

METHODOLOGICAL CONSIDERATIONS REGARDING THE SEGMENTATION OF HOUSEHOLD ENERGY CONSUMERS

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Abstract: *Over the last decade, the World has shown increased concern for climate change and energy security. The emergence of these issues has pushed many nations to pursue the development of clean domestic electricity production via renewable energy (RE) technologies. However, RE also comes with a higher production and investment cost, compared to most conventional fossil fuel based technologies. In order to analyse exactly how Romanian electricity consumers feel about the advantages and the disadvantages of RE, we have decided to perform a comprehensive study, which will constitute the core of a doctoral thesis regarding the Romanian energy sector and household consumers' willingness to pay for the positive attributes of RE. The current paper represents one step toward achieving the objectives of the above mentioned research, specifically dealing with the issue of segmenting household energy consumers given the context of the Romanian energy sector. It is an argumentative literature review, which seeks to critically assess the methodology used for customer segmentation in general and for household energy users in particular. Building on the experience of previous studies, the paper aims to determine the most adequate segmentation procedure given the context and the objectives of the overall doctoral research. After assessing the advantages and disadvantages of various methodologies, a psychographic segmentation of household consumers based on general life practices is chosen, mainly because it provides more insights into consumers compared to traditional socio-demographic segmentation by focusing on lifestyles and not external characteristics, but it is also realistically implementable compared to more complex procedures such as the standard AIO. However, the life practice scale developed by [Axsen et al. \(2012\)](#) will need to be properly adapted to the specific objectives of the study and to the context of the Romanian energy sector. All modifications will be based on the results of previous research performed by us and on a qualitative study among industry experts and consumers.*

Keywords: energy; segmentation; consumer behaviour; psychographics; lifestyle

JEL classification: M31; Q41

1. Research Background

The energy sector has been the engine driving the fundamental development of humanity ever since the end of the nineteenth century, when electricity became widely used to provide public lighting and transportation in the world's busiest commercial hubs. Nowadays, our personal and professional lives are so intertwined with the need for constant access to electricity that ensuring the stability of the energy sector has become a matter of national security for most, if not all, countries

in the world.

Over the last decades, the international energy markets have been subjected to various shocks, such as steep rises in fuel acquisition prices ([Hopkins, 2008](#)) and even outright interruption of fuel supply ([Jolly, 2009](#)). The emergence of such instability, combined with the ever more tangible negative effects of traditional electricity generation on human health and the environment, has pushed many nations to pursue the development of clean domestic electricity production via renewable energy (RE) technologies.

One of the regions most affected by supply shocks has been Europe, which has seen a rapid growth in its RE production ([World Bank, 2013](#)). Due to recently passed legislation regarding support mechanisms for RE development, Romania has also seen a steep increase in its RE installed base over the last few years ([EWEA, 2013](#)). However, RE also comes with a higher production and investment cost, compared to most conventional fossil fuel based technologies ([Rogner, 2010](#)). Considering the financial difficulties which the whole world and especially Europe are currently facing, the perspective of rising electricity costs may be displeasing for most consumers.

Severe public reaction to increases in energy prices could be seen recently in Bulgaria, where, due to the low average income level, electricity represents a significant part of the household budget ([Euronews, 2013](#)). In order to analyse exactly how Romanian electricity consumers feel about the advantages and the disadvantages of RE, we have decided to perform a comprehensive study regarding the Romanian energy sector and household consumers' willingness to pay for the positive attributes of RE. This research will represent the core of a doctoral thesis on the subject, centred on two main objectives:

- determining Romanian household consumers' willingness to pay in order to benefit from the positive effects of utilising RE
- describing the typologies of Romanian household electricity consumers based on customer segmentation

The doctoral research process was preceded by a series of articles written in collaboration with industry specialists with middle-management and top-management roles in the strategic marketing function of one of the world's largest energy companies ([Maxim and Thoma, 2011](#); [Maxim et al., 2011](#)). These works represented the basis of a dissertation thesis which offered some projections regarding the future evolution of the European RE sector and illustrated some potential development strategies for renewable energy companies ([Maxim, 2011](#)).

