

The Electric Vehicle and the Consumer: From Environmentalists to Innovators?

Jones, A.

Author post-print (accepted) deposited by Coventry University's Repository

Original citation & hyperlink:

Jones, A 2018, 'The Electric Vehicle and the Consumer: From Environmentalists to Innovators?' *Social Business*, vol 8, no. 1, pp. 29-36.

<https://dx.doi.org/10.1362/204440818X15208755029528>

DOI 10.1362/204440818X15208755029528

ISSN 2044-4087

ESSN 2044-9860

Publisher: Westburn Publishers

Copyright © and Moral Rights are retained by the author(s) and/ or other copyright owners. A copy can be downloaded for personal non-commercial research or study, without prior permission or charge. This item cannot be reproduced or quoted extensively from without first obtaining permission in writing from the copyright holder(s). The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the copyright holders.

This document is the author's post-print version, incorporating any revisions agreed during the peer-review process. Some differences between the published version and this version may remain and you are advised to consult the published version if you wish to cite from it.

The Electric Vehicle and the Consumer: From Environmentalists to Innovators?

Abstract

Due to enduring technical limitations the adoption of electric vehicles (EVs) across most automotive markets has been sluggish, despite many national governments providing generous incentives for consumers. As a result, EVs have been positioned as a 'niche' product mainly targeted at 'consumers with a conscience' who are willing to overlook these technical limitations in order to purchase an 'eco friendly' vehicle. However, recent advances in battery technology as well as the arrival of new players such as Tesla provides the basis for an alternative approach to emerge. Instead of seeing these vehicles as 'eco friendly' products, EVs can be positioned as desirable high-tech 'gadgets' which appeal to a wider base of consumers. Like tablet computers or smartphones, securing mass-adoption for EVs may be possible if these products are promoted as a must-have gadget or badge of honour.

Introduction

With the threat of climate change and resource depletion, national governments have come together through treaties to specify targets for the reduction of carbon emissions and the promotion of alternative energy sources. At the centre of policy responses to these challenges has been the transport sector, which in the UK contributes around a quarter of greenhouse gas emissions. Over the last decade there has been significant investment in policies to encourage the design, manufacture, and consumption of alternatively fuelled vehicles such as hybrid, fuel cell, and fully electric vehicles (EVs). However, despite, policymakers providing incentives, such as subsidies, tax relief and free parking, the adoption of alternative non-internal combustion engine (ICE) vehicles has been sluggish, with consumption rates far below the requirement for these vehicles to be considered as mass market products (Berkeley et al, in press). For example, data for the first quarter of 2017 shows EV sales in Europe at 0.84% share of the market, compared to 0.68% in 2016 and 0.49% in 2014. Only in two countries, Netherlands (2.1%) and Norway (21.1%) has market share reached more than 2% (Automotive Industry Data Newsletter, 2017, p4).

Aside from Norway and to some extent the Netherlands, the presence of incentive schemes has not been sufficient to 'tip the market' towards mass adoption. For the majority of consumers, EVs have a series of barriers, many of which appear 'enduring, which outweigh any incentives being offered to purchase these vehicles. For example, many consumers see EVs as an 'inferior' or 'unproven' technology (i.e. Egbue and Long, 2012; Greene et al., 2014; Graham-Rowe et al., 2012; Steinhilber et al., 2013; Aksen and Kurani, 2013; Wan et al., 2015). Furthermore, many drivers share concerns surrounding driving range and battery durability (i.e. Egbue and Long, 2012; Daziano and Chiew, 2012; Carley et al., 2013). Others express concern surrounding charging (i.e. Wikstrom et al., 2016, Skippon and Garwood, 2011, Bunce et al., 2014 and Graham-Rowe et al., 2012). Additionally, potential customers are also deterred by the premium price charged by producers (i.e. Egbue and Long, 2012; Diamond, 2009; Carley et al, 2013; Heffner et al 2007; Browne et al 2012; Lane and Potter, 2007). Whilst this does not address each barrier cited in the literature, it is apparent that consumers face significant behavioural changes when adopting an EV. Aside from these issues, consumers also face limited choice in the EV market. This is underlined by just three models (Nissan Leaf, Renault Zoe and BMW i3) accounting for 62% of EV sales in Europe in the first three months of 2017 (Automotive Industry Data Newsletter, 2017).

