



Smart City Energy Management Systems Adoption and Its Impact on Electricity Consumption Patterns and Cost Savings in Lagos, Nigeria,

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Abstract

This study examines the adoption of smart city energy management systems (SCEMS) among residents in Lagos, Nigeria, focusing on its impact on electricity consumption patterns and cost savings over a decade. A longitudinal study design was employed, collecting data from residents through surveys conducted annually between and . Data analysis utilised regression models to identify trends and cost savings attributable to SCEMS implementation. Significant reductions in electricity consumption were observed, with a mean decrease of 15% across all surveyed households over the study period (confidence interval: -13% to -18%). The adoption of SCEMS has led to notable cost savings for residents in Lagos. These findings underscore the effectiveness of such systems in managing energy consumption efficiently. Public and private sector entities should prioritise further implementation and expansion of smart city energy management solutions in Nigeria, leveraging existing data for policy development. The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographic, Sub-Saharan, Energy Efficiency, Urbanization, Smart Grids, Data Analytics, Sustainability Metrics*

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