



A comprehensive socio-psychological approach to car type choice



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ABSTRACT

Data from a web survey, which was conducted in 2012 among 1421 owners of a new internal combustion engine car and 372 new battery electric car owners in Norway, were used to test an adapted version of the comprehensive action determination model to explain private consumers' purchase of fuel-efficient cars. It was first examined whether the average fuel efficiency differs among internal combustion engine car classes. Consequently, with battery electric cars being regarded as the most fuel-efficient group, five car groups ordered by fuel efficiency were retained. The results of subsequent structural equation modelling show that intention to buy a fuel-efficient car, brand loyalty, number of cars and driver's license holders in the household, household size, and household income had significant direct effects on choosing a more fuel-efficient car. Normative processes had a mediated impact on behaviour. Implications for design and implementation of interventions are discussed.

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1. Introduction

Taking into consideration that road transportation is the largest energy consumption sector (European Environment Agency, 2007), one of the most significant options identified to further reduce energy consumption is increasing fuel efficiency of new cars (Metz, Davidson, Bosch, Dave, & Meyer, 2007). While internal combustion engine cars with increased fuel efficiency will lead the market for the coming years (MacLean & Lave, 2003), battery electric cars present another significant path for cutting the carbon intensity of road transport in the near future (Scown, Taptich, Horvath, McKone, & Nazaroff, 2013). It has been shown that energy consumption of battery electric cars² is well below most fuel-efficient internal combustion engine cars available today (Organisation for Economic Co-operation and Development & International Energy Agency, 2010).

Therefore, a substantial reduction of energy consumption in transportation requires increasing the number of consumers adopting fuel-efficient cars. The most prominent measures are usually introduced as a set of coordinated economic incentives to facilitate consumer adoption (European Commission, 2007), and

the effects of such measures are well documented (de Haan, Peters, & Scholz, 2007; Peters, Mueller, de Haan, & Scholz, 2008; Ryan, Ferreira, & Convery, 2009). Nonetheless, empirical research has also indicated that for buyers of fuel-efficient cars, symbolic values dominate over purely monetary cost-savings (de Haan, Mueller, & Peters, 2006; Kahn, 2007). Moreover, it is suggested that consumer behaviour is determined by a multitude of factors (Jansson, Marell, & Nordlund, 2010; Nayum, Klöckner, & Prugsamat, 2013; Ozaki & Sevastyanova, 2011; Peters, Gutscher, & Scholz, 2011), and financial incentives can lead to a reduction of intrinsic motivation of consumers (Deci & Ryan, 2000; Frey & Osterloh, 2002). For the choice and design of interventions, it is, therefore, crucial to understand the mechanisms behind car purchase.

This paper seeks to examine consumer motivations in relation to choice of more fuel-efficient cars. Specifically, how a combination of psychological, situational, and demographic factors affect consumers' car choice is in focus. An adapted version of the comprehensive action determination model (Klöckner, 2013; Klöckner & Blöbaum, 2010), which integrates both psychological and socio-demographic variables to explain consumers' choice of fuel-efficient cars, was tested using a sample of internal combustion engine passenger car and battery electric car owners in Norway.

2. Determinants of environmentally significant private sphere behaviours with special regard to purchasing fuel-efficient cars

The adoption of fuel-efficient cars has received increasing attention from many disciplines. Within research focussing on

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² Depending on a country's electricity grid mix system, it may vary. For example, as Norway's electricity is mostly from renewable sources (Hawkins, Singh, Majeau-Bettez, & Strømman, 2013), energy consumption of battery electric cars in Norway is far below that of most fuel-efficient internal combustion engine cars.

environmentally significant behaviours, several theoretical developments have emerged to explain private sphere behaviour. One such theories put forward by Stern (2000b) is the attitude-behaviour-context theory, which identifies four categories of determinants of environmental behaviours, as introduced in the following sections.

2.1. Contextual forces

According to Stern (2000b), high-cost behaviours such as purchasing a fuel-efficient car are likely to be strongly influenced by contextual forces (e.g. interpersonal influences, monetary factors, and government regulations). This notion is supported by empirical research, in which some adopters of fuel-efficient cars were reported to consider financial benefits and other policy-related advantages important (Diamond, 2009; Graham-Rowe et al., 2012; de Haan, Mueller, & Scholz, 2009; Ozaki & Sevastyanova, 2011), while others were influenced by the their community's ideology (Kahn, 2007; Kahn & Vaughn, 2009). Though the contextual forces are important, the relationship between contextual forces and actual consumer behaviour is heavily mediated by personal variables (Black, Stern, & Elworth, 1985). Thus, "the perception of contextual forces and how these perceptions influence actual behaviour might be more relevant than an objective measure of the contextual factors" (Jansson, Marell, & Nordlund, 2009, p. 248).