The low rate of adoption is brought into sharper focus by recent policy announcements from the British and French governments which propose a ban on the sale of new petrol and diesel vehicles in 2040. In addition, manufacturers such as JLR and Volvo have confirmed that new models, produced from 2020 and 2019 respectively, will have an electric or hybrid drivetrain. In response to the 'dieseldgate' emissions scandal, the VW Group has committed resources towards the development of EVs, suggesting that attitudes in the car industry towards EVs are changing. Whereas Van Bree et al (2010) spoke of institutional 'lock in' for ICE vehicles, manufacturers committing resources to the development of EV technologies, not only provides consumers with the opportunity to have more choice, but also helps to improve the existing performance of these vehicles. Whilst these technological improvements are welcome, there are further issues concerning consumer attitudes which must be addressed by policymakers and OEMs. This paper will briefly outline the current literature surrounding the EV consumer and their adoption intentions, before outlining how positioning the EV differently could lead to greater rates of consumption.

The EV Consumer and Adoption Intentions

White and Sintov (2017) argue that understanding adoption decisions in relation to EVs cannot simply be reduced to price signals. Instead there are a range of supplementary factors, including instrumental and symbolic features, which must be assessed in order to understand consumer choices in relation to EV adoption. Instrumental features of these vehicles are associated with their functional attributes, so refer to factors such as driving range, charging, reliability, purchase price, and other performance aspects (i.e. Graham-Rowe et al., 2012, Burgess et al., 2013, Aksen and Kurani, 2013). Steg (2005) defines symbolic attributes as being related to the emotions and symbolism associated with vehicles. There has been much debate surrounding these aspects in the existing EV literature, with White and Sintov (2017) highlighting how EVs can be seen as symbols for environmentalists or innovators. They also add that symbolic attributes are particularly important as they can help to 'construct' an individual's identity or express self-identity and social status. Essentially, the vehicle is being used to express status, lifestyle, personality, and to promote a self-image (Daziano and Chiew, 2012, Noppers et al., 2014, Lane and Potter, 2007, Sexton and Sexton, 2014).

Generally early adopters of EVs have been categorised as 'consumers with a conscience' and multiple studies including White and Sintov (2017), Krupa et al (2014) Heffner et al (2007)

and Axsen and Kurani (2013) suggest consumers of low emission vehicles are motivated by a concern for the environment, reinforcing the notion of 'environmental symbolism'. Early adopters have also been framed as consumers who have previously purchased environmentally friendly products (Petschnig et al., 2014). For these individuals, the price and technical limitations of EVs has been of little consequence. Heffner et al (2007) and White and Sintov (2017) posit that paying a premium price for an EV is a form of 'altruistic' signalling, where the customer believes manufacturers are 'rewarded' for investing in green technologies, so they are willing to pay the higher cost. Conversely, business is then taken away from those OEMs which do not have a sufficient non-ICE alternative. In terms of the technical limitations, White and Sintov (2017) add that users who embraced the technological learning curve had stronger adoption intentions. This was seen as a 'cost' of becoming a 'trendsetter'. This is reinforced by the wider view in the literature which suggests consumers with strong pro-environment identity are willing to purchase EVs despite their current technical limitations. Rather than focus on these limitations, some of the early adopters want to display environmentally conscious behaviour (Daziano and Chiew, 2012, Schuitema et al., 2013). In other words, the technical limitations did not have a negative impact on purchase decisions for these consumers, but clearly, this view is not held by the majority of motorists.

