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A STUDY ON CORRELATION BETWEEN HOUSEHOLD CHARACTERISTICS AND ENERGY CONSUMPTION IN SEOUL USING SPATIAL REGRESSION MODELS

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Abstract

This study examines the impact of spatial characteristics of 426 administrative districts in Seoul on electricity consumption, focusing on residential buildings during heatwave periods. The analysis aims to identify factors contributing to increased electricity usage due to global warming and propose policy recommendations. We conducted a correlation analysis using electricity consumption data from the Ministry of Land, Infrastructure, and Transport's building system and environmental indicators from the Seoul Metropolitan Government. A spatially weighted regression model, incorporating LISA and Moran's I index, was employed to test spatial correlation, while a linear regression model was used for comparison and to assess geopolitical consistency.

The study categorized urban environmental factors into environmental, social, and spatial variables and developed a model to analyze the impact of each factor by administrative district. Key findings revealed that the number of older houses, unit area size, and household size were the most influential factors affecting electricity consumption. Among these, older residential buildings were particularly significant during heatwaves, highlighting the need for targeted interventions to improve energy efficiency in aging buildings.

The results provide valuable insights for developing energy reduction policies in Seoul, with an emphasis on enhancing the energy efficiency of older residential buildings. Such policies are expected to reduce greenhouse gas emissions and support environmental sustainability, addressing climate change challenges in the urban context.

Key words: building energy, electricity consumption, environmental protection, heat wave period, residential buildings, spatially weighted regression model

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