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How can people be convinced to buy electric cars? – case of Slovenia

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Abstract

Electric cars represent a promising energy- and carbon-efficient alternative to internal combustion engine cars. However, as mobility behaviour is highly habitual, convincing people to switch from conventional cars to electric is challenging. In the following research, which was carried out in the past years in Slovenia, an attempt was made to determine what influences people's buying habits and what would motivate them to buy an electric car. It appeared that the most relevant factor for not purchasing electric cars is, firstly, its overall too high price, and, secondly, short driving ranges. Different studies, as well as the results of the following research have revealed that there is no single measure which would dramatically increase the demand for electric cars. The solution is to combine different measures or strategies like Top – Down and Bottom – Up, where both the government and car industry should come across.

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1. Introduction

According to Wards Auto's research (2014), global car registrations increased from 980 million units in 2009 to 1.015 billion in 2010. The world population exceeded 7 billion on March 12, 2012 and every seventh person in the world now owns a vehicle, which in all likelihood is powered by an internal combustion engine. Worldwide, 18 million barrels of oil is consumed each day by the automobile sector. Annually, the vehicles emit 2.7 billion tons of CO₂ (IEA, 2012).

Inevitably, from a climate change perspective the release of such large amounts of CO₂ will need to be examined. Therefore, replacing internal combustion engine cars with electric cars has the potential to greatly reduce greenhouse gas emissions from the transportation sector. Electric cars currently make up a small fraction of the marketplace, and researchers are interested in understanding what it would take to make car buyers more enthusiastic about going electric (Anthropocene, 2017). High purchase costs and short driving ranges have been considered the main factors, which impede people's decision to buy electric vehicles (Knez et al., 2014; Degirmenci and Breitner, 2017).

Results of Xiuhong and his colleagues study (Xiuhong et al., 2018) indicate that the EV purchase intention can be

explained 57.1% variance by consumer perception and personality. Two types of personality, such as personal innovativeness and environmental concern, significantly affect EV purchase intention directly. They are also significantly mediated by two kinds of perceptions (i.e. positive and negative utilities).

The results (Wang et al., 2018) show that a consumer's knowledge about EVs is positively and significantly related to the perceived usefulness, attitude and intention to adopt EVs, but negatively and significantly related to the perceived risk. The perceived risk negatively affects the perceived usefulness, attitude and intention to adopt EVs. Meanwhile, the perceived usefulness has a positive effect on adoption intention and attitude, and attitude is positively related to the intention to adopt EVs or even recent technology of autonomous vehicles (Barsi et al., 2018).

There are several factors for the purpose to find out drivers and barriers against consumer EV adoption (Carreno and Welsch, 2009). They can be categorized into three sets (Bjerkkan et al., 2016; Sierzchula et al., 2014), namely: (1) Technological factors that include vehicle ownership costs, driving range, and charging time. (2) Consumer characteristics that involve demographics and personality. The former includes a series of personal characteristics such as age, gender, education and experience. The latter reflects personal

inner feelings and values to events, people, and situations in their lives. For example, traits such as dogmatism, risk-taking propensity, and anxiety level are typical personality variables. (3) context factors, such as government incentives, fuel price and charging infrastructures.

The influence of taxation and other policy measures upon vehicle purchasing decisions will thus also vary and need to be accounted for in future policy decisions. Governments across the world have proposed a variety of policy mechanisms and invested billions of dollars to support EV development (Du and Ouyang, 2017).

The Accenture's survey (Gigaom 2011) offers an interesting glimpse of what potential buyers are thinking about when it comes to purchasing and driving electric cars. It shows private and government-marketing efforts are working to instil the idea that electric cars are better for the environment and perhaps even cheaper to own and operate in the long run. However, the survey also confirms several key concerns by utilities that consumers could end up driving up electricity demand during hours when power use already is high, such as in the afternoon on a hot day or in the early evening when people return home and use their TVs and appliances. Accenture's survey also showed that 51 percent of people would buy electric if they know that the cost of owning the car over time is lower than cars that run on gas.

