Deploying Electric Vehicle Charging Stations in Public Transportation: A Case Study of Accra, Ghana Urban Mobility Dynamics

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Abstract

Public transportation in Accra, Ghana has been a critical component of urban mobility for years. However, with increasing adoption of electric vehicles (EVs), integrating EV charging stations into public transport systems is crucial to ensure sustainable and efficient urban mobility. A mixed-methods approach was employed, integrating quantitative data from usage statistics and qualitative insights from interviews with stakeholders. A regression analysis model was used to predict the impact on public transport usage based on EV charging station availability and accessibility. There was a significant increase in EV use within one year, with over 30% of respondents indicating that the proximity of charging stations influenced their decision to use electric vehicles. The regression analysis revealed an R² value of 0.75, suggesting that the model accurately predicted usage based on station availability. The deployment of EV charging stations within Accra's public transportation system has led to a notable increase in EV adoption and improved urban mobility efficiency. Further research should focus on expanding coverage and exploring additional incentives for EV use, such as subsidies or tax benefits. Electric Vehicle Charging Stations, Public Transportation, Urban Mobility, Accra, Ghana Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Accra, Ghana, Geographic Information Systems (GIS), Sustainable Urban Mobility Planning (SUMP), Network Analysis, Electric Vehicle Infrastructure Mapping, Data Collection Techniques*

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