to reduce dependence on fossil fuels and lower greenhouse gas emissions. For example, in the fields of solar and wind energy, India is developing higher wattage solar panels and higher megawatt wind turbine technologies to reduce unit power generation costs and improve power generation efficiency.

In the field of green hydrogen, India is also exploring innovative financing mechanisms and new opportunities for technological development cooperation.

At the same time, in terms of policy framework, the Indian government has announced the development of a 'Green Steel Policy Framework' and is considering including green steel products in government public procurement, which will help promote the green transformation and sustainable development of the Indian steel industry [11]. The Indian Ministry of Steel has established a special working group to define the concept of 'green steel' and develop benchmarks, certification, and monitoring rules for measuring carbon emissions from steel plants. Hopefully, India is also exploring other green innovation initiatives, such as promoting the development of electric vehicles and establishing green supply chains. These measures will help reduce carbon emissions and promote sustainable development of the Indian economy. Just to noted that, to meet growing energy demands and distinguish economic growth from greenhouse gas emissions, the Indian government must prioritize green technologies in addition to green energy generation [12].

2.2.4. International Cooperation

India also recognizes the importance of international cooperation in environmental governance and actively participates in international environmental cooperation and exchanges, such as the United Nations Framework Convention on Climate Change and the Paris Agreement. These agreements provide a platform for India to collaborate with other countries in addressing climate change and environmental pollution.

Drawing on the successful experiences and practices of other countries including China and other developed countries from the Global North, India has made improvement in environmental governance and combining experiences and lessons from other countries with the actual situation. For example, China and India have carried out technical exchanges and project cooperation in renewable energy fields such as solar and wind energy, jointly promoting the development of green energy. China has also actively helped India develop renewable energy projects, improve energy efficiency and reduce carbon emissions through South-South cooperation and the green 'the Belt and Road' initiative [13]. India has also had exchanges and financial exchanges with countries such as the United States and Europe in areas such as climate change and clean energy. These collaborations not only help India introduce advanced environmental protection technologies and management experience, but also provide necessary financial support, promoting the deepening of India's environmental governance work.

2.2.5. Humanity Factors

Indian society is highly diverse and inclusive, with people from different social classes, religions, and regions having varying needs and expectations for environmental policies. This diversity requires the government to fully consider the interests and needs of all parties when formulating environmental policies, to achieve fair and sustainable environmental governance.

The Indian government also emphasizes grassroots participation and environmental practices, encouraging grassroots forces such as communities and non-governmental organizations to participate in environmental governance. This participatory governance model helps to enhance the public's environmental awareness and sense of responsibility and promote the implementation of environmental policies [14].

2.3. Discussion

As the economic foundation determines the superstructure, poverty can exacerbate environmental degradation through various channels [9]. In terms of production, the poor are more inclined to exploit

forests in an unsustainable way. At the same time, the lack of education for the poor indirectly leads to their awareness not being significantly improved even though calls from the government and relevant institutions are strong. The contributions and efforts made by China and India in environmental governance are practical, their specific effects will still be affected by different national conditions. In the comparative study of the two cases, it is not difficult to find that China is slightly ahead of India in various aspects, which is closely related to its domestic political and economic factors including Gross Domestic Product (GDP), poverty alleviation level, leadership changes, openness, as well as geographical factors such as terrain, land area, population density.

The Chinese government regards environmental protection as an important issue for national development, has formulated multiple environmental policies and laws, and strictly enforces them. It is worth acknowledging that the Chinese government's investment in environmental pollution control continues to grow, providing solid guarantees for the construction of ecological civilization. China has implemented action plans for the prevention and control of air, water, and soil pollution, and comprehensively promoted environmental governance through various means such as industrial structure adjustment, energy structure optimization, and motor vehicle pollution control.

Although the Indian government has also proposed some environmental protection plans and goals, compared to China, the implementation is relatively weak and lacks effective integration and implementation mechanisms. Moreover, the high cost of environmental governance poses a huge challenge to India's fiscal capacity and government administrative efficiency, resulting in insufficient investment and practical actions in environmental protection. Considering the occasional political instability in India, the negative impact of political struggles between local and national leaders on addressing environmental issues such as haze control cannot be ignored.

3. Conclusion

Overall, there are significant differences between China and India in environmental governance. China has achieved significant environmental governance results through the government's high attention, huge investment, multiple governance measures, and increased public awareness. However, India faces challenges such as insufficient implementation, financial pressure, political influence, and low public awareness, resulting in relatively limited effectiveness in environmental governance. However, it is worth noting that environmental governance is a long-term and complex process that requires joint efforts from governments, businesses, and the public to achieve sustained and stable progress. Other countries, both the developed and the developing groups, should learn the lessons from the two countries' cases since the Sustainable Development Goals (SDGs) are set for all human beings and our mother Earth.

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