Volume: 2 Issue: 10 Pages: 17-21

A Roadmap to India's Green Transition for Economic Growth: An Overview

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Article Info.
E-ISSN: 2583-6528
Impact Factor (SJIF): 5.231
Peer Reviewed Journal
Available online:
www.alladvancejournal.com

Received: 21/Sep/2023
Accepted: 22/Oct/2023

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Abstract
Growing Green Practices with Sustainable actions toward green economy has recently emerged as a key concept in the Indian sustainable development goals. Over the last decade, India's rapid growth has created job opportunities and helped improve the standard of living. Sustainability will lead to Economic growth. Green Transition has become a catalyst for growth across all sectors of the economy. However, its remarkable growth record is restricted by a degrading environment and depleting natural resources, which has necessitated taking major steps to achieve a green and decarbonized economy. The pandemic Situation has turned consumers' attention to a greener economy, prompting brands to resort to sustainability by default. This research study helps to assess the present status of Green Initiatives in India and to analyse the impact for Sustainable Economic Growth. Green Innovations in all over the field. A green start-up's success probability and importance are explained in this Study. Analysing the data from various published records, Reports, Statistical reports, and Websites found that government initiatives are turning green by providing Green Sustainable Innovative changes, Indian start-ups are exploiting this opportunity by implementing sustainable entrepreneurship.

Keywords: Green Economy, Green Initiatives, Sustainability, Green Transitions, Roadmap.

Introduction

Green Economy: Initiatives

India is primarily a domestic demand-driven economy, with consumption and investments contributing 70% to the country's economic activity. India's transition to a green economy could contribute more than $1 trillion in economic impact by 2030, as well as create over 50 million jobs, stated a report by the World Economic Forum. By 2070, the economic impact could increase to $15 trillion, the report further added. The WEF's 'Mission 2070: A Green New Deal for a Net-Zero India' report provides a roadmap for India's transition. Resource Efficiency refers to how resources are used to deliver value to society and aims to reduce the number of resources needed, and emissions and waste generated, per unit of product or service. The Green Economy provides a macroeconomic approach to sustainable economic growth with a central focus on investments, employment, and skills.

Green Economic Growth in the Indian Context

The concept of Green Growth spans much beyond climate mitigation and adaptation and aims at achieving economic growth that is socially inclusive and environmentally sustainable. Green growth involves rethinking growth strategies about their impact(s) on environmental sustainability and the environmental resources available to poor and vulnerable groups.

Raising Awareness for Sustainable Development

New-age start-up companies have increased their focus on environmental awareness and are going beyond advocacy for plastic-free or paper-free workplaces with this raised significance for Economic Growth. Nearly various sectoral companies have begun adopting greener practices to reduce their carbon footprint- it refers to the number of greenhouse gases produced by a single entity and is measured as tonnes of CO2 emitted per year. Our country has recently shown

significant growth in the number of unicorns, a jump in export value, and other economic aspects related to business growth. Moreover, it endeavours to assess and compare our Country's performance in sustainable business activities.

Challenges of Implementing Green Transition

Currently, there is a need for a Green New Deal transition with sustainable actions in India. The government, the private sector, investors, civil society organizations, and individual citizens need to step forward and accelerate the Next Green Revolution. India has two significant transformations. The first is its economic transformation. India is home to one of the youngest populations in the world. Rapid and equitable economic growth will be critical to meeting the growth and lifestyle aspirations of 1.4 billion people.

Social and Economic Co-Benefits in India

Approximately 4.7 million tons of plastic bypass the public waste collection system every year and are sorted, cut, cleaned, pelletized, and recycled by the informal sector to be returned to the economy (WBCSD 2016). Prospects for the circular economy in India are promising: efforts for a circular economy in construction, food, and agriculture, as well as transport remanufacturing, could contribute US$ 624 billion by 2050, equivalent to 30 percent of India's current GDP (Ellen MacArthur Foundation 2016.

Sustainable Business Growth

The movement is thus from mere economic growth to achieving a triple-win development that includes social integration, economic viability, and environmental sustainability. Redefining the way progress is looked at, with the needs of our society and our natural infrastructure, the concept of the green economy is to create long-term priorities for investment that will form the basic fabric of improving levels of human well-being and natural capital systems.