The aim of the current paper is to establish a methodological approach to satisfying the second objective of the above mentioned doctoral research – describing the typologies of consumers based on customer segmentation. This will be a theoretical paper, based on a review of general and energy marketing research. Section 2 of the paper will present the specific context of the Romanian energy sector. Section 3 will illustrate some of the previous approaches used in segmenting energy consumers. Section 4 will describe the segmentation approach chosen for the current study and will argue its level of adequacy and utility considering the specific context of the research. The final section of the paper will provide an outline for the next steps to be taken in order to achieve the proposed objective and finalize the doctoral research process.

2. The Romanian Energy Sector

The Romanian energy sector has been going through a long and significant transformation which started in the second half of the '90s. These changes came as a direct result of the transition to a free-market economy and Romania's strengthening connection with the European Union, of which it became a member in 2007. This section will briefly address the most significant of these changes, starting with the liberalization of the energy sector, the introduction of a RE support scheme and, most recently, the gradual phasing out of regulated electricity tariffs.

In 1998, the Romanian Government issued a decision through which RENEL, the state-run company which had a monopoly position over the entire electricity sector, was broken up into several companies ([ANRE, 2012c](#)), generally grouped along the main components of the energy value chain: generation (or production), transmission (high voltage transportation of electricity), distribution (medium and small voltage transportation of electricity up to the end-user) and supply (sale of electricity to the end-user). Over the following decade, these companies went through further restructuring, privatization, consolidation and even liquidation. Today, the electricity sector is much more granular, especially with regard to generators and suppliers. The state run companies still represent a significant portion of the distribution and generation components, while the transmission is controlled by a single state company which, through its subsidiaries, acts as a supervisor and facilitator of wholesale energy transactions (similar to Spain's Red Eléctrica) ([Red Eléctrica de España, 2013](#)).

The liberalization or "opening" of the electricity market was implemented in Romania in order to harmonize the internal legislation with the one applicable in the other member states of the European Union. Thus, since the 1st of July 2007, all Romanian consumers (industrial, commercial or household) are free to choose the company which supplies them with electricity ([ANRE, 2013](#)). However, by the end of 2011, none of the 8.4 mil household consumers had changed suppliers, likely due to the lack of information regarding the possibility and the procedure that needs to be followed, but also due to uncertainties regarding the prices of electricity ([ANRE, 2012c](#)).

All household consumers continue to benefit from a regulated tariff. This means that the National Agency for Regulation in the Energy Sector (ANRE) establishes the price at which suppliers sell electricity to end-users. The tariff is periodically updated. However, starting with September 2012 and July 2013 for companies and households respectively, this system has begun being phased out and replaced with a tariff calculated based on the average costs of electricity observed on the competitive market ([ANRE, 2012b](#)). Thus, any discrepancies between the regulated tariff and the actual costs of supplying energy to consumers will be eliminated. In theory, the measure should encourage consumers to negotiate and opt for the most cost effective offers on the market and suppliers will be motivated to become more competitive in terms of price, resulting in lower electricity costs overall. It remains to be seen whether or not this will actually happen. However, it is certain that consumers will become more aware of the market and of the possibility to change their supplier, making marketing strategies, such as positioning through differentiation and segmentation, more viable for electricity sellers.

With regard to the support mechanisms used to promote the development of RE,

two approaches seem to be most frequently used, especially in Europe: green certificates and feed-in tariffs. Out of these, the Romanian Government chose to implement a support mechanism based on green certificates (GCs). While feed-in tariffs also encourage small, non-specialized generators (household and commercial), leading to a faster increase of the RE production rate, GCs are more adequate for attracting large specialized investors. As with most such mechanisms, in Romania GCs are awarded to green energy generators for a certain amount of electricity which was produced and delivered into the grid. Suppliers are required by law to acquire a certain amount of GCs on the open market and are allowed to transfer the cost of these to the final consumer ([ANRE, 2012a](#)). Choosing a GC system for promoting ER development seems to be the right choice for Romania, considering that by the end of 2010, the country had already reached a 23.6% share of RE in its overall production, out of the 24% established as a target for 2020 through the 2009/28/EC Directive ([European Commission, 2013](#)).

