ABSTRACT

Global warming and environmental degradation are major challenges in achieving environmental sustainability. The rise in global temperatures due to greenhouse gas emissions, particularly carbon dioxide (CO_2), has generated serious impacts on ecosystems and human well-being. In Southeast Asia, economic growth, industrialization, and increasing fossil fuel consumption are the primary drivers of carbon emissions. This study focuses on ASEAN-5 countries (Indonesia, Malaysia, the Philippines, Thailand, and Vietnam), which have committed to achieving net-zero emissions by 2050 in accordance with the COP28 agreement. ASEAN-5 is selected because it reflects dynamic economic growth, industrial expansion, and high fossil fuel usage, while also demonstrating diverse development levels and environmental policy capacities—conditions that provide a realistic basis for analyzing the effectiveness of carbon emission reduction strategies. This study aims to examine the Environmental Kuznets Curve (EKC) hypothesis, which describes the relationship between economic growth and environmental degradation in ASEAN-5 during the period 2010–2021.

This research employs a fixed effect model to analyze the panel regression. The study uses secondary data consisting of one dependent variable—carbon dioxide emissions—and five independent variables: the Human Development Index, gross domestic product, foreign direct investment, trade openness, and green technology innovation.

The findings indicate that the Environmental Kuznets Curve hypothesis is supported in the ASEAN-5 region. Based on the analysis, Indonesia, the Philippines, Thailand, Vietnam, and Malaysia are positioned on the left side of the EKC. The HDI and FDI variables have no significant effect on carbon dioxide emissions, while GDP and trade openness exhibit positive and significant effects. Conversely, green technology innovation shows a negative and significant effect, indicating that improvements in green technological innovation can effectively reduce carbon emissions.

Keywords: Environmental Kuznets Curve, Carbon Dioxide Emissions, ASEAN-5, Fixed Effect Model.