

ABSTRAK

PENGARUH KETERBUKAAN PERDAGANGAN, POPULASI PENDUDUK KOTA, SEKTOR MANUFAKTUR TERHADAP EMISI GAS KARBON DIOKSIDA PADA NEGARA ANGGOTA G20

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perkembangan sektor manufaktur berkontribusi terhadap peningkatan emisi karbon dioksida (CO₂). Negara-negara G20 menyumbang sekitar 75% emisi gas rumah kaca global sehingga memiliki peran penting dalam upaya pengendalian emisi. Penelitian ini bertujuan menganalisis pengaruh keterbukaan perdagangan, populasi penduduk kota, dan sektor manufaktur terhadap emisi CO₂ pada 19 negara anggota G20 selama periode 2004–2023. Negara-negara tersebut dikelompokkan ke dalam kategori emisi tinggi dan emisi sedang. Data sekunder diperoleh dari World Bank dan dianalisis menggunakan regresi data panel dengan pendekatan Fixed Effect Model (FEM). Hasil penelitian menunjukkan bahwa secara simultan ketiga variabel berpengaruh signifikan terhadap emisi CO₂ pada kedua kelompok negara. Secara parsial, pada kelompok emisi tinggi, keterbukaan perdagangan, populasi penduduk kota, dan sektor manufaktur berpengaruh positif dan signifikan terhadap emisi CO₂. Sementara itu, pada kelompok emisi sedang, populasi penduduk kota dan sektor manufaktur berpengaruh positif dan signifikan, sedangkan keterbukaan perdagangan tidak berpengaruh signifikan. Temuan ini menunjukkan bahwa peningkatan aktivitas ekonomi berpotensi meningkatkan emisi karbon apabila tidak diimbangi dengan efisiensi energi dan penerapan teknologi yang lebih ramah lingkungan.

Kata Kunci : Emisi Karbon Dioksida, Keterbukaan Perdagangan, Populasi Penduduk Kota, Sektor Manufaktur, G20, Data Panel, Environmental Kuznets Curve

ABSTRACT

THE IMPACT OF TRADE OPENNESS, URBAN POPULATION, AND MANUFACTURING ON CARBON DIOXIDE EMISSIONS IN G20 MEMBER COUNTRIES

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Increasing global economic activities through international trade, urbanization, and the expansion of the manufacturing sector have contributed to rising carbon dioxide (CO₂) emissions. G20 countries account for approximately 75% of global greenhouse gas emissions, making them key actors in emission mitigation efforts. This study aims to analyze the effects of trade openness, urban population, and the manufacturing sector on CO₂ emissions in 19 G20 member countries during the 2004–2023 period. The countries were classified into high-emission and medium-emission groups. Secondary data were obtained from the World Bank and analyzed using panel data regression with the Fixed Effect Model (FEM) approach. The results indicate that, simultaneously, all three variables significantly affect CO₂ emissions in both groups of countries. Partially, in the high-emission group, trade openness, urban population, and the manufacturing sector have a positive and significant effect on CO₂ emissions. In the medium-emission group, urban population and the manufacturing sector have a positive and significant effect, while trade openness has no significant effect. These findings suggest that increasing economic activity may lead to higher carbon emissions if not accompanied by energy efficiency improvements and the adoption of environmentally friendly technologies.

Keywords: *Carbon Dioxide Emissions, Trade Openness, Urban Population, Manufacturing, G20, Panel Data, Environmental Kuznets Curve*