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Determinants of Green House Gas Emissions, role of Green Finance, Urbanization & Eco Innovation

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ABSTRACT

Greenhouse gas emissions have emerged as one of the most critical environmental challenges facing both developed and developing economies. The BRICS countries—Brazil, Russia, India, China, and South Africa—have experienced rapid industrialization, urbanization, and economic growth, which have significantly increased environmental pressures. Although green finance and eco-innovation are widely recognized as important tools for promoting sustainable development, their effectiveness in reducing greenhouse gas emissions remains inconclusive in emerging economies. This study investigates the determinants of greenhouse gas emissions by examining the roles of green finance, urbanization, and eco-innovation in BRICS countries over the period 1998–2023. Balanced panel data comprising 130 observations were obtained from the World Development Indicators and other international databases. Carbon dioxide emissions (CO_2) were used as a proxy for greenhouse gas emissions. Green finance was measured by domestic credit to the private sector, urbanization by total urban population, and eco-innovation by high-technology exports. GDP per capita, energy use, renewable energy consumption, and trade openness were included as control variables. The study employed descriptive statistics, correlation analysis, multicollinearity diagnostics, Fixed Effects and Random Effects models, and the Hausman specification test.

The findings reveal that urbanization and eco-innovation significantly increase emissions, while renewable energy consumption and trade openness significantly reduce them. Green finance shows a negative but statistically insignificant relationship with emissions. The Hausman test confirms that the Fixed Effects model is the most appropriate estimator. The study concludes that strengthening green finance, promoting renewable energy, and adopting sustainable urban policies are essential to achieving environmental sustainability in BRICS countries.

Keywords: *Greenhouse Gas Emissions, Green Finance, Urbanization, Eco-Innovation, BRICS Countries.*

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