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## Climate change behaviors related to purchase and use of personal cars: Development and validation of eco-socially conscious consumer behavior scale



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### ABSTRACT

A constantly changing environment and global warming are issues that are recognized at all global forums. One of the major reasons for global warming is the emission of greenhouse gases which is primarily caused by use of personal cars as means of transport. This study reports on the development of an eco-socially conscious consumer behavior (ESCCB) scale specific to purchase and use of personal cars, based on samples of actual automobile customers in Pakistan. Using mixed method approaches, the results of 3 studies yield a 9-item three-dimensional scale (eco-social conservation, eco-social use, and eco-social purchase) with satisfactory reliability, construct validity and nomological validity. Second-order factor analysis revealed that eco-social purchase was the most important dimension, followed by eco-conservation and eco-social use. A test of nomological behavior shows that the scale is positively associated with a related construct: environmental concern. This study advances the literature on pro-environmental behaviors by introducing a conceptual definition of ESCCB related to personal car purchase and use, developing a measure for the ESCCB concept and validating the scale in the context of an emerging economy, Pakistan. The scale provides important insights for marketers in the automobile industry for remodelling marketing plans, as well as for environmentalists focusing on strategies to bring change in consumer behavior.

### 1. Introduction

Climate change is a globally recognized concern. Greenhouse gas (GhGs) emissions contribute to global warming and climatic change (De Richter et al., 2016; Shah, 2015). One of the most heavily emitted anthropogenic greenhouse gases is carbon dioxide (CO<sub>2</sub>), produced primarily by the burning of fossil fuels (USEPA, 2015). The International Energy Agency (IEA) reports that the largest cause of CO<sub>2</sub> emissions (90%) is energy consumption (IEA, 2015). Consumption of energy is closely associated with the growth rate of countries - higher growth rates being positively correlated with more consumption. The dynamics of this link between economic growth and increased energy consumption are a necessary feature of increased industrial activity.

The transport sector plays a vital role in countries' growth as economic activity fuels transport demand, serving the needs of both freight and passengers transportation. Energy consumed in transportation largely (95%) comes from using highly CO<sub>2</sub>-emitting oil-based fuels. It is estimated that 44.5% of emissions are contributed by light duty vehicles (passenger cars) alone (IPCC, 2004). In emerging economies, due to economic stability and growing populations, the use and purchase of personal cars is increasing, resulting in higher emissions of CO<sub>2</sub> (IPCC, 2004).

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While increases in travel and possession of personal cars are an unavoidable aspect of increased economic growth, the rate of emissions and use of fossil fuels can still be mitigated against and the impact thereof reduced. Energy efficient vehicle technologies and minimizing the use of personal cars may help to reduce the impact of growing travel energy consumption on the environment (Arne et al., 2015; Herring and Sorrell, 2009). However, consumer behavior related to the purchase and use of personal cars encompasses a complex set of decisions contingent upon product need perceptions, cultural traits, values, norms, and efforts to promote pro-environmental behaviors (Brand et al., 2013; Marc and Barbara, 2013; Steren et al., 2016). An important consideration for researchers is conceptualizing the nature of behavior related to transport decisions. We report on the development of a consumer behavior measurement instrument examining purchase and use of personal cars in the context of an emerging economy of South Asia, Pakistan.

## 2. The context

Pakistan is a rapidly growing country with a population growth rate of 1.46% per annum (as of 2015) and an average economic growth rate of 4.06% per annum in the period 2011–2016 (CIA, 2015). The country currently faces several environmental issues, of which air pollution from vehicular exhausts and increasingly and uncharacteristically volatile weather patterns are of major concern (CIA, 2015). Numerous studies indicate that environmental pollution due to increasing CO<sub>2</sub> emissions in emerging economies is escalating as it has in the developed world (Afroz et al., 2015; Beck et al., 2013), warranting investigation in emerging economies like Pakistan. A study conducted in the context of CO<sub>2</sub> emissions in Pakistan reported that 60%–70% of environmental pollution comes from vehicular exhausts, 81% of which being contributed by motor cars under individual and household use (Ilyas, 2007).

The automobile market in Pakistan is growing rapidly. According to the Pakistan Automotive Manufacturers Association (PAMA), the total number of personal cars sold during 2014–2015 was 152,524 units, in comparison with 118,102 units during 2013–2014: a growth of almost 30% (PAMA, 2015). This growth is due to increased purchasing power, stable fiscal policy, improved economics in the automobile sector and the overall recovery of the economy from the 2007–2008 global financial crisis (Aftab, 2016). The Government has recently approved an auto development policy, incentivizing new entrants by reducing duties and taxes in order to encourage foreign direct investment which is expected to further accelerate sales of personal cars (EDB, 2016; Rana, 2016).

Constantly changing climate and changing patterns of consumer behavior in Pakistan may combine to create a unique risk situation, arising out of severe natural hazards. A recent study posited that countries in south Asian region, especially Pakistan and India, are expected to face deadly heat waves posing severe threats to people in the latter part of the 21st century if greenhouse emissions are not controlled and climate change impacts are not mitigated (Im et al., 2017). Given that the transport sector, and the personal car segment specifically, contribute significantly to CO<sub>2</sub> emissions, an early intervention is inevitable to promote eco-social behavior related to the choice and use of personal cars. It is therefore important to understand consumer behavior as related to purchase and use of personal cars through the development of a measurement instrument in order to guide applicable policy creation, taking into account socio-cultural differences between developed and developing countries.

## 3. Pro-environmental behaviors and gaps in existing measurement scales

The extant literature puts forth numerous scales to measure general pro-environmental behaviors, however, these only partially capture elements of specific behaviors related to purchase and use of personal cars. Drawing upon the recommendation of Kaiser (1998), that ‘...whether the goal of the research is behavior change or the evaluation of different determinants of ecological behavior, the accurate measurement of ecological behavior is a precondition...’, an analysis of existing scales measuring environmental behaviors is presented to identify neglected areas, leading to the development of a new scale measuring eco-socially conscious consumer behavior (ESCCB) specific to purchase and use of personal cars.

### 3.1. The Ecologically Conscious Consumer Behavior (ECCB) scale

The ECCB construct was first proposed by Roberts (1991) and later refined by Tilikidou (2001). The core concept of the ECCB was based on 3 dimensions, namely the ‘cognitive dimension’, the ‘affective dimension’, and the ‘behavioral dimension’ (Tilikidou, 2001). A final version of the instrument contained 4 dimensions: ‘pro-environmental purchase behavior’, ‘pro-environmental activities’, ‘pro-environmental attitudes’, and ‘recycling attitudes’ (Tilikidou, 2002).

An inherent issue with the ECCB scale is the number of items used to measure the concept. Due to the great number of items, the scale lacks precision because of redundancy and suffers from non-response during application. Therefore researchers have used only subscales of this instrument in their studies (Fraj and Martinez, 2006; Khare, 2014). The ECCB scale reports only one item relevant to this current study, that of ‘I avoid using my car unless it is absolutely necessary’ (Tilikidou, 2002).

### 3.2. The General Ecological Behaviors (GEB) scale

Since ecological behaviors are distinct in nature and behave differently from one context to other, no single metric can be devised to measure all types of ecological behaviors. However, subscales representing different ecological behaviors with reasonable correlation can be utilized to measure general pro-environmental behavior. The GEB scale developed by Kaiser (1998) presents an example of scale to measure several pro-environmental behaviors. The GEB scale consists of 38 items and with 7 distinct dimensions (Kaiser, 1998).

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