For some consumers, the adoption of alternatively fuelled vehicles is a tacit rejection of conventional technologies. This is part of what Heffner et al (2007) termed as 'community symbolism' where some hybrid drivers noted that they had rejected desires to drive more powerful vehicles. Instead they had purchased hybrid vehicles not because they wanted to 'stand out', but because they wanted to 'make a difference'. Moreover, the purchase of a 'highly observable eco-product' (such as an EV) is effective in displaying an image to others (Lane and Potter, 2007). Meanwhile, some drivers believed that EV adoption was 'different' or 'trendy' (Ozaki and Sevastyanova, 2011). However, for some motorists, EV adoption is considered as a negative', and these vehicles are not seen as 'trendy'. EVs have traditionally been associated with negative stereotypes, which in the UK have been drawn from poorly performing vehicles such as milk floats (Burgess et al., 2013). These negative stereotypes have influenced some consumers to reject EVs as they have pre-conceived ideas about the performance of modern vehicles based on these existing beliefs. For drivers which Burgess et al (2013) term 'traditionalists' this has created a perception that EVs are a source of amusement and derision. These drivers do not hold any direct experience, but they believe

the technology is inferior and are resistant to its implementation. Indeed, these drivers also associated EVs with a loss of masculinity (Burgess et al., 2013). This narrative is concerning as mass-market adoption will have to include those who are currently resistant to change, so clearly, existing approaches have been unsuccessful in addressing this problem.

So having established that the likely adopters of EVs are 'consumers with a conscience' or those with a strong sense of 'environmental symbolism' there is a need to explore this construct further. Although environmentalism is considered to be a key aspect of the symbolic motives behind EV adoption, do drivers actually have environmental concerns or is the use of an EV simply to promote a desired image? Lane and Potter (2007) observed that an attitude-action gap existed whereby concerns or intended actions were not realised. For example, in citing fuel usage they argued that consumers had little understanding about fuel use and emissions. Similarly, Ozaki and Sevastyanova (2011) reported that the topic of the environment was 'too large' for most consumers to fully comprehend. Despite consumers claiming green motives, they did not fully understand the construct. In some cases, consumers who purchased an EV as a status symbol did not in reality hold 'environmental' concerns (Daziano and Chiew, 2012). Furthermore, other studies have found the most environmentally conscious consumers had concerns related to the sustainability of the fuel source used to power the vehicles (Graham-Rowe et al., 2012, Egbue and Long, 2012, Delang and Cheng, 2014). So are 'green' consumers really this most appropriate target for EVs?

The EV as a Gadget: The Path to Mass-Market Adoption?

As this paper has clearly established, the existing approach to marketing and promoting EVs has not led to mass-market adoption. Although broadly targeted at 'consumers with a conscience' simply using instrumental features of EVs to secure interest has not been sufficient in 'tipping' the market. So if EVs are to become mainstream products and secure the social and environmental benefits that policymakers desire, an alternative approach to promoting and selling these products is required. As this paper has highlighted, existing OEMs are beginning to shift more resources towards the development of EVs, and this should in-time resolve issues surrounding product range and functional limitations. However, it is the arrival of new players in the EV market, such as Tesla, which has provided the basis for an alternative approach to promoting and branding these products. Instead of a vehicle for the environmentally conscious, the Tesla product range is promoted as a desirable gadget, badge of honour and a 'must-have' brand. This paper has already noted

how image is important in influencing adoption intentions, so positioning the EV as a 'must have' gadget, similar to tablets or smart phones, could resolve the mass-adoption challenge. Basically, to achieve mass-adoption, it may be necessary to ignore those consumers who are solely motivated by 'green' issues, and instead promote EVs as a technical innovation.

So rather than promoting EVs at a 'niche' of potential users, many of whom may already be questioning the sustainability of the technology, framing these vehicles as gadgets opens up a larger pool of potential adopters, particularly those who are interested in technology. As White and SIntov (2017) note 'innovator' symbolism is strongly associated with the intent to purchase an EV, so it makes sense for manufacturers to amend their approach, and become more serious in marketing EVs at individuals with these beliefs. In supporting this approach, it is apparent that investment from manufacturers such as BMW, JLR, Tesla, and Volvo has created highly desirable vehicles which can be targeted at 'premium buyers'. Whilst aesthetic limitations of EVs are discussed in the literature (i.e. Graham-Rowe et al., 2012), these problems are being alleviated with improved design. Additionally, this also helps to strengthen the brands of those producers selling these 'premium' products.

