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THE ROLE OF INNOVATION AND TECHNOLOGY IN BUILDING A SUSTAINABLE GREEN ECONOMY

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Abstract
The transition to a green economy presents both opportunities and challenges for developing countries. This paper explores how sustainable economic growth can be achieved through the adoption of renewable energy, eco-friendly production, and green employment initiatives. It highlights the importance of policy reforms, technology transfer, and international cooperation in promoting environmentally responsible development. While the green transition offers significant social and economic benefits, such as poverty reduction and job creation, it also poses financial and infrastructural challenges that must be addressed to ensure inclusive and equitable progress.

Keywords: Green economy, sustainable development, renewable energy, developing countries, environmental policy, green jobs, climate change

Introduction

In recent years, the concept of a green economy has gained global attention as nations seek sustainable pathways to economic growth while addressing environmental degradation. For developing countries, the transition to a green economy represents both a pressing necessity and a strategic opportunity. These nations are often heavily dependent on natural resources and face growing challenges such as climate change, pollution, and resource scarcity. Embracing green economic models allows them to pursue growth that is inclusive, resilient, and environmentally responsible. However, the process of transition is complex and requires overcoming barriers related to finance, infrastructure, and technology. This article discusses how developing countries can successfully

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navigate this transformation, the benefits it can bring, and the policies needed to ensure a just and sustainable transition.

In recent years, global warming, climate change and ecological hazards have become the most pressing economic issues. Global warming and climate change are primarily driven by greenhouse gas emissions. On the other hand, carbon dioxide (CO2) emissions, as the core element of greenhouse gases, have attracted widespread attention in the environmental literature (Gur, 2022). The expansion of fossil fuel energy use has triggered a surge in carbon dioxide (CO2) emissions, necessitating an immediate shift to compressing CO2 emissions to achieve sustainable development goals (IEA, 2024). Also, there is an urgent need for sustainable growth, affordable clean energy, sustainable production, technological innovation and sustainable consumption, which are all elements of the Sustainable Development Goals (such as SDGs 7, 8, 9, 12 and 13) set by the United Nations to address climate change (United Nations, 2015). Thus, on a global scale, mitigating carbon emissions is considered a major issue of concern to many countries. The introduction of green technological innovation is one of the key indicators to reduce carbon emissions, while improving green productivity, energy efficiency, growth rate, and promoting the transformation of the world's economic development model (Dong et al., 2022; Lin and Ma, 2022). Green technology innovation is the latest technological innovation that limits the use of fossil fuel energy, reduces pollutant emissions, promotes the development of green economy, and ultimately improves environmental quality (Obobisa et al., 2022). Green technology innovation produces clean energy that can replace fossil fuel energy and is less harmful to the environment than fossil fuels, while the application of green technology can produce green products that reduce energy use and environmental pollution (Jaiswal et al., 2022). In addition, green technology innovation contributes to the development of renewable energy and helps economies optimize the use of renewable energy (Fang, 2023). The green technology innovation and renewable energy development encountered in recent years are important measures for emerging economies to reduce environmental emissions and achieve long-term economic growth and environmental sustainability (Fang et al., 2022). Thus, a potential remedy to condense environmental pollution and make productive economic activities in

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developing economies more sustainable is to invest in green technological innovations.

In addition to developing green technological innovations, quality system construction also helps formulate environmental protection measures and improve environmental quality by reducing carbon dioxide emission levels (Obobisa et al., 2022). Countries are recently making efforts to combat exploitation, strengthen financial management and develop environmental context by establishing sound and effective institutional frameworks. An effective and sound system in a country can significantly control environmental pollution (Ren et al., 2023). However, as some researchers acknowledge, developing economies need more effective institutions to curb greenhouse gas emissions by implementing strong strategies and clear directives (Fekete et al., 2021; Hassan et al., 2020). The positive impacts of high-quality institutions have been documented to outweigh their negative impacts, particularly in curbing crime and corruption in emerging economies, but research shows that their impact and consequences on the environment are limited. Thus, revealing the environmental impact of green technology innovation and institutional quality in developing Asian economies is the main purpose of this study.

From a global perspective, emerging economies in Asia have leading non-fossil energy resources, but are still plagued by energy shortages, destructive externalities of climate change, technological backwardness, and institutional fragility (World Economic Forum, 2023a). In addition, Asia's emerging economies tend to be far away from the technological frontier, reflecting a huge technological innovation gap. As a result, inventors in emerging Asian countries do not have the ability to patent their inventions, and due to insufficient investment in R&D, the level of innovation has not yet reached expectations (Park and Kim, 2022). It has been noted that Asian emerging countries pay less attention to the contribution effects of institutional panic and technological innovation to the environment and growth. Technological backwardness and weak institutions in Asia's emerging economies have been blamed on rising carbon dioxide emissions caused by the use of fossil fuel energy in production processes (Wang M. et al., 2023). Thus, the environmental and growth performance of emerging Asian countries may be affected by future advances in

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institutional and technological innovation. In this context, it is crucial to reveal how high-quality institutions and green technology innovation affect economic growth and the environment in emerging Asian countries.

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