Objectives of the Study

1. To Study the Concept of Green Economy Initiatives in India
2. Learn the Significance behind the Current Economy needs Shifting to Green Transitions Movements
3. To Know about the Challenges and Barriers to Implementing Green Economical Transitions Developments
4. To Study the Benefits of Social and Economic Benefits of Green Economical Developments
5. To Learn About the Factors to Improve the Economic Growth Through Sustainable business needs

Literature Review

Barman, B. C. (2017) [3] "Role of Green Economy in the Context of Indian Economy" suggested with his study that for sustainable development through green economy it is needed active civil society participation. Through the paper he concludes the current need towards a green economy there are many areas that present themselves for consideration: agriculture, buildings, energy, fisheries, forests, industry, tourism, transport, waste and water and this list is not exhaustive. Dr Vandana Tyagi N. (2017) [1] "Green Economy in India: Possibilities and Challenges" concluded that given the majority share of unsustainable production and associated technological characteristics, there is urgent need for a policy shift for green reforms to enable India to achieve sustainable development. Thus, efforts in both the national and international fronts are needed in true spirit. Pratiksinh S. Vaghela, Surat Harsheshkumar (2018) explained "Green Economy: An Indian Perspective" their idea understand position of India with respect to green economy. The perception score of India as green economy has been increased during 2014 to 2016 but in case of performance score, which is more important of India has been reduced. Dr. Mukesh Agarwal. (2020) [6] analyse" Green Economy" clearly evident that countries and their governments cannot afford to ignore the benefits that switching to a Green Economy will bring. A Green Economy attempts alleviate a wide range of problems through a variety of institutional reforms and regulatory, tax, and expenditure-based economic policies and tools. Dr. Kishore P. Bholane (2020) [7] "Green Economy in The Context of India" The transition to green and inclusive economies has been long deliberated both at national and global level. India has recently made two major global commitments: the 2030 Global Development Agenda (popularly known as the Sustainable Development Goals) and the ratification of the Paris Agreement, which aims for holistic wellbeing of all, today and in the future, without surpassing the natural boundary limits of the environment. Shreyans jain (2020) [2] "Financing India's Green Transition" explained that Climate change has emerged amongst India's most formidable challenges to sustained GDP growth. To accelerate the implementation of the country's commitments under the Paris Agreement and advance its progress towards the Sustainable Development Goals finance is key. The researcher explained his idea that risk premium on every polluting asset in India because they will go bankrupt in the coming decade. Söderholm, P. (2020) [8] "The green economy transition: the challenges of technological change for sustainability". Study concludes, the green economy transition should also benefit from research that involves various impact evaluations, including methodological innovation in evaluation studies. Impacts of important baseline trends, digitalization and automation, globalization, environmental and distributional outcomes but also on the prospects for green innovation collaborations and various circular economy-inspired business models. Mukul Bhatnagar, Sanjay Taneja and Ercan Özen (2022) [14] explained through "A wave of green start-ups in India-The study of green finance as a support system for sustainable entrepreneurship "to assess the present status of green finance in India and see its impact on start-up's. This paper explained and analyse the reports and statistical report, World Transition Development reports, Current trends 2022 and refer the future needs.

Green Transition Interventions and their Impact

In this current situation, Green Economy has integrated techno-economic analysis to understand the impact of energy-related green growth interventions on the future. Energy demand, emissions, energy access, energy security, and development indicators. To understand the interlinkages modal of Green Transition Movements, an integrated modeling framework will be suggested to design this model. Combining a bottom-up energy systems model (Teri-Markal) along with a top-down simulation-based dynamic, recursive computable general equilibrium model.

This Integrated Modelling Framework Used to Conduct Scenario Analysis around the Following Green Growth Interventions

1. Energy efficiency and conservation measures in energy demand sectors (agriculture, transport, industry sector, commercial building, and residential sector)

2. Enhancement of modern energy access
3. Promotion of clean energy supply through renewables and cleaner fossil-fuel–based energy generation technology, and
4. Resource (soil and water) conservation in the agriculture sector. Green Growth Interventions are surpassing all over the sectors and help the future requirements for sustainable economic growth. There have a lot of interventions have been implemented through the Green Industrial revolution, Green Transition Movements, Green Industrial Policy, UNEP Development Programs, and World economic forum. The following Table 1.1 helps to understand the Key Development Indicators for India and Select Countries of the year 2022.

Table 1.1: Key Development Indicators for India and select Countries

	GDP in billion (con-stant 2005 US$)*	GDP per capita (con-stant 2005 US$)*	CO_2 emis-sions (MT)[b]	CO2 emis-sions (met-ric tons per capita)[b]	Energy use (Kilograms of oil equivalent per capita)[c]	International Trade Balance in Goods	Cash surplus/deficit (% of GDP)[C]
Brazil	1206	5853	439.41	2.19	1391.90	-4.13	-1.84
China	5274	3866	9019.52	6.71	2142.81	370.02	-
European Union	15372	30241	3574.10	7.07	3253.82	134.78	-3.63
India	1600	1235	2074.34	1.66	623.72	-139.88	-3.81
Japan	4780	37595	1187.66	9.29	3545.60	-120.64	-7.97
Russian Federation	1000	6844	1808.07	12.65	5283.41	188.04	2.67
United States	14797	46405	5305.57	17.02	6814.82	-727.15	-7.56
South Africa	329	6086	477.24	9.26	2674.82	-18.1	-4.47
World	58055	7996	34649.483	4.94	1897.95	-	-4.94

