

Technological Advancements and Environmental Impact: A Meta-Study on the ICT-Environment Nexus

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Abstract

A body of literature has examined the nexus between technological advancements and environmental improvements. However, existing research presents inconclusive evidence, with mixed findings on ICT's impact on issues such as pollution and climate change. This meta-study empirically examines the impact of Information and Communication Technology (ICT)—including Fixed Broadband, ICT Capital Stock, ICT industrial input, and Internet Servers—on environmental issues such as air pollution, CO₂ emissions, climate change, water pollution, and fossil fuel energy consumption. Utilizing advanced analytical techniques, namely Bayesian Model Averaging, Frequentist Model Averaging, and Weighted Average Least Squares, our results indicate a weak nexus between ICT and environmental outcomes. Additionally, the study identifies potential publication selection bias, suggesting that positive or significant findings are more likely to be reported. Our findings underscore the need for caution in interpreting the environmental benefits of ICT investments. Policymakers are advised to consider a broader set of strategies beyond ICT for addressing environmental challenges. For future researchers, we recommend ensuring a more balanced and comprehensive reporting of results to provide a clearer understanding of the ICT-environment relationship. This study contributes to the ongoing discourse on sustainable development by highlighting the complex and often overstated linkages between technological advancements and environmental improvements.

Keywords: Information and Communication Technology (ICT), Climate change, Meta-analysis, Bayesian Model Averaging, Frequentist Model Averaging