

How to Trigger Mass-Market Adoption for Electric Vehicles? - An Analysis of Potential Electric Vehicle Drivers in Austria

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Motivation and Research Questions

Road transportation is one of the biggest contributors to CO₂ emissions globally. By choosing full-electric over conventional fuel vehicles, car users can lower greenhouse gas emissions and help mitigate the causes of climate change (UNFCCC; 2015). Even though barriers to the adoption of electric vehicles such as price, range, charging infrastructure, etc. are diminishing, sales growth has fallen short of industry expectations (IEA 2016). Hence, it is of importance to better understand potential electric vehicle (EV) adopters compared to early and non-adopters and to identify drivers to accelerate the diffusion of zero-emission cars.

This research project advances existing analyses (e.g., Axsen et al. 2016; Nayum et al. 2016) by concentrating on two research objectives. First, we aim at advancing our understanding of early and potential adopters of EVs with a particular focus on cultural worldviews individuals subscribe to as predictors of acceptance. Second, we aim to shed some light on the different sub-groups of potential adopters with distinct socio-demographic and psychographic profiles and their preferences for policy incentives.

Methods and Data

A nationally representative survey on public perception regarding renewable energy forms in Austria was conducted in autumn 2016 (n=1,000). Filter questions in the beginning of the questionnaire ensured that all respondents were involved in household decisions relevant to our context. A subsection of the questionnaire focused in particular on issues surrounding EVs, such as details on participants' current car ownership (e.g., type, age, firm car yes/no, used vs. new, type of engine, etc.), their general willingness to invest into EVs as a next vehicle and their purchase intention. Based on this information we classified the respondents into three groups (dependent variable):

- *Early Adopters* (17%): already purchased an EV or intend to buy an EV as next car
- *Potential Adopters* (32%): stated an interest in purchasing an EV
- *Non-adopters* (51%): No purchase intention at all for an EV

Moreover, a set of EV policy incentives were evaluated based on their perceived attractiveness to stimulate the purchase of a full-electric EV. Further questions were included to evaluate potential purchase- and non-purchase motives. To allow for comparison between different customer segments, socio-demographic variables such as age, education level, income, number of people per household, dwelling density (urban vs. rural), and number of cars per household zip-code were collected. The zip-code also served as basis for the contextual variable regional policy incentives per sub-region, which was researched and included post-survey manually. Moreover, the survey also asked for socio-psychological information on respondents' worldviews (hierarchical and individualistic), pro-technological and pro-environmental attitude.

We used multinomial logistic regression to test whether the socio-demographic, socio-psychological and context- characteristics have an influence on the willingness to purchase EVs. Further analyses included factor analysis of electric vehicle purchasing and non-purchasing motives, which served as an input for a k-means cluster analysis, identifying different potential adopter segments. These segments were then characterized along a set of socio-demographic and socio-psychological variables with multiple single ANOVAs.

Results and Conclusions

Socio-demographic factors seem to play a marginal role in explaining the differences between the electric vehicle adopter segments, with the expectation household size and the number of cars. In contrast to this, socio-psychological variables seem to be better predictors of respondents' willingness to purchase an EV in the future. Non-adopters are more likely to have a more individualistic and less egalitarian worldview, a less pro-environmental and technological attitude than early adopters. Potential adopters compared to non-adopters are twice as likely to be pro-environmental and less likely to have a hierarchical worldview. Potential

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² Sample identified as ten current EV and hybrid electric vehicle drivers out of a 1,000, which is equivalent to the Austria current EV market share of approx. 0.1% (Austria Tech, 2015).

and early adopters are also very similar in their socio-psychological characteristics except for that potential adopters tend to be significantly more individualistic than early adopters. Regarding context variables, analyses showed that early adopters live in regions with more elaborated EV-incentive systems, i.e., for instance, potential adopters are 65% more likely to live in a sub-region with no subsidies than respondents of the early-adopter segment. However, our analysis also showed that EV policy incentives as predictor overall are not statistically significant, because the non-adopters seem not to be affected by incentives.

To get a better understanding of the differences between potential adopters and their incentive preference, this paper identifies four groups with varying degrees of attitudes towards EVs purchase and non-purchase motives (see table 1). Across all four clusters, we identified different preferences regarding the altitude and type of incentives. Hence, in contrast to literature (e.g., Langbroek et al., 2016) we argue that there is some preference difference between user-orientated and purchase-incentives among potential customer segments. The identification of proper incentive-packages for different target groups and their actual effectiveness could be fields of further research.

Table 1: Four profiles of potential adopters identified by cluster analysis

	Low purchase motives	High purchase motives
High non-purchase motives	<u>Conservative Non-Techies (34%)</u> : more likely to be female, better educated, living on the countryside and has a higher income Preference for purchase-based incentives	<u>The Undecided (28%)</u> : less educated, earn below average income, inhabit more likely the countryside and has a more individualistic worldview High preference for any kind of policy incentive
Low non-purchase motives	<u>Undiscerning Urbanites (16%)</u> : tend to be younger and more educated and live in an urban area, tend to have no car No real preference for incentives at all	<u>EV Supporters (32%)</u> : a male, older and environmentally conscious car driver, who shows high pro-environmental attitude Decent high preference for purchase- and user-based incentives, similar to early adopters

All in all, our study contributes to the literature by showing first insights regarding the effect of cultural worldviews as predictor of EV purchase. Given the abstract nature of cultural worldviews the findings reported above represent a very promising starting point for future studies in this line of research. Furthermore, with our findings we aim to support marketers and policymakers to better tailor their messages and incentives towards new identified potential adopter segments and encourage them to “walk their talk”. Last but not least, our study aims to contribute to the current discussion of governments and policymakers, which EV incentives are most suitable and attractive for potential EV drivers.

Publication bibliography

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