ELECTRIFYING PUBLIC URBAN MOBILITY IN UGANDA:DRIVERS, BARRIERS AND WAY FORWARD

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Overview

Innovations in the transport sector affirm that electric vehicles (EVs) are an appropriate alternative to internal combustion engine vehicles that contribute immensely to greenhouse gas emissions and climate change (International Energy Agency, 2020). In response to continuous improvement in electric vehicle technology and continued effort to abate climate change, the adoption of electric vehicles across the globe has gained momentum. Presently, there are more than 10 million EVs on the world's roads with a larger percentage in Europe, the United States and China (International Energy Agency, 2021). Many other countries through various initiatives are advocating for EV adoption given the benefits of the adoption.

The Government of Uganda has for a considerable time been working hard towards the promotion of adoption of EVs particularly in the mass public transport domain. Government efforts include investment in several EV ventures including Kiira Motors Corporation which manufactures electric buses (Kayoola buses) for mass transportation The government has fronted several policies to support EV adoption and has highlighted the EV sector in its development forethoughts like in the Energy Policy of 2023, the National e-mobility strategy, Vision 2040 and National Development Plan III. Government effort to scale up EV adoption is supported by several entities including International Organizations and private business establishments. The aim of the unified effort is to diversify Uganda's EV landscape and pave way for substantial EV adoption. Despite these initiatives, the electrification of mass public systems in Uganda is still budding as fossil fuel powered vehicles dominate the country's public transportation systems. To scale up mass public transport electrification in Uganda, it is critical to investigate the drivers and challenges of public transport electrification in Uganda since limited research has probed into the area.

This paper attempts to examine the barriers and drivers of mass public transport electrification in Uganda from the perspective of e-mobility experts. The paper examines conditions that support or deter transition to an electrified mass public transport system. By uncovering potential deterrents and propellers for EV adoption, the paper assists actors in the EV eco-system to ensure that pathways that guide transition to EVs in public transport in Uganda are effective, sustainable and all-encompassing. The paper offers the following exceptional advantages: 1) It adopts the analytical hierarchical process approach that weights the barriers and drivers of mass public transport electrification. 2) By weighting the drivers and barriers, the study directs policy on which area to place emphasis in order to hasten the transition. 3) The study mirrors what could be the scenario in other developing countries where EV adoption is still meagre and thus recommendations from the study can be applied to them too.

The paper is structured as follows; After the introduction, the second section discusses theoretical and empirical literature on knowledge and discernment of EVs and their adoption. Section three discusses the methodological approach used for the study. The fourth section presents the results and discussion of the results whereas section five presents the conclusion and recommendations drawn from the study.

Methods

The study uses the Analytical Hierarchy Process (AHP) methodology (Saaty, 1980) to establish the weighted rankings for the barriers and potential drivers of electrification of mass urban public road transport. The AHP is a systematic approach that estimates individual subjective judgements during decision making and ranking of aspects (Vaidya & Kumar, 2006; Ball & Srinivasan, 1994). The AHP model makes an analysis of the hierarchical makeup of a research context or problem and makes it possible for decision makers to make trade-off decisions by converting subjective preferences into numbers which are represented as weights (Shen et al, 2015; Saaty, 2008). Attributes that exhibit higher values are more important than the attributes with lower values. The purpose of weighting any attributes is to establish a framework that is structured and can be used to prioritize interventions and or policy strategies.

The study obtained data from 30 e-mobility experts and they gave their ranking of the barriers and drivers of mass public transport electrification. To ensure unbiasedness and consistency of results, the study used the consistence index (Saaty, 1994). The consistency index or ratio takes on values from 0 to 1. Consistent responses should have a

consistency ratio that is closer to 0 whereas inconsistency of responses is recorded if consistency values are closer to 1. Since the study respondents were experts, only consistence ratios from 0 to 0.1 were considered in accordance to Ho et al, (2005) who assert that for expert respondents, the consistence ratio should be 0.1 and less, whereas non-expert respondents can have a consistency ratio that is less or equal to 0.2.

Results

The key result of the paper is that environmental benefits of using electric vehicles and financial incentives attached to transport electrification are the most significant drivers of public transport electrification and lack of information and limited vehicle range are the most significant barrier to public transport electrification.

Conclusions

The identified weights of the barriers and drivers to public transport electrification indicate the areas that the government ought to respond in a chronological order so as to hasten the process of publis transport electrification. By following the chronology, it means that stakeholders can avoid wasting resources by concentrating on policy gaps that do not show a high level of importance. Policies should be focused on strengthening the drivers and combating the challenges.

Key words: Electric vehicles, Mass public transport, Barriers and drivers, Analytical Hierarchical Process