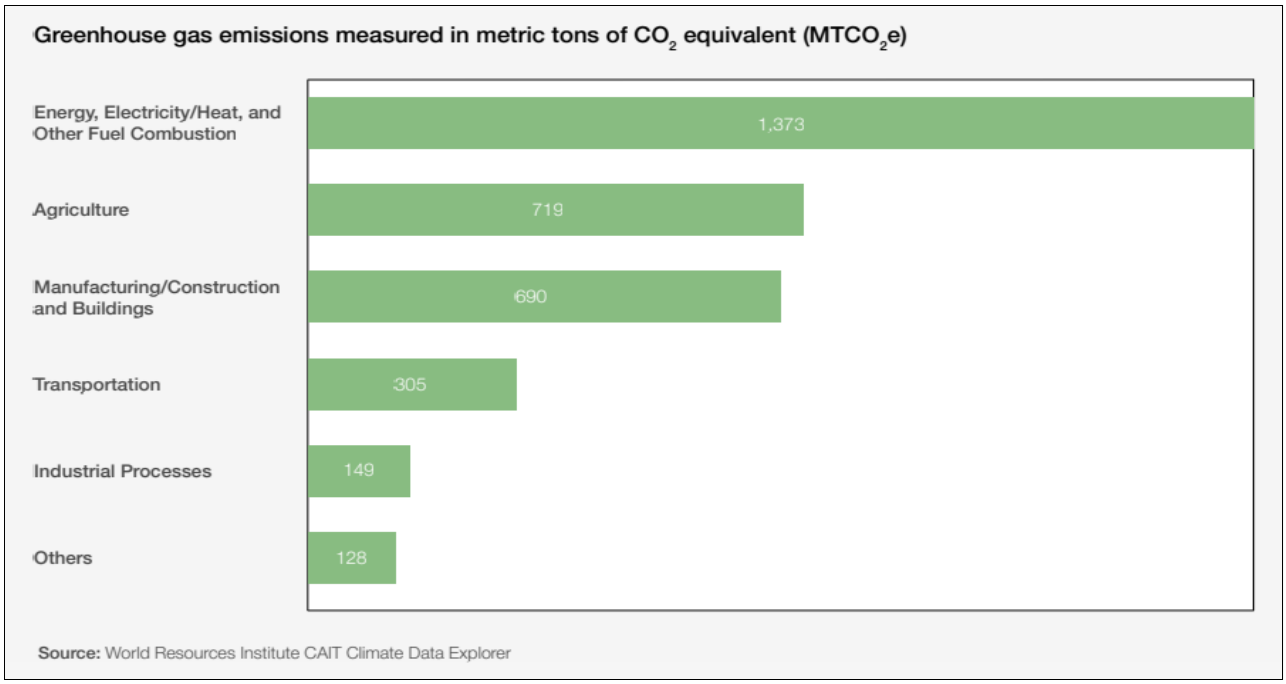
Environmental Policy Triggers to Initiate Green Technologies

Environmental regulations boost economic growth and sustainable business activities for various sectors by spurring demand. The technologies fostered innovation in scrubber and coal combustion. Government intervention for environmental protection can therefore boost the growth of eco-friendly industries, supplying technologies that mitigate or clean up pollution.

India's GHG Footprint Today

India is the third largest GHG emitter in the world, behind the United States and China. Five sectors of Indian sectors energy, agriculture, industry, transportation, and infrastructure/buildings help to contribute more than 96% of India's GHG emissions today. India's net zero transition will need an ambitious multi-decade effort to transform each of these sectors. The following Table 1.2 explained Carbon-Di-Oxide emission in the different sectors in India and energy consumption from various industry sectors. This will help to analyze the current situation and future action.

Table 1.2: Greenhouse Gas emissions measured in Metric tons of Co_2 equivalent



A Green New Deal for India will Necessarily Implicate the Five Sectors that Contribute to Almost all its GHG Emissions