The following sections will look at how previous research has approached the task of segmenting energy users and will illustrate the relevance of customer segmentation considering the context of the Romanian energy sector as described above.

3. Past approaches to customer segmentation in the energy sector

There is evidence that customer segmentation as a marketing strategy was already being implemented within some large industries (household appliances, automotive, tobacco) in the period immediately following the Second World War ([Smith, 1956](#)). However, the first author to actually define and structure this approach seems to have been Wendell Smith in the year 1956. His aim was to provide a marketing vision to the classical and neoclassical economic theory. Thus, starting from concepts such as free market and perfect competition, he notices that demand is not convergent, but actually divergent, with consumers manifesting different specific tastes and preferences. The author wishes to convey the understanding of this heterogeneous market as a sum of “slices” or homogeneous sub-markets which result from the divergence of preferences. He further proposes that companies should approach these “segments” in a differentiated manner in order to satisfy consumer needs more precisely ([Smith, 1956](#)).

The emergence of segmentation brought about the end of standardized mass production (as per Henry Ford’s famous aphorism: “You can buy the Model T in any colour, as long as it’s black”). It is from this point onward that marketing truly begins to develop as a science and as a company function through concepts, methodologies and commercial strategies such as differential advantage, market research, positioning and product differentiation ([Munteanu et al., 2008: 13-17](#)).

3.1. Socio-demographic segmentation

Among the first and most frequently used approaches to market segmentation were those based on a combination of external or “visible” characteristics: geographical, social and demographical ([Diamantopoulos et al., 2003](#)). These have frequently been referred to as socio-demographics. They represent consumer traits which can be observed externally or which are recorded in a standard format as population statistics: age, sex, income, education, profession, place of residence, marriage status, number of children etc. Such variables have been widely used in the

segmentation process primarily because, compared to other methodologies, socio-demographics are widely available ([Myers, 1996](#)). Generally, they can be obtained without significant costs (or even freely) and their processing and analysis is much more straightforward than, for example, that of personality traits.

In the case of studies concerning the energy sector or environmental protection, socio-demographic segmentation has been frequently used in order to assess attitudes, beliefs and the passive ecological behaviour of consumers, as well as their intention to purchase RE micro-generation equipment ([Ichim, 2012](#); [Menegaki, 2012](#); [Mozumder et al., 2011](#); [Zhang and Wu, 2012](#)). However, in analysing purchase intent, some researchers have combined socio-demographics with psychological traits, such as perception of control or motivation ([Leenheer et al., 2011](#)).

Diamantopoulos et al. combine a comprehensive literature review with an empirical study in their attempt to validate the relationship between socio-demographics and environmental consciousness (assessed as a combination between knowledge, attitude and behaviour) ([Diamantopoulos et al., 2003](#)). Their research was partially motivated by the fact that the majority of studies regarding environmental consciousness were, at that time, focused only on energy consumers from the United States, while their research was targeting the UK population. Diamantopoulos et al. conclude that socio-demographic variables have a weak explanatory power regarding the variance of environmental consciousness and are also unable to explain the behavioural component of consumers. However, they argue that the use of socio-demographics in characterizing consumers is ultimately useful in fine-tuning marketing communication campaigns, given that media consumption profiles are based on such segmentation variables.

One possible explanation found by Diamantopoulos et al. for their results is that there is a generally high level of environmental awareness among Western consumers, regardless of their demographic profile. Thus, in order to achieve a useful segmentation, a more profound analysis would be required – one which would go deeper than the surface level of socio-demographic traits.

