



# Implications for the energy policy derived from the relation between the cultural dimensions of Hofstede's model and the consumption of renewable energies

Corina Pelau<sup>a,\*</sup>, Nicolae Al. Pop<sup>b</sup>

<sup>a</sup> Bucharest University of Economic Studies, Faculty of Business Administration in Foreign Languages, Calea Grivitei nr. 2-2A, Sector 1, Bucharest, Romania

<sup>b</sup> Bucharest University of Economic Studies, Faculty of Marketing, Bd. Dacia nr. 41, Sector 1, Bucharest, Romania



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## ABSTRACT

This paper aims to determine the relation between national culture and the consumption of renewable energies in several European countries. According to the Renewable Energy Directive of the European Commission, there have been set common goals for the share of consumption of renewable energies in the European Union, but each country is responsible for the action plan to achieve these targets. These targets have been set based on the initial values of the renewable energies and on the natural resources of each country. Cultural aspects and energy consumption patterns have not been taken in consideration for the analysis of the willingness and motivation of consumers to switch towards renewable energies. In this paper a panel data analysis has been carried out in order to measure the relation between Hofstede's cultural dimensions and the share of renewable energies in final consumption. The results show a highly significant relation between the masculinity index and the share of renewable energies and an acceptable relation for the long term orientation index. The energy policy of the European Union and of its countries should consider the cultural characteristics in the development of the national action plans for the implementation of renewable energies.

## 1. Introduction

One of our society's biggest challenges for a sustainable energy consumption is the identification of those incentives, which determine consumers to change their consumption towards green non-polluting energies. Despite the fact that most experts agree on the importance of renewable energies, in the energetic systems of different countries, the process of switching to this type of energies is relatively low (Claudy et al., 2013; Jacobsson and Johnson, 2000; Mirchi et al., 2012; International Energy Agency, 2015). Many researchers agree that one issue which escaped in the trend towards green energies is the understanding of the reasons and attitudes of final consumers, in accepting and switching to renewable energies. As researchers observe, a big part of the energy consumption is determined by final consumers (Reveiu et al., 2015; Gadenne et al., 2011; Abrahamse and Steg, 2009) and only by understanding their reasons and motives, they can be determined to change their energy consumption pattern. Although experts agree on the increased importance of the topic of eco-friendly and pro-environmental consumption, few studies have researched this issue in an international context (Leonidou et al., 2013).

The objective of this article is to determine if there is a relation

between the national culture and the willingness to consume renewable energies. The relation between these variables was tested with a panel data analysis in Stata, between Hofstede's cultural dimensions and the indicator share of renewable energies in the gross final consumption, which is one of the Sustainable Development Indicators of the EU Sustainable Development Strategy, for the period 2011–2015. The correlation was tested for each of the six cultural dimensions as independent variables and the share of renewable energy as dependent variable as well as for two models with three respectively four variables.

The aim of this paper is to highlight the importance of the national culture and the national characteristics of consumer for the implementation of the Renewable Energy Directive of the European Union. The Renewable Energy Directive of the European Commission sets an overall policy for the production and promotion of renewable sources. According to this directive in the European Union 20% of the total energy sources should be provided by renewables until 2020. In 2016, a revised form of the Renewable Energy Directive sets the target even higher by aiming to achieve a 27% of renewable energy sources by 2030. In order to achieve this objective, there have been set national targets for each of the countries of the European Union, depending on

\* Corresponding author.

E-mail addresses: [corina.pelau@fabiz.ase.ro](mailto:corina.pelau@fabiz.ase.ro) (C. Pelau), [nicolae.pop@mk.ase.ro](mailto:nicolae.pop@mk.ase.ro) (N.A. Pop).

the starting points and their potential for renewable energy sources (European Commission, 2017a). Despite these common goals, each of the European countries has to set its own action plans for achieving this target by setting their own energy policies, their own renewable technologies, depending on their energy potential and by applying joint or regional projects (European Commission, 2017b). Therefore in the implementation of these national plans, the national culture and the cultural characteristics of each country have a major role in the willingness of the consumers to adopt the renewables. Of course each country has its own natural potential for renewable resources. In spite of this, the consumers and their willingness to adopt a pro-environmental behavior plays a major role in the exploitation of these natural resources and in their motivation to develop clean energy technologies. For this reason, it is important to determine how the national characteristics are related to the consumption of renewable energies.

## 2. Background and literature review

### 2.1. General factors that influence the renewable energy consumption

Over the years, researchers have focused on factors which encourage a pro-environmental behavior. While most of the policy makers put the emphasis on financial or monetary incentives (Hast et al., 2015; Balcombe et al., 2013; Yoo and Kwak, 2009), several studies have showed that socio-demographic or cultural factors may also influence consumer's orientation towards renewable energies (Beunder Groot, 2015; Keitsch et al., 2016; Mukherjee and Chakraborty, 2013; Mitrut et al., 2015; Rommel et al., 2016; Volland, 2016). Trying to determine the demographic factors that influence energy consumption, researches have revealed, for instance, the fact that people with higher incomes (Cayla et al., 2011; Yoo and Kwak, 2009) or higher education (Sardianou and Genoudi, 2013) are more willing to pay for renewable energies. Consumers in developed countries are willing to pay more for renewable energies than for traditional ones (Murakami et al., 2015). Consequently, the affordability of buying renewable energies is another factor that influences their consumption (DeCicco et al., 2015).