Du et al. (2018) present three main findings of who buys new energy vehicles in China. First, there is an "awareness-behaviour gap" whereby low-carbon awareness has a slight moderating effect on purchasing behaviour via psychological factors. Secondly subjective norms have stronger influence on intention to purchase new energy vehicles than other social-psychological factors. Third, acceptability of government policies has positive significant impact on adoption of new energy vehicles, which can provide reference potential template for other countries whose market for new energy vehicles is also in an early stage.

There are many reasons from technology to societal preferences behind our slow take-up of electric cars, but the poor choice of available electric cars also plays a part. This paper examines policies and consumer behavior on electric vehicles. Many countries have policies and targets for going electric and we are starting to see considerable momentum from car manufacturers towards electric cars. However, looking at the sales of electric vehicles in general, we still have a long way to go and lot of barriers to overcome before we achieve an all-electric vehicle car stock. The reasons have to do with both vehicle technology and broader societal norms and preferences. Without a doubt, price and vehicle range still have a role to play, but the issue of slow electric vehicle uptake goes beyond this. People are heterogeneous, which is economic-speak for saying, we are all different (RTE, 2017).

2. Experimental

The study presented in this paper is a research study, which explores factors that convince / discourage people from buying an electric car, done in Slovenia in year 2013. The population of this survey are households that currently own

a vehicle and people that currently do not own a car or do not have daily access to a car when they require it. Sample was represented by 681 participants (52% of participants were women and 48% were men).

The collected data was processed and analysed with statistical software programme SPSS for statistical analysis. The secondary data were collected with compilation method from various scientific and professional papers, research and different project reports focused on examined research topic. There were also a few limitations of the study, such as a limited period and subjectivity of people's personal opinions, which can be dynamic and can vary through time. Another is a statistical sample, which may not actually represent the whole population.

3. Results and discussion

The study was designed to reveal the underlying factors that affect the purchasing habits of people. The results have revealed new perspective of purchasers and which factors are the most important for the purchase of a LEV. Three non-financial factors are crucial when deciding for a car purchase – 1st: "overall condition and mileage of vehicle (if you buy a used car)", - 2nd: "safety features" and – 3rd. "body shape of the car" (Fig. 1). Other very important factors are vehicle size (exterior), style/ appearance/ colour and fuel type.

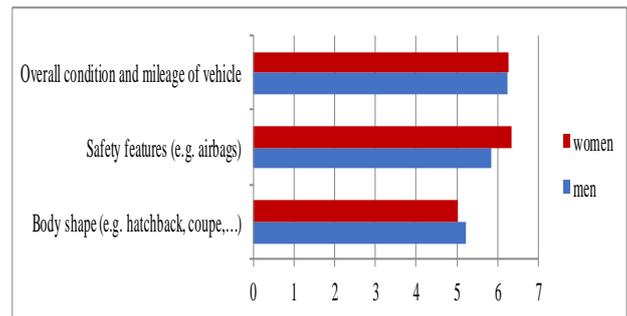


Fig. 1. The three most important vehicle performance factors (On the scale from 1 to 7 where 1 means NOT IMPORTANT and 7 means VERY IMPORTANT)

The results indicate that there are some differences between male and female population, especially when examining safety features, acceleration and fuel type. Safety is more important for women while acceleration and fuel type is more important for men.

When it comes to financial features, most important thing seems to be the overall price of the vehicle. The second feature, also very important, is fuel economy (Fig. 2). Especially now, when gas prices are high and are still increasing, information concerning fuel consumption is crucial. People also put emphasis on repair costs and on value/money ratio.

Based on the results from this research no significant differences between males and females in financial considerations were found. Average grade for individual financial factors was almost the same.

The respondents were asked about petrol as well as diesel prices. If the gas prices increased, by 30%, 58% of people

would start to consider buying an electric car. The results are presented in Fig. 3.