3.2. Lifestyle segmentation and psychographics

In order to compensate for the above mentioned shortcomings of consumer studies based on socio-demographics, researchers began to include several psychological variables in their analyses. The combination of “psychology” and “demographics” gave rise to the term “psychographics”, which refers to a much more complex analysis of consumer behaviour which can prove to be a lot more insightful both for academic and managerial purposes. The first such studies relied mainly on psychological research instruments, which were used to generate personality profiles. However, practice again proved that there is a weak correlation between such profiles and consumer behaviour. Thus, they were replaced by analyses focused on “lifestyles” ([Vyncke, 2002](#)).

From a marketing perspective, lifestyle means “a system for assessing an individual, based on his activities, interests, opinions, likes, dislikes and consumption patterns” ([Maxim and Gherasim, 2000: 160](#)) - in other words, the way in which the consumer lives and spends money. Market research focused on lifestyles can prove to be highly valuable, since it can generate both an account of how consumers behave, as well as an understanding of the internal motivation of their actions. However,

such studies can prove to be highly complex and difficult to implement. In addition, there is currently no standardized theoretical framework which can be applied in order to ensure consistency and comparability among various pieces of research. The most widely used method for studying lifestyles is called AIO (activities, interests and opinions) ([Datculescu, 2006](#); [Maxim and Gherasim, 2000](#); [Vyncke, 2002](#)). Activities refers to the actions that the consumer performs (shopping, work, practicing sports etc.). Interest is analysed in relation to something (family, work, an object, a service etc.), while opinions are descriptions of the beliefs and points of view of a consumer.

In order to perform an analysis on these three dimensions, a battery of AIO sentences needs to be created (e.g. "I go shopping several times a week", "Usually, I am interested in celebrity news", "People should be more faithful" etc.). Next, a large scale study is required in order to quantify the degree in which people agree or disagree with each sentence. Then, the sentences need to be reduced or condensed using factor analysis so that, in the end, we are left with a set of variables which respect the "mutually exclusive, collectively exhaustive" principle ([Rasiel and Friga, 2001: 3](#)).

Although the method has been used successfully in the past, it is difficult to implement due to the large scale survey associated with it: 200 – 500 AIO sentences are usually required ([Datculescu, 2006: 181](#)), and factor analysis practice dictates that 5 – 10 respondents are required for each sentence to be analysed ([Pallant, 2011: 183](#)). Thus, the implementation of AIO is problematic both due to the large sample size (1,000 – 10,000 respondents) and due to the significant effort that a respondent makes in order to complete a questionnaire made up of several hundred items.

As a solution to this issue, more recent research attempted to use values as measures of lifestyle. Values can be defined as trans-situational objectives of varied importance which act as guiding principles for an individual's life. Researchers have brought several arguments in favour of this method (e.g. wider applicability, transcendence of specific situations etc.), but the most significant is the fact that research instruments now needed to contain 10 – 20 sentences, as opposed to 200 – 500 ([Vyncke, 2002](#)). The main disadvantage of value based evaluations is the lack of a theoretical framework to guide researchers in the creation of the instrument. Some batteries exist which were considered to be somewhat standard, such as the one proposed by [Rokeach \(1973\)](#). However, some researchers argued that this was only applicable to American middle class families ([Ness and Stith, 1984](#)). This is a good example of why a standard set of variables cannot be established, since values tend to be circumstantial (specific to a certain geographical area, social class or even time period). Since a universally valid scale does not exist, researchers need to perform an initial exploratory study (based on primary or secondary data) in order to establish a relevant set of variables for the population to be examined. Only after completing this initial stage can they begin the actual lifestyle research.

[Vyncke \(2002\)](#) attempts such an approach by performing a large scale exploratory study aimed at creating and demonstrating the practical validity of a lifestyle evaluation instrument. This was built starting from a set of values (35 items), but also adding three other concepts: life visions (20 items), aesthetic styles (28 items) and media preferences (42 items), naming the overall scale VLAM. Significant effort

went into designing the instrument: 5 quantitative and qualitative studies with a total number of nearly 1,000 respondents. The final result is tested through a segmentation exercise applied to four very different markets (automotive, tourism, politics and media). Although the VLAM construct is proven to be more useful than socio-demographics, its complexity resembles that of AIO batteries (125 items excluding socio-demographics).

