



The intention to adopt electric vehicles: Driven by functional and non-functional values



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ABSTRACT

This study aims to investigate consumers' intention to adopt electric vehicles (EVs) from the consumption value perspective. Drawing from consumption value theory, consumers' value perceptions of EVs are classified into functional values (monetary, performance and convenience values) and non-functional values (emotional, social and epistemic values). We try to explore how consumers' intention to adopt EVs is affected by these two groups of values and how such effects are mediated by their attitude towards EVs. Via a survey of car drivers in Hefei, China, 607 responses were obtained to empirically test the relationships. The results indicate that the perceived functional value have both direct and indirect effects on consumers' intention to adopt EVs. While the perceived non-functional value have only indirect effects on the adoption intention, which is mediated by attitude. This research deepens the existing understanding of consumers' multi-dimensional value perceptions towards EVs. In practice, the findings could provide sensible guidelines for making the marketing strategies and offer references for policy makers to enhance the operability and pertinence of current policies.

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1. Introduction

Carbon emissions generated from transport sector is becoming a major source of total carbon emissions (Sang and Bekhet, 2015). The report of the International Energy Agency (IEA) suggests that transport sector contributes approximately one-fourth of the total worldwide greenhouse gas emissions, which is predicted to increase from 23 to 50 percent by 2030 (IEA, 2009). There can be no doubt that decarbonizing the transport sector is helpful in reducing carbon emissions and mitigating the high reliance on fossil fuels (Sang and Bekhet, 2015; Larson et al., 2014). Hence, increasing concerns about the environmental impact of the current road transport system as well as the risks associated with peak oil have stimulated the adoption of electric mobility systems (Hirsch et al., 2005).

Currently, energy-sustainable transport innovations such as electric vehicles (EVs) have been regarded as one of the substantive responses to reduce carbon emissions from the transport sector (Bakker and Trip, 2013; Klöckner et al., 2013; Sierczhula, 2014). EVs are vehicles that derive motive power exclusively from onboard electrical battery packs that can be charged with a plug through an electric outlet (Lieven et al., 2011; Egbue and Long, 2012; Wu et al., 2015). Compared with conventional vehicles, EVs have advantages in improving fuel efficiency and reducing carbon emissions (Granovskii et al., 2006; Romm, 2006; Lieven et al., 2011). To promote the penetration of EVs, great efforts have been exerted, such as subsidizing consumers and

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manufacturers, facilitating the construction of charging infrastructures and providing relevant convenient policies for EVs' daily travel and maintenance. The same goes in China. By the end of 2016, the global EVs ownership has exceeded 2 million and China owns the largest proportion. The EVs ownership in China has reached 900,000 and China has been the largest worldwide adoption market. Thus, research on Chinese consumer acceptance of EVs is essential and meaningful.

The success of EVs largely depends on the extent to which they are accepted and adopted by consumers (Lieven et al., 2011). However, the public acceptance of this new eco-friendly vehicle is relatively insufficient, and consumers are suspicious of this new technology since they have minimal experience or knowledge (Zhang et al., 2013). Mainly of current adoption of greener or cleaner transport instruments is promoted by relative policies or programs launched by government. There are few studies or reports that we can refer to obtain a comprehensive understanding of consumers' acceptance from the social perspective. It is worth noting that consumers' consumption motivation is multi-dimensional, including both situational factors and psychological factors. Thus, to understand how consumers' decision-making process is affected by these factors, it is urgent and vital to consider these multi-faceted factors via the existing behavioral theoretical models to understand their latent relationships. Within our achievable literature accumulation, the current research on the adoption of EVs mainly originates from two perspectives. One perspective is the focus on the attributes, particularly the instrumental attributes of EVs (Ozaki and Sevastyanova, 2011; Skippon and Garwood, 2011; Egbue and Long, 2012; Carley et al., 2013; Krupa et al., 2014). These results indicate that instrumental attributes such as price, operation cost, comfortability, performance, pollution level, driving range, charging time and convenience, have significant effects on consumers' attitude and their acceptance of EVs. The other research scope regards EVs as green technology innovation products and from the consumer perspective to explore the effects of innovative personality, green values and beliefs, environmental attitude and responsibility, moral norms and other cognitive and psychological factors on consumers' intention to adopt EVs. Certain research theories and models such as the theory of planned behavior, the diffusion of innovation theory, the values-beliefs-norms theory, the technology acceptance model and the norm activation model are often exploited (Ajzen, 1991; Stern et al., 1999; Venkatesh and Davis, 2000; Lane and Potter, 2007; Moons and De Pelsmacker, 2012; Egbue and Long, 2012; Skippon and Garwood, 2011; Wang et al., 2016).

According to the marketing theory especially the consumer value theory, consumers are more likely to make purchase decisions only if the products contain specific values and meet their requirements (Sheth, 1983; Day and Wensley, 1983; Murray, 1991; Sheth et al., 1991). However, to the best of our knowledge, limited research has empirically investigated the role of consumer value on EVs adoption. Such a void leaves a significant gap between theoretical and empirical research to promote EVs. In this paper, we attempt to fill this gap. There are several contributions in this research. Firstly, this research was conducted from the perspective of consumption value; Secondly, we classify the consumption values into two general categories to evaluate their effects and such classification may enable to make our prediction more accurate and targeted.

The remainder of this paper is organized as follows. Sections 2 and 3 address the literature review and proposes the conceptual framework and hypotheses. Section 4 focuses on the data and the research method. Data analysis and the results are presented in Section 5. In Section 6, we conclude the research and note the implications and limitations.

2. Literature review

There is an extensive body of analytical literature exploring factors that correlate with consumers' purchasing behavior. Holbrook and Hirschman (1982) describes consumers as "problem solvers" in terms of consumers seeking "fun, fantasy, arousal, sensory stimulation and enjoyment" when they make purchase decisions. Apparently, the capacity of a product to "solve problems" represents the value of this consumption, which addresses "what consumers want and believe they get from buying and using a seller's product" (Woodruff, 1997). Therefore, consumers can be more like "value seekers" than "problem solvers" (Levy, 1999). The values that influence the consumers' behavior are implicit criteria for making preference and evaluate judgments (Holbrook, 1996).

Zeithaml (1988) suggests that the value perceived by consumers can be regarded as a "consumer's overall assessment of the utility of a product (or service) based on perceptions of what is received and what is given". Most researchers note that consumer value is a complex concept and believe that the multidimensional conceptualization of consumer values can show a more predictive ability on consumers' purchasing or repurchasing intention than the one-dimensional approach (Sheth et al., 1991; Leroi-Werelds et al., 2014).

Gwinner et al. (1998) identify four relational values: psychological, social, economic and customization and they also find that these values are the fundamental basis for consumers to make purchase decisions. Roy (1994) measure three consumer values: functional, deal-proneness and recreational values. Babin et al. (1994) identify two dominant consumer values: hedonic values (shopping for fun) and utilitarian values (shopping with a specific goal in mind). Sheth (1983) regards consumer choice as a set of multiple value dimensions and divides the values into five dimensions: functional, social, emotional, epistemic and conditional values. Subsequent studies such as Sheth et al. (1991) and Forsythe et al. (2006) propose two consumer values: functional values, which relate to tangible needs and utilitarian functions such as convenience, variety and quality of products and price, and non-functional values, which relate to intangible wants concerning reputation, social status, social and emotional needs for enjoyment. Holbrook (1996) and Forsythe et al. (2006) indicate that the values perceived by consumers have significant effects on their purchase intentions. The better the product meets the users' needs and expectations, the greater the likelihood that the user will prefer that product (Mahatoo, 1989).

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