1. **Energy Sector:** Accounts for ~40% of India's GHG emissions, with coal being the dominant source of total fossil CO_2 emissions. Decarbonizing the energy sector is a required priority for three-important approaches: replace fossil fuels with renewables; reduce fossil CO_2 emissions from legacy infrastructure through enhanced efficiencies; to remove unavoidable carbon emissions through carbon emissions.
2. **Transport/Mobility Sector:** Is heavily reliant on oil and contributes to almost oil demand. A green transformation in Transport Sector needs a shift in modal mix from road to rail, as well as a broad-based fuel diversification approach to encourage sustainable fuels (biofuels, CNG, LNG) in the immediate term, electrification in the medium term, and hydrogen based heavy mobility in the long term.
3. **Industry Sector:** Manufacturing is a key contributor to India's GHG emissions, with the iron and steel, cement, and chemicals and fertilizers sectors having the highest CO_2 footprint. Radical decarbonization of these sectors will need demand-management measures such as circular economy acceleration. It will continue energy efficiency improvements, electrification of heat, carbon capture, utilization and storage, low carbon fuels such as biomass and hydrogen, and innovative technologies with non-fossil feedstock.
4. **Infrastructure Sector:** India's top 25 cities contribute more than 15% of its estimated GHG emissions. India's transition to greener cities, buildings, and infrastructure will need a rethink of its approach to urban planning with a focus on transit-oriented urban development and an emphasis on low-carbon buildings and infrastructure construction.
5. **Agriculture Sector:** Is the largest contributor to nitrous oxide (N2O) and methane emissions. To reduce agriculture emissions, India will need a national campaign to empower, educate and enable more than 100 million farmers in adopting precision agriculture, sustainable animal husbandry, and green energy.

Findings and Suggestions

1. **Low-Carbon Energy:** In the Energy sector decarbonization will need holistic interventions across all its fossil-fuel sources (coal, gas, oil). In addition, innovative ways need to be identified to reduce emissions in energy transfer to consumers via transmission and distribution networks.

Conceptual Model Framework for Green Transition

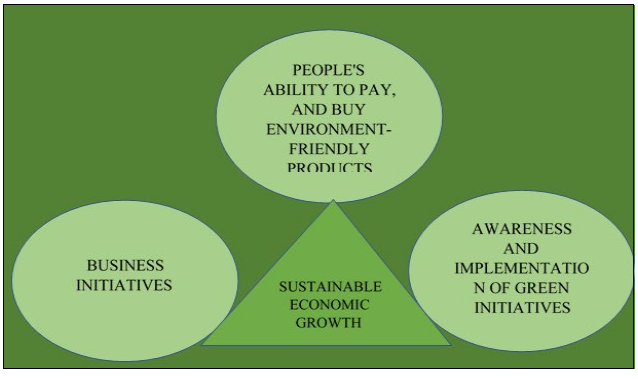


Fig 1: Sustainable Growth Framework

Adopted Modal for Green Transition to Achieve Economic Growth

2. **Green Mobility:** Contributes to ~10% of its GHG emissions. In 2020, an estimated 60% of India's final energy use in transport arose from passenger transport and 40% from freight transport. Suggestions are mentioned as follows:
   - Green Fuels and Green Vehicles
   - Fuel Efficiency
   - Sustainable Fuels
   - Electric vehicles
   - Hydrogen Mobility

3. **Decarbonisation of Energy Intensive Industries:** Here can include the relative decline in cost of decarbonized versus conventional commodities, availability of resources (such as biomass or geological storage space for captured CO2), and the feasibility of adapting old as well as new facilities. Enabling the transition will require investment in R&D to make emerging new technologies such as hydrogen affordable, policy support, and incentives from the government to steer the industry towards sustainable technologies and increased global collaboration.
4. **Green Buildings, Infrastructure, and Cities:** Urban development in India are currently fragmented in national and local policies, regulations, and stakeholders. A nationally coordinated approach will be critical to ensuring carbon-efficient execution of urban development interventions.
5. **Sustainable Agriculture:** Around 80% of agricultural methane is emissions from livestock production, including enteric fermentation and manure management. The second largest contributor of agricultural methane emissions is rice production, with the remaining emissions from the burning of savanna and the use of crop residues for agricultural purposes.

Cross-Sectional Green Technology Enablers

1. Green Technology Innovation-R&D and investments in technologies that can accelerate the carbon transition
2. Green Finance-Financing the green revolution
3. Carbon Sequestration-CCUS and Carbon Sinks Catalysing carbon capture as well as carbon offsets (natural sinks and DACCS)
4. Climate Adaptation-India cooling plan, knowledge and capability building, indoor work transitions

Conclusion

India's Green transformation needs technology, finance, and leadership that is successfully happening and blazing a trail for the emerging world economic growth. India's green growth is not for itself alone: it will have a multiplier effect, blazing a trail that combines inclusive prosperity with decarbonization. Through this achievement and awareness among the people, the green transition can able to achieve economic growth.

Future Research and Limitations

This study is focused on how green economical transitions are promoted and the growth of green start-ups in India. Still, businesspeople and policymakers promote and elevate sustainable development. This research is specific to exhibit the Green Innovations and Implications of the Indian economic system. Hence there is a need for future awareness, highlighting needs for the future needs and supporting system.

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