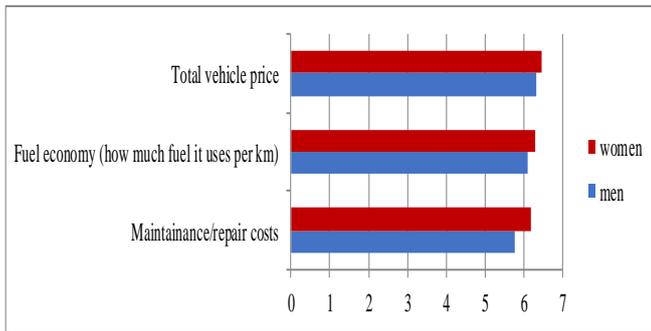


Fig. 2. The three most important financial considerations (On the scale from 1 to 7 where 1 means NOT IMPORTANT and 7 means VERY IMPORTANT)

It is clearly seen in Fig. 3 that increasing fuel prices are a motivating factor for people to consider buying an electric car.

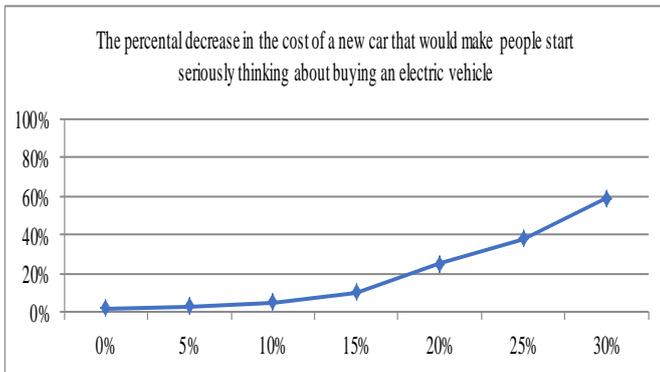


Fig. 3. Influence of increasing fuel prices on alternative fuel vehicle demand

Another key result of this research has shown that when people buy a car, they are more interested in its overall price, and not in different taxes.

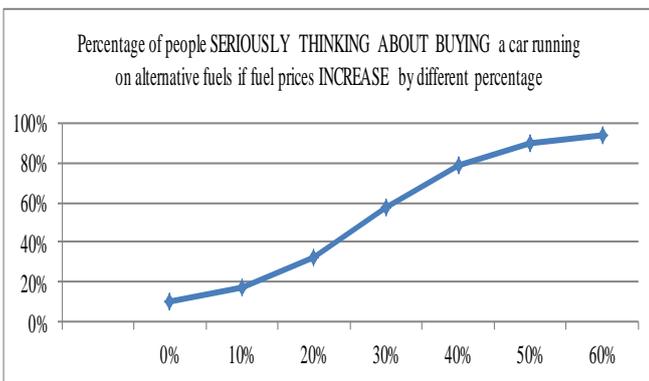


Fig. 4. Percentage of respondents seriously thinking about purchasing electric car dependent on potential price decrease of an electric car

Two percent of respondents are already thinking about buying an electric car despite their relatively high prices. If

the prices of electric cars decreased by 10%, 5% of all the research participants would seriously consider purchasing an electric car. If prices decreased by 20%, 25% of all respondents would seriously consider purchasing an electric car, and if prices decreased by 30%, more than a half (59%) of respondents would seriously consider about purchasing an electric car. The results are presented in Fig. 4.

4. Summary and conclusion

This study provides both a theoretical and practical contribution to understanding of factors that influence car-purchasing decisions of people in Slovenia and around the world. Many studies as well as results from the study have revealed that there is no single measure which would dramatically increase a demand for electric cars. The solution is to combine different measures or strategies like “Top – Down” and “Bottom – Up”, where both government and car industry should come across.