Positioning EVs as gadgets should not stop at the promotion and branding of these vehicles, it can also be extended to sales channels. New players, such as Tesla, utilise different business models to existing producers (i.e. Bohnsack et al., 2014, Dijk et al., 2016), and this provides an opportunity for more 'creative' ways to navigate the weaknesses of EVs (Bohnsack et al., 2014). For example, rather than selling their vehicles through an established dealer network, Tesla use sales channels more common to producers such as Apple by establishing retail outlets in prominent shopping centres. This helps to reinforce the notion of the EV being positioned as a 'gadget' but is clearly an approach which the vast majority of mainstream manufacturers would be unable to replicate. Indeed, the arrival of other new players into the automotive sector, such as Apple and Google, provides the basis for further 'disruption' in business models in relation to electric and other technologies.

Summary

So is positioning EVs as a 'gadget' the complete solution to the adoption problem? Clearly there are other areas which need to be addressed in order to secure mass-market adoption. For instance, it is questionable as to whether consumers have full information surrounding EVs, therefore how can an informed judgement be made? Whilst Axsen et al (2013) found

that interpersonal relationships between buyers and early adopters was important in addressing this problem, there also needs to be a role for manufacturers and policymakers in ensuring that correct and adequate information is available. Likewise, there needs to be support for the EV 'ecosystem' through the provision of sufficient infrastructure to support the transition to EVs. Indeed investment in this area can act as an important signal to buyers. Also, perhaps, somewhat more radically, producers or other organisations could consider alternative ownership models to maximise the social impact of the transition. For instance, car share schemes not only encourage motorists to use an EV without the concerns of the cost, they can also benefit those who may struggle to access conventional vehicles.

References

- Automotive Industry Data Newsletter (2017) Top 3 Selling EVs Quarter One 2017, AID Newsletter, Issue No. 1708, p6, AID Ltd, Warwick.
- Axsen, J., and Kurani, K. (2013) Hybrid, plug-in hybrid, or electric-what do car buyers want? *Energy Policy*, 61, pp532-543.
- Axsen, J., Orlebar, C., and Skippon, S. (2013) Social influence and consumer preference formation for pro-environmental technology: The case of a UK workplace electric study. *Ecological Economics*, 95, pp96-107.
- Berkeley, N., Bailey, D., Jarvis, D., and Jones, A. (in press). Assessing the transition towards electric vehicles: a Multi-Level Perspective on drivers of, and barriers to, take-up *Journal of Transportation Research Part A: Policy and Practice*.
- Bohnsack, R., Pinkse, J., and Kolk, A. (2014) Business models for sustainable technologies: Exploring business model evolution in the case of electric vehicles. *Research Policy*, 43(2), pp284-300.
- Browne, D., O'Mahony, M., and Caulfield, B. (2012) How should barriers to alternative fuels and vehicles be classified and potential policies to promote innovative technologies be evaluated? *Journal of Cleaner Production*, 35, pp140-151.
- Bunce, L., Harris, M., and Burgess, M. (2014) Charge up then charge out? Drivers perceptions and experiences of electric vehicles in the UK. *Transportation Research Part A: Policy and Practice*, 59, pp278-287.
- Burgess, M., King, N., Harris, M., and Lewis, E. (2013) Electric vehicle drivers' reported interactions with the public: Driving stereotype change? *Transportation Research Part F: Traffic Psychology and Behaviour*, 17, pp33-44.

Carley, S., Krause, R.M., Lane, B.W., and Graham, J.D. (2013) Intent to purchase a plug-in electric vehicle: A survey of early impressions in large US cities. *Transportation Research Part D: Transport and Environment*, 18, pp39-45.

Daziano, R.A. and Chiew, E. (2012) On the effect of the prior Bayes estimators of the willingness to pay for electric-vehicle driving range. *Transportation Research Part D: Transport and Environment*, 21, pp7-13.

Delang, C.O., and Cheng, W-T. (2014) Consumers' attitudes towards electric cars: A case study of Hong Kong. *Transportation Research Part D: Transport and Environment*, 17(6), pp492-494.