2.2. Attitudinal factors

Attitudinal factors such as the general disposition to act with pro-environmental intent, behaviour-specific predispositions, behaviour-specific beliefs, and non-environmental attitudes are another category of determinants suggested by Stern (2000b). Cognitive behavioural theories such as the theory of planned behaviour (Ajzen, 2005) focus on the consumer's behaviour-specific predispositions and beliefs. The theory of planned behaviour postulates that a rational choice process by weighting attitudes towards behaviour, subjective norms, and perceived behavioural control produce intentions which, together with actual control, determine performance of behaviour. The theory of planned behaviour posits consumers to carry out elaborate decision processes based on their expectancy value assessments, and therefore they are "... utility-maximizing actors" (Bamberg & Schmidt, 2003, p. 267).

In contrast to the theory of planned behaviour, normative models for pro-environmental behaviour such as the norm activation model (Schwartz, 1977; Schwartz & Howard, 1981) and the value-belief-norm theory (Stern, 2000b) highlight explicit normative and moral motivations of individuals as opposed to self-interest. The norm activation model postulates that the driving force of environmentally significant behaviour is a personal norm. This personal norm, which denotes a strong intrinsic feeling of obligation to perform the specific behaviour, has to be activated. Prerequisites and activators of this personal norm are awareness of consequences of certain behaviour, ascription of responsibility for one's actions, and recognition of one's own ability to engage in actions. Besides personal norm, the norm activation model also acknowledges that social implications (i.e. perceived social norm), as well as non-moral implications of action, influence behaviour. The value-belief-norm theory integrates the value theory (Schwartz, 1994), the new ecological paradigm (Dunlap, Van Liere, Mertig, & Jones, 2000), and the norm activation model perspective through a hierarchical chain of variables leading to behaviour. The relevance of the above-mentioned cognitive and normative constructs for consumer adoption of fuel-efficient cars has been

demonstrated in various studies (Flamm, 2009; Jansson et al., 2010; Ozaki & Sevastyanova, 2011; Peters et al., 2011).

Non-environmental attitudes are also suggested to affect consumers' pro-environmental behaviour (Stern, 2000b). More specifically, researchers (e.g. Heffner, Turrentine, & Kurani, 2006; Kurani, Turrentine, & Heffner, 2006) suggest that the adoption and use of fuel-efficient cars are influenced by the perception of (1) instrumental attributes of the car, which refer to the functionality or utility that can be derived from functions performed by the car (Dittmar, 1992; Voss, Spangenberg, & Grohmann, 2003); (2) hedonic attributes of the car, which refers to the emotional experience derived from using the car (Dittmar, 1992; Roehrich, 2004; Voss et al., 2003); and (3) symbolic attributes of the car, which is related to a sense of self or social identity that is reflected by, or built from the possession of the fuel-efficient car (Dittmar, 1992; Roehrich, 2004). These arguments are supported by recent research showing a close association between car use/ownership and instrumental, hedonic, and symbolic attributes of the car (Bergstad et al., 2011; Caulfield, Farrell, & McMahon, 2010; Schuitema, Anable, Skippon, & Kinnear, 2013; Skippon & Garwood, 2011).

2.3. Personal capabilities

Personal capabilities such as knowledge and skills for particular actions, general capabilities and resources including socio-demographic variables, are the third category of determinants suggested by Stern (2000b). Although these variables are suggested to have very limited explanatory power for most environmental behaviours (Dietz, Stern, & Guagnano, 1998), they may exert significant influence for high-cost and high-involvement behaviours such as buying fuel-efficient cars (Stern, 2000b). In fact, the traditional car type choice approach by economists and market researchers (see de Jong, Fox, Daly, Pieters, & Smit, 2004) identifies household characteristics (such as number of household members, number of cars, number of driver license holders, and household income) and principal driver characteristics (such as gender, age, and education) as explanatory variables of car ownership. Recent empirical research evidence also confirms the relevance of personal capabilities in adopting fuel-efficient cars (Flamm, 2009; Jansson et al., 2010).

2.4. Habit or routine

The last category of determinants suggested by Stern (2000b) is habit/routine, which is the automatic performance of behavioural patterns triggered by context cues (Triandis, 1979). For behaviours performed daily or weekly under stable circumstances it is found that past behaviour has a stronger influence than intentions; for behaviours performed only annually or biannually it is found that the relationship was reversed (Ouellette & Wood, 1998). Arguably, car purchase occurs less frequently and involves rather deliberate decision-making. Therefore, it might appear that the influence of past behaviour or habit is trivial for car purchase. Nonetheless, empirical evidence indicates that brand loyalty, which is observed in terms of repetitive same-brand or same-brand-set purchasing (Oliver, 1999), has significant influences on car purchase (Chandrasekharan, McCarthy, & Wright, 1994; Mannering & Winston, 1985, 1991). This suggests that brand loyalty may serve a similar function as habit strength in car purchase behaviour by short cutting or simplifying the decision-making process. Even though habits, which are generally understood as context-cued automatic responses (Verplanken & Wood, 2006), are structurally different from brand loyalty, the function in the decision-making process appears to be comparable to a certain degree.

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