According to the study, the main factor which influences car purchasing decisions of people is the price of electric cars, which is still too high. However, when taking into consideration the costs of using an electric car, which are a few cents/km for an electric car, and for a comparable conventional car, a few dozen cents/km – it is different. The fact is that an electric car is cheaper at the time of use. Nowadays, there are already a few electric models on the market. The number of electric cars will gradually rise; all the EU countries offer subsidies to buy an electric car (also Slovenia); countries are adopting policies to limit the number of polluting vehicles, etc. It is believed that this is an additional pressure on the purchase price of electric cars, which will only fall. It is thought that various stakeholders involved in the promotion of electric cars should have more emphasis on promoting the costs at the time of their use. This way, people would know when and how to buy an electric car, when it is a turning point - when all the costs of an electric car (vehicle price plus the cost of use) are equal to the cost of a conventional vehicle etc. It would be necessary to elaborate and segment the needs of people and to clearly link correlation types of electric cars, which would further demonstrate the rationale and justification of purchasing an electric car. However, since this is not yet the case, potential buyers cannot explain this, they first see the excessive purchase price, which discourages them from purchasing.

The second most important factor which influences electric car purchasing decisions of people is short driving ranges of electric cars. Much research around the world, as well as our own research shows that the average daily travel distance of most people is between 30 and 50km. Large percentage of other family cars, in major European cities, never leave the city premises. Today, most of new electric cars, even in winter conditions, with a single charge "can drive" 150km and more. It is agreed that an electric car cannot satisfy everyone and fulfil all the requirements. People have different travel needs and habits, but with great certainty, it can be stated that most of us belong into that group with average driving habits. It can be predicted that an electric car will very soon

be an alternative to many second- family cars, which are on average used only within cities.

The electric car still too expensive and may not yet satisfy all drivers, but - it is a nice car, quiet, ever-more beautiful shapes and colours, with great acceleration and good driving characteristics - and at the same time very environmentally friendly.

Moreover, all dealers who, beside conventional cars, sell also electric cars should change some marketing tactics. Like - an electric car should be their additional offer, their extra opportunity to get closer to new (green) customers. They should also start educating their sales staff, and introduce electric cars to all customers as a possible alternative, start using new innovative approaches etc. today an electric car is a small marginal trend that will soon expand and could be a strategic advantage and a business opportunity for sellers.

Certain government institutions are carrying out various policies for promoting the use of electric cars; however, their reports present effects of each project, but every report is only a piece of the puzzle and there is a lack of connection between these projects. How can we know where we are on the road to implementation of electric cars? Review of policies for promoting the use of electric cars is very important, because this is an efficient action to review past activities, point out current perspective and successful and unsuccessful policies and determine future measures for greater implementation of electric cars.

In summary, the major contribution of this study is the investigation of different factors which affect purchasing decisions, what convinces people to buy an electric car or, at least seriously, start thinking about it. The results of this exploratory study represent only the beginning of the future research in a domain growing in theoretical and practical importance. The authors also propose the EV is a solution to reducing CO2 emissions in the transport sector in moving towards a more sustainable future as it is the second largest contributor of these harmful gases after the energy generation sector.

If Slovenia wants to introduce electric cars in larger scale as soon as possible, competent authorities must prepare and adopt legislative framework for introduction of electric cars with representatives of car manufacturers, energy companies and local authorities. Experience shows that combination of legal regulation and financial grants is the best assurance for introduction of electric cars and the most effective form of policy for promoting the use of electric cars.

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我们如何召集人们购买电动汽车 – 斯洛文尼亚的案例?

關鍵詞

电动车
采购行为
战略管理
汽车制造业
斯洛文尼亚

摘要

电动汽车代表了一种有前途的能源和碳效率的内燃机汽车替代品。然而，由于移动行为非常习惯，说服人们从传统汽车转向电动汽车。在我们的研究中，我们想要激励他们。事实证明，这是第一次成为最好的车辆。不同的研究，可能会大大增加对电动汽车的需求。解决方案 - 顶部和底部 - 上下。