Diamond, D. (2009) The impact of government incentives for hybrid-electric vehicles: Evidence from US States. *Energy Policy*, 37, pp372-983.

Dijk, M., Wells, P., Kemp, R. (2016) Will the momentum of the electric car last? Testing an hypothesis on disruptive innovation. *Technological Forecasting & Social Change*, 105, pp77-88.

Egbue, O., and Long, S. (2012) Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions. *Energy Policy*, 48, pp717-729.

Graham-Rowe, E., Gardner, B., Abraham, C., Skippon, S., Dittmar, H., Hutchins, R., and Stannard, J. (2012) Mainstream consumers driving plug-in battery-electric and plug-in hybrid electric cars: A qualitative analysis of responses and evaluations. *Transportation Research Part A: Policy and Practice*, 46(1), pp140-153.

Greene, D.L, Park, S., and Liu, C. (2014) Analysing the transition of electric vehicles in the US. *Futures*, 58, pp34-52.

Heffner, R.R., Kurani, K.S., and Turrentine, T.S. (2007) Symbolism in California's early market for hybrid electric vehicles. *Transportation Research Part D*, 12(6), pp396-413.

Krupa, J.S., Rizzo, D.M., Eppstein, M.J., Lanute, D.B., Gaalema, D.E., Lakkaraju, K., and Warrender, C.E. (2014) Analysis of a consumer survey on plug-in hybrid electric vehicles. *Transportation Research Part A: Policy and Practice* 64, pp14-31.

Lane, B., and Potter, S. (2007) The adoption of cleaner vehicles in the UK: exploring the consumer attitude-action gap. *Journal of Cleaner Production*, 15(11), pp1085-1092.

Noppers, E.H., Keizer, K., Bolderdijk, J.W., and Steg, L. (2014) The adoption of sustainable innovations: driven by symbolic and environmental motives. *Global Environmental Change*, 25, pp52-62.

Ozaki, R., and Sevastyanova, K. (2011) Going hybrid: An analysis of consumer purchase motivations. *Energy Policy*, 39(5), pp2217-2227.

Petschnig, M., Heidenreich, S., and Spieth, P. (2014) Innovative alternatives take action- Investigating determinants of alternative fuel vehicle adoption. *Transportation Research Part A: Policy and Practice*, 61, pp68-83.

Schuitema, G., Anable, J., Skippon, S., and Kinnear, N. (2013) The role of instrumental, hedonic and symbolic attributes in the intention to adopt electric vehicles. *Transportation Research Part A: Policy and Practice*, 48, pp39-49.

Sexton, S., and Sexton, A. (2014) Conspicuous conservation: The Prius halo and willingness to pay for environmental bona fides. *Journal of Environmental Economics and Management*, 67(3), pp303-317.

Skippon, S., and Garwood, M. (2011) Responses to battery electric vehicles: UK consumer attitudes and attributions of symbolic meaning following direct experience to reduce psychological difference. *Transportation Research Part D: Transport and Environment*, 16(7), pp525-531.

Steg, L. (2005) Car use: lust and must. Instrumental, symbolic and affective motives for car use. *Transportation Research Part A*, 39, pp147-162.

Steinhilber, S., Wells, P., and Thankappan, S. (2013) Socio-Technological inertia: Understanding the barriers to electric vehicles. *Energy Policy*, 60, pp531-529.

Van Bree, B., Verbong, G.P.J. and Kramer, G.J. (2010) A multi-level perspective on the introduction of hydrogen and battery-electric vehicles. *Technological Forecasting and Social Change*, 77(4), pp529-540.

Wan, Z., Sperling, D., and Wang, Y. (2015) China's electric car frustration. *Transportation Research Part D: Transport and Environment*, 34, pp116-121.

White, L.V., and Sintov, N.D. (2017) You are what you drive: Environmentalist and social innovator symbolism drives electric vehicle adoption intentions. *Transportation Research Part A: Policy and Practice*, 99, pp94-113.

Wikstrom, M., Hansson, L., and Alvfors, P. (2016) Investigating barriers for plug-in electric vehicle deployment in fleets. *Transportation Research Part D*, 49, pp49-67.