Economic impact of transition to electric trucks. Case study of a freight transport microentrepreneur in Mexico.

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Research field: x Economics, ☐ Technology, ☐ Politics, ☐ Social Aspects
Preferred Presentation Type: x Oral ☐ Poster

Abstract

Throughout 2023, 100,818 units of the 671,002 internal combustion freight engine vehicles that circulated in Mexico were 3-axle trucks (class C-3, according to Mexican regulations), of which 90% were used for general cargo transportation. Out of the total number of C-3 trucks in the country, models from 1960 - 1999 represented 55% of the total, 22% models from 2000 - 2010, and 23% models after 2011. In 2023, there were 211,424 general cargo transportation permit holders, of which 87% were microentrepreneurs (owners of 1 to 5 vehicles). Being the research question: What challenges does a microentrepreneur face when making the decision to transition to electric cargo vehicles? The objective of the study was to conduct a technical-economic study focused on a microentrepreneur with two C-3 trucks that distributes food merchandise and household materials, which makes an average of 391 trips per year, traveling 281 km on average per trip, with a 1978 C-3 truck that offers a diesel fuel economy of 3.38 km/l, an initial cost of $13,813.0 dollars and at least ten more years of useful life. The estimated Net Present Value during the 2019-2023 period was $33,348.84 dollars considering an interest rate of 15%, which represented a viable project. During 2023, fuel expenses represented 67% of variable, fixed and administrative costs. Currently, the price of an electric truck, designed and manufactured locally, like the C-3 category and its on-site recharging system represents an approximate investment of $190,000.0 dollars. To ensure the viability of the transition project to an electric truck during the 2019-2023 period, with the same 15% interest rate, annual expenditure flows would have to represent less than 25% of those obtained with the current C-3 truck. Performing the same exercise, if the interest rate were only 5%, the annual expenditure flows would have to represent less than 49% of those obtained. Current electric truck technology allows for a reduction of more than 50% in carbon equivalent emissions per ton/km compared to internal combustion technology, but the development of inclusive and modern financial services that drive innovation and productivity in companies must be promoted.

Introduction and Motivation

Applied Method

Results

Conclusions

References