The more recent research concerning the energy business utilizes more refined and practical approaches for customer segmentation. They tend to use evaluation scales of 10 – 20 items (constructed based on secondary research), which generally address customer beliefs and behaviour. For example, [Sütterlin et al. \(2011\)](#) utilize a scale built around energy consumption patterns and respondents' beliefs regarding the energy sector, while [Axsen et al. \(2012\)](#) use a scale consisting of general "life practices" of consumers. Both studies use cluster analysis to generate market segments and Axsen et al. also use factor analysis in order to compress their segmentation variables.

The scale used by Axsen et al. was constructed based on the theory of [Giddens \(1991\)](#) regarding lifestyle sectors. These are sets of activities which the community or society perceive as being coherent. They are tied to various points of reference within an individual's existence (e.g. family orientation, career orientation, outdoor and sports orientation etc.) and combined they form an individual's "self-concept" ([Axsen et al., 2012](#)).

As a conclusion, there are numerous studies such as that of [Sanquist et al. \(2012\)](#) or any of the ones listed above, that may or may not refer to the energy sector, which prove that a characterization and especially a segmentation of consumers based on lifestyles is more efficient in explaining their purchasing behaviour than the more traditional socio-demographic approaches. Each of the papers mentioned also illustrates some disadvantages specific to the lifestyle methodology, but the general consensus is that the added value of this approach is enough to compensate for any shortcomings, especially if caution is taken when establishing the items to be used in the segmentation scale.

Taking into consideration all of the aspects mentioned above, the segmentation of energy consumers for the present doctoral research will be based on psychographics and will use a set of sentences which illustrate consumer life practices, similar to the example offered by Axsen et al. The following section will offer some additional arguments for this choice and will illustrate its applicability in the context of the Romanian energy sector.

4. The segmentation of Romanian energy consumers

As mentioned in the previous section, the segmentation method chosen for this research is based on analysing lifestyles. Marketing specialists include lifestyle among the principal factors which explain how consumer behaviour is formed and expressed ([Maxim and Gherasim, 2000: 160](#)). Moreover, the last few years have seen significant changes in the legislation governing how the Romanian retail electricity market functions, giving end-users a more active role. Thus, an incursion into the basic theory of consumer behaviour would be relevant.

Section 2 offered some details regarding the changes which took place in the Romanian retail electricity market since 2007 and especially 2013. The relationship between suppliers and customers has been liberalized and the regulated sales

tariffs have begun being phased out and replaced with market based tariffs. The most significant change is that consumers will be encouraged to have an active behaviour on the market by opting for electricity suppliers based price or their own specific preferences. Since supplier switching is the equivalent of an acquisition, this means that a decision making process for the purchase will take place, as defined by theoretical frameworks ([Munteanu et al., 2008: 77](#)).

[Gamble et al. \(2009\)](#) and [Ek and Söderholm \(2008\)](#) both endeavour to analyse energy consumer behaviour in order to understand the reasons why Swedish household customer tend to have a low supplier switching rate, in spite of the fact that the electricity market in Sweden was liberalized in 1996 (more than a decade prior to the two studies). In both cases, the authors identify three different factors which determine the emergence of the purchase behaviour (as seen in figure 1). In addition, Gamble et al. identify two variables which act as obstacles for the completion of the decision making process: loyalty toward the incumbent supplier (a mostly emotional obstacle) and information availability (which creates an opportunity cost due to the time spent getting informed). Other researchers conclude that a lack of information regarding the switching procedure and the difficulty of comparing electricity tariffs among different companies are also major obstacles for the decision to change suppliers ([Salmela and Varho, 2006](#); [von der Fehr and Hansen, 2010](#)).

