

Name: Owais Ibin Hassan

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Supervisor name: Prof. Shahid Ashraf

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Findings

This study extensively examines the complex interplay between economic development and environmental sustainability in India. The findings highlight the significant impact of trade, financial development, and agricultural practices on pollution levels, reinforcing the urgent need for policy interventions that balance economic growth with environmental protection.

The study confirms a positive correlation between trade openness and CO₂ emissions in India. Trade has accelerated economic growth by facilitating industrial expansion and technology transfer. However, it has also increased energy consumption and pollution, primarily due to the expansion of industries and transportation networks. Urban population growth and domestic investments were also found to be significant contributors to increased emissions, emphasizing that trade-driven economic gains often come at an environmental cost.

The validation of the Pollution Haven Hypothesis (PHH) in the Indian context reveals that foreign direct investment (FDI) flows into the country have significantly increased CO₂ emissions. Industries such as chemicals, petrochemicals, cement, iron, steel, and automotive sectors contribute substantially to environmental degradation. Both short-term and long-term analyses confirm that India attracts polluting industries due to relatively lenient environmental regulations and lower production costs compared to developed nations. This underscores the necessity for stringent environmental policies and robust enforcement mechanisms to mitigate industrial pollution.

The study further establishes a strong positive relationship between financial development and air pollution. While an efficient financial system is crucial for economic expansion, it inadvertently incentivizes practices that contribute to environmental degradation. Increased access to financial resources has stimulated industrial activities and consumer spending, leading to higher emissions. The findings emphasize the importance of integrating green financing mechanisms and sustainable investment practices to counteract the environmental downsides of financial development.

Agricultural practices in India also significantly contribute to environmental pollution. The Green Revolution, while enhancing agricultural productivity, has led to substantial environmental challenges, including soil degradation, excessive fertilizer use, and crop burning. These practices contribute to greenhouse gas emissions, particularly carbon dioxide and nitrous oxide. The study confirms that agricultural activities have a direct and substantial impact on

pollution levels, necessitating a shift towards sustainable agricultural practices such as organic farming, precision agriculture, and improved crop residue management.

The study highlights several policy implications crucial for achieving sustainable development in India. Energy efficiency measures, including the adoption of renewable energy sources and clean technologies, are necessary to reduce dependence on fossil fuels. Strengthening environmental regulations and enforcement mechanisms can curb industrial emissions and ensure compliance with sustainability goals. Additionally, promoting sustainable agricultural practices through financial incentives, education, and technological advancements can help mitigate the environmental impact of farming activities.

Encouraging green financing and investment is essential to align economic growth with environmental sustainability. Financial institutions should incorporate environmental considerations into their lending and investment decisions, promoting green bonds and sustainable banking practices. Furthermore, enhancing public awareness and participation in environmental conservation efforts can foster a collective responsibility toward sustainability.

The study underscores the importance of international cooperation and adherence to global environmental commitments, such as the Paris Agreement, to address climate change and pollution challenges effectively. Strengthening partnerships for technology transfer and capacity-building initiatives can further enhance India's ability to implement sustainable policies and practices.

Overall, the findings of this study provide a comprehensive understanding of the intricate relationship between economic activities and environmental sustainability in India. They serve as a foundation for policymakers, researchers, and stakeholders to develop informed strategies that balance economic progress with environmental preservation. By adopting a holistic approach that integrates economic, social, and environmental dimensions, India can achieve sustainable development while mitigating the adverse effects of pollution and climate change.