Chapter 15
Sustainable Synergy: Exploring the Environmental Landscape of Energy Transition and Economic Growth for India

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ABSTRACT

Understanding the interrelationships between economic growth, environmental quality, and sustainable development is pertinent for India. This connection is marked by reciprocal causation and feedback mechanisms-energy consumption stimulates economic growth by providing the necessary fuel for production and consumption. However, economic expansion influences energy consumption patterns by altering the industrial structure, adopting new technologies, and changing income levels. This study investigates the relationship between economic growth, energy transition, and sustainable development in India from 1990 to 2020. It also estimates the impact of industrialisation and trade openness on economic growth using an Auto Regressive Distributed Lag (ARDL) approach. The results show a positive and significant relationship between environmental degradation (CO2) and economic growth. Policymakers and stakeholders must develop efficient energy policies and effective, sustainable development strategies. The policies should facilitate economic expansion and safeguard energy stability, ecological endurance, and social well-being.

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1. INTRODUCTION

20th and 21st centuries have experienced economic growth accompanied with industrialization, massive population expansion and advancements in healthcare underlining overall human development. Economic growth has been accompanied with greater affluence, prolonged life expectancy, elevated living standards, and enhanced accessibility to education, knowledge, and opportunities. On the downside, this progression has also been accompanied with the collective challenges of increasing inequalities, poverty, and deprivation along with escalating environmental degradation. Energy use and economic prosperity and development are convolutedly correlated and the connection is bidirectional. Not only does energy consumption play a critical role in the expansion of production processes and the development of infrastructure, but it also complements and enhances the quality of life. In fact, the extent of energy utilisation is often cited as an index of economic development. Energy is an indispensable component of production and economic growth, and economic expansion propels energy consumption by rising living standards. The correlation between energy and growth has been an essential subject in economic literature (Stern, 1993; Cheng & Lai, 1997; Cheng, 1999; Stern, 2000; Chang, 2010, Bartleet & Gounder, 2010; Bekun et al., 2019). Increased levels of economic growth are typically accompanied by a rise in availability, dependability, and usage of power (energy)[1]. Although the direction of the causal relationship between economic growth and energy is debatable (Kraft & Kraft, 1978; Zhixin & Xin, 2011; Bildirici & Bakirtas, 2014), however, it is undeniable that increased energy use is essential for development.

Energy use and availability has undeniably played a crucial role in driving economic growth, however, in turn it has also given rise to pertinent and persistent concerns in the form of environmental degradation and pollution. Given the swift progress of urbanisation and industrialisation, economic growth is becoming more reliant on energy consumption. Greater economic activity, encompassing both production and consumption, necessitates greater amounts of energy and material inputs. Manufacturing, transportation, and infrastructure development use energy derived from resources including fossil fuels, leading to pollution, emissions, climate change and other environmental impacts. Intensified extraction of resources accompanied with the generation and accumulation of higher volumes of waste along with the concentration of pollutants will inevitably surpass the ecosystem's carrying capacity. Further, depletion of resources at a fast pace will ultimately jeopardise economic activity itself. Hence, attaining indefinite economic growth without confronting resource constraints or harsh environmental damage seems overtly ambitious.