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Sub-Saharan Africa's Electricity Crisis and the Impact of CO_2 Emissions on the Infrastructure-Growth Nexus

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Introduction

Sub-Saharan Africa (SSA) is a region of over 950 million people, but it also has the world's poorest access to electricity. According to the World Development Indicators, carbon dioxide (CO_2) emissions from electricity and heat production (CO_2EM) and the ratio of electricity transmission and distribution losses (RETDL) have been raising in SSA over the past decades, implying a decline in power sector efficiency. Poor electricity access continues to be a major impediment to most businesses and economic growth in several SSA countries. Given the region's persistent rise in CO_2EM, potential threats from greenhouse gases are associated with a significant negative impact. CO_2 emissions cause environmental problems, and many countries have signed the Kyoto Protocol and pledged to reduce them [1].

The remainder of the research is organised as follows: Section two provides a brief review of the literature. The third section provides an overview of the SSA electricity shortage and efficiency. Section four describes our approach to assessing the impact of CO_2 emissions from electricity generation on the growth contributions of electricity stock and quality. Section five discusses the study's key findings. Section six concludes with the conclusions and policy implications [2].

Because electricity and heat production are major sources of CO_2 emissions, a number of empirical studies have been conducted to investigate the relationships between electricity, CO_2 emissions, and growth. Using the autoregressive distributed lag model and vector error correction model, Ahmad et al. discovered a long-run cointegrating relationship between energy consumption, CO_2 emissions, and economic growth, as well as the validation of the Kuznets curve. Furthermore, they discovered feedback effects between CO_2 emissions and growth, as well as a positive relationship between energy and CO_2 emissions. Salahuddin and colleagues investigated the relationship between CO_2 emissions, electricity consumption, economic growth, and financial development in the Gulf Cooperation Council [3].

Poor quality in electricity production and distribution exacerbates the problem, as evidenced by the high ratio of electricity transmission and distribution losses, which tend to exert negative pressure on economic growth. Furthermore, CO_2 emissions from electricity and heat production may pose a challenge to SSA's potential growth. As shown, SSA had higher ETDL than MENA in 1971 and 1980, but then fell slightly below MENA levels in the following years. ETDL in SSA has been higher than in Latin America, the Caribbean, and South Asia. Furthermore, over the last five decades, the SSA's ETDL has remained below the low income benchmark while rising above the middle income level as of 2010. The Eurozone is followed by the North American Union [4].

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As economic development progresses and industrialization occurs, there is significant resource depletion and waste accumulation. During this stage, there is a positive relationship between per capita growth and environmental degradation. According to this theory, however, further economic development is expected to overcome environmental degradation that occurred during the early stages of economic growth, resulting in an inverted U-shaped relationship between growth per capita and environmental degradation. In other words, environmental degradation decreases as economic development increases, as does the enforcement of environmental regulations, environmental awareness, higher environmental expenditures, and improved technology. The EKC hypothesis implies that economic development does not pose a threat to global sustainability [5].

Discussion

This section investigates the contribution of electricity infrastructure (quantity and quality) to economic growth in SSA while accounting for CO_2 emissions from electricity and heat production. The overarching goal is to uncover the nature and magnitudes of CO_2 emissions' impact on electricity growth contribution. First, this study develops an electricity-related CO_2 emission index, using 1990 as the baseline year, and then tracks changes in CO_2 emissions in subsequent years. Second, the CO_2 emission index is used to create two additional indices: modified electricity consumption (MELEC) and modified RETDL [6,7].

Conclusion

Increasing the percentage of energy derived from renewable sources has a positive impact. There are numerous advantages, including sustainability and inexhaustibility. Most renewable energy sources, such as wind, hydro, and solar, are environmentally friendly. in comparison to coal, oil, and natural gas In addition, this paper demonstrated (via correlation analysis) that increasing the proportion of renewable energy sources while decreasing the proportion of traditional energy sources Non-renewable energy sources in the energy mix can help to reduce CO_2 emissions from electricity. Emissions. Using hydro to represent renewable sources, in particular, the correlation with CO_2 emissions is 0.90, while the correlation with GDP is 0.90. The relationship between non-renewable and CO_2 emissions is 0.90. Rural Renewable energy sources, such as solar and wind, can provide enormous benefits to the population. Such as solar and wind Off-grid solar farms and wind farms can be established in a decentralised manner across the country.

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