Several country related macroeconomic conditions also have an impact on the consumption of renewable energies. The energy policy of the country in which they live is one of the factors that affect the energy consumption (Nesta et al., 2014) as well as the country's chosen security strategy (Valdés et al., 2016). This result is extended by a research by Lin et al. (2016) which shows that the consumption of renewable energy is linked to macroeconomic indicators including the standard of living of the population. In China the preference is also influenced by the type of renewable energy (Ma et al., 2015) and by the possibility to choose the provided technique (Hast et al., 2015, Reveiu et al., 2015). This fact is confirmed by a study by Streimikiene and Mikalauskiene (2014), who affirm that the pricing instrument is very important for increasing the willingness of consumers to buy renewable energies. General conditions such as infrastructure or access to public facilities such as water or electricity, may also influence the consumer in their sustainable consumption. If being environmental-friendly costs too much, than consumers might reduce their eco-friendly behavior (Varadarajan, 2014). In some countries, such as Japan, the information provided to the consumer about the positive effects of an ecological friendly behavior has an influence on the consumer's behavior (Iwata et al., 2015). The public market concern about a pro-environmental behavior also influences the international performance of products (Leonidou et al. 2013).

Different personal characteristics of consumers determine their willingness to have a pro-environmental behavior and therefore on the consumption of renewable energies. A research conducted by Salahodjaev showed that the IQ or the intelligence level of people has an influence on their pro-environmental behavior (Salahodjaev, 2016). Gender is another determinant of energy consumption, proving that men spend more energy than women (Raty and Carlsson-Kanyama,

2010). Some authors even prove that the general consumer behavior including social norms shape eco-friendly behavior, showing a boom-erang effect on several consumer groups (Yakovovitch and Grinstein, 2016). Going deeper into the values and norms of consumer (Nguyen et al. (2016) prove in a research that the biospheric values do also affect the buying of energy efficient electronic products. Other studies reveal the dominant effect of an education oriented towards pro-environmental and eco-friendly behavior, on the behavior of consumers (Ntona et al., 2015). Self-efficacy also sustains pro-environmental behavior. Consumer who observe the fact that certain simple "green" actions improve their behavior have the tendency to engage in more difficult pro-environmental behavior (Lauren et al., 2016).

The psychological process of the buying behavior in the particular case of energy resources was revealed as an influencing factor. A research conducted by Bamberg and Moeser (2007) showed that there are few changes over time in the perception and the behavior of consumers towards energy use. According to this study the preference for a certain type of energy resource is mainly determined by three aspects: the awareness of the importance of using a certain type of energy, the difficulty in using a certain type of energy and the social norms (Bamberg and Moeser, 2007). This result is confirmed by authors who show that the awareness of the importance of consuming renewable energies (Soon and Ahmad, 2015) as well as the attitudes (Claudy et al., 2013) influence the switch towards green energies. The difficulty of using a certain energy type is often associated with the context (Ortiz-de-Mandojana et al., 2016) which can encourage or not a certain type of energy behavior.

A research conducted by Sutterlin et al. (2011) tried to identify clusters of energy consumers based on their main motives to have a pro-environmental behavior. In this research, there were found six typologies of behavior regarding the energy consumption based on three antagonisms: idealism – materialism of consumers, problem aware – convenience oriented consumer and thrifty – selfness inconsequent consumers. The approach of this research was to address in different ways to these six types of consumers (Sutterlin et al., 2011). Another aspect regarding the energy consumption is the difference between intention and action. Many consumers state in discussions that they prefer renewable energies, but it takes some time and incentives until they put their intention into practice. Momsen and Stoerk (2014) suggest for this, the application of several nudges in order to determine the consumption.

### 2.2. The relation between culture and the energy consumption

As seen above, most of the researchers focus their attention on several demographic criteria such as family status, education, income, home surface (Beunder and Groot, 2015) or psychological elements such as attitudes, values, awareness of consequences, behavioral antecedents (Abraham and Steg, 2009; Awuni and Du, 2016), but there are still very few authors who have studied the impact of the national culture on the consumer's willingness to buy renewable energies. Despite these, there is evidence that the consumers in different countries perceive and therefore react in different ways to topics related to energy, such as energy security (Sovacool, 2016). Gifford and Nilsson (2014) determine 18 factor that affect the pro-environmental behavior of consumers including culture or ethnic variations. In the same research, it is proven that factors like childhood experiences, values and even religion have an impact on the pro-environmental behavior (Gifford and Nilsson, 2014).

Most of the researches taking national culture as an influencing factor focus on the pro-environmental behavior (Ceglia et al., 2015; Morren and Grinstein, 2016,) and its different subsections (Soyez, 2012). The research conducted by Morren and Grinstein (2016) gives an overview on several national researches on pro-environmental behavior, trying to integrate these results. Based on their studies, they focus on finding behavioral differences between developed and

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