Human Factors in Deployment of Renewable Energy in Iran: The Case of Dairy Farmers

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Abstract

An increasing global energy demand, anthropogenic emissions of greenhouse gases and environmental degradation caused by energy generation from fossil fuels, stimulated debates on future efficacy of fossil fuel. In this situation, renewable energies sources (RES) can be one of the options to satisfy energy demand with low carbon energy generation. The government of Iran is recognising the potentials of RES and announced the plan to deploy 2 GW of RES capacity between the years 2010 – 2015. However, scientific evidence shows that public acceptance is an important issue for the deployment of such policy. The aim of this study is to provide much-needed empirical data about dairy farmers' attitude and willingness to use renewable energy instead of fusel fuel energy at their farms. For this purpose we apply a well-established social-psychological model, the Theory of Planned Behaviour, to identify the psychosocial factors that influence attitudes of dairy farmers towards renewable energy. The empirical data collection part includes a cross-sectional survey among dairy farmers in the Kohgiluyeh and Boyer-Ahmad Province in the southern Iran. The data were collected through a questionnaire specially designed for this survey. Structural equation modelling showed that attitudes and perceived behavioral control are significant factors influencing willingness to use of renewable energy, while subjective norms do not play a significant role. These variables can predict nearly 57% variance in dairy farmers' willingness. The findings yield public policy implications for renewable energy use among dairy farmers.

Introduction

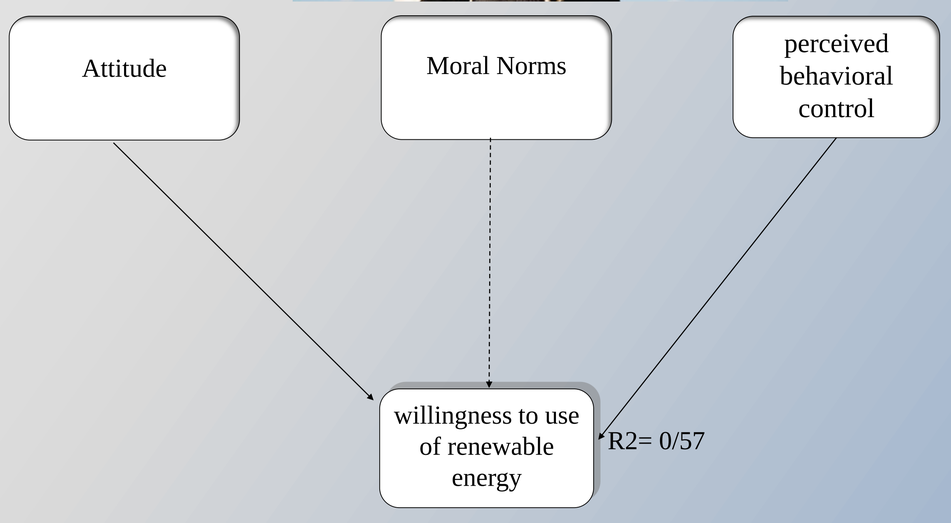
Scientific evidence confirms that heavy use of fossil fuels such as oil, coal and natural gas leads to emissions of greenhouse gases, destruction of natural resources, concerns about energy security and the threat of conflict. On the other hand, renewable energy sources, in general, and biofuels, in particular can satisfy energy demand with low carbon energy, which would address concerns of climate and energy security as well as other above mentioned risks.
, livestock rising and production play an important role in this emission. For example, Massé et al (2011) reported that livestock production contribute to 18% of global GHG emissions through CH4 directly emitted from domestic animals or livestock manures, and N2O emitted from land applied manures and grazed lands (also see, Massey & Ulmer, 2010). This and other problems rising by livestock (see, Massé et al., 2011) make the livestock places in the earth under pressure (see, Steinfeld et al., 2006; Janzen, 2011).
Therefore, the aim of this paper is to investigating Iranian livestock producers' intention toward usage of renewable energy in their farm.

Theory of planned behavior
To understand the socio-psychological factors, which influence farmers acceptance and willingness to use RES, we are applying a well-established social–psychological model, the Theory of Planned Behavior (TPB) (Ajzen, 1991). There is also scientific evidence about benefits of using TPB for research in the area of resources consumption behavior. Also if policymakers apply results from research to develop policy measures, they expect methodologies to be theoretically sound, quantitative, standardized and repeatable, and applicable at a large scale (Wauters et al., 2010). TPB is an extended version of theory of reasoned action (TRA) (Fishbein and Ajzen, 1975). TPB is a socio-psychological model, which claims that a person's actual behavior in performing a certain action is directly guided by his or her behavioral intention, such as motivation or plan,. The behavioral intension is jointly determined by attitude, subjective norm and perceived behavior control (Ajzen, 1991). Attitude refers to "the degree of a person's favorable or unfavorable evaluation or appraisal of the behavior in question" (Fishbein and Ajzen, 1975). Subjective norm refers to "the perceived social pressure to perform or not to perform the behavior" (Ajzen, 1991) and, finally, perceived behavioral control refers to the "people's perception of ease or difficulty in performing the behavior of interest" (Liao et al., 2007), or "the extent to which individuals perceive the behavior to be under their volitional control" (Fielding et al., 2005).

Methodology

The TPB was quantitatively tested using the survey methodology to understand individual intention. An in-depth literature review was used to develop the questionnaire to collect data for this study. Data were collected through personal interviews based on a structured questionnaire. The questionnaire was structured to assess the central components of the TPB. The questionnaire was used for a face-to-face survey with students, conducted in the period from December 2016.
The questions were scored on a 1-5 point scale (very low, low, moderate, high, very high) to reduce the statistical problem of extreme skewness (Fornell, 1992). Based on Ajzen's (1985) recommendations, scales containing multiple items were developed to measure each of the following psycho-social variables comprising measures of: willingness to use, attitude, subjective norm, perceived behavior control. It is important to note that for assessed TPB variables we used items that closely follow the measurement of this constructs used in past studies.
The questionnaire internal reliability was investigated using coefficient (Cronbach's) alpha. All scales indicated a good-to-excellent reliability; generally 0.75 to 0.9. It is important to note that we used a mix of positive and negative items in our questionnaire. Furthermore, the validity of the questionnaire was approved by a panel of experts (the panel included an expert of architecture and civil engineering, an expert of psychology and a sociologist).

Results



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