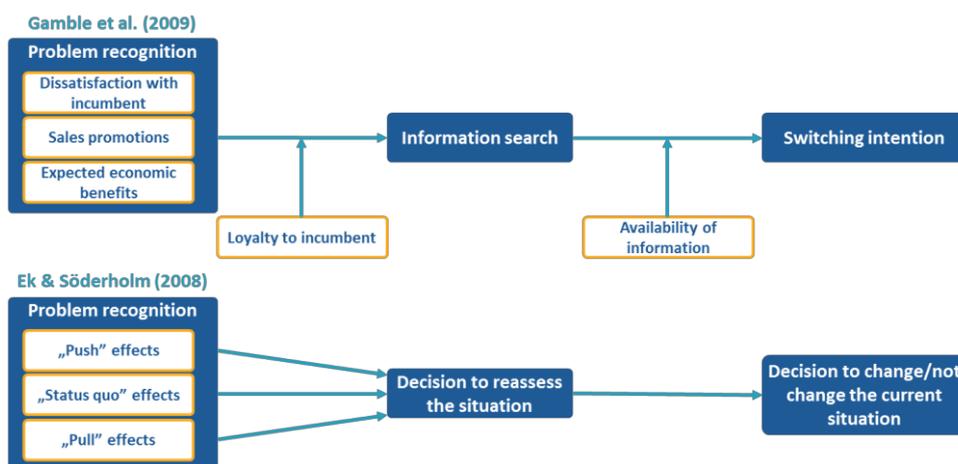


Figure 1: Models based on energy consumers' decision making process
Adapted from: [Ek and Söderholm \(2008\)](#); [Gamble et al. \(2009\)](#)

The liberalization and deregulation of the energy sector in Romania will allow for a differentiation of the services offered by suppliers. They will be able to compete on matters such as tariffs, service quality or even energy mix (i.e. the proportion of RE in the total amount of electricity sold). If we consider the two models illustrated in figure 1 and refer only to the proportion of RE in the energy mix as a differentiating factor, we can conclude that it would potentially generate “push” (displeasure with current supplier) and “pull” (attractiveness to other sellers) effects as per the Ek and Söderholm model. Similarly, it could generate “dissatisfaction with incumbent” or it can be used as a “sales promotion” point as per the Gamble et al. model.

Coming back to the discussion regarding the choice of segmentation methods, as concluded from the previous section, psychographics has an increased utility in determining consumer profiles. In addition, it is to be expected that companies which sell electricity are already able to perform a segmentation of their customers based on socio-demographics using the data included in sales contracts and public statistics. However, a psychographic segmentation has the potential to generate insightful consumer profiles which would be highly useful in understanding the structure of the liberalized retail market, so that suppliers can build adequate marketing strategies.

Out of the various psychographic segmentation procedures presented in section 3, the approach used by Axsen et al. is considered to be the most adequate for the current research process. By comparison, the AIO and VLAM procedures are considered to be too demanding both for the limited budget of this research and for the cognitive and temporal availability of the respondents, while the values based approach is likely to have limited accuracy without first carrying out a broad exploratory pilot study. In addition, analysing a combination of consumer lifestyle sectors would allow for a more comprehensive understanding of energy users than a segmentation based primarily on their environmental attitudes. Finally, if the research instrument would put too much focus on ecological behaviour, it could generate a social desirability effect ([Axsen et al., 2012](#)).

5. Next steps

In conclusion, the current doctoral research will utilize an adapted version of the life practices scale proposed by Axsen et al. in order to achieve a psychographic segmentation of Romanian energy consumers. The 15 statements listed in Annex 1 will, however, need to be adjusted to suit the local context and the specific objectives of this research project (e.g. no focus on researching automobiles). All modifications will be based on the results of previous research performed by us and on a qualitative study among industry experts and consumers. The resulting scale will be pretested and further modified as needed and the final construct will be included in the main instrument of the doctoral research.

Annex 1 – Life practices scale used by [Axsen et al. \(2012\)](#)

How often do you engage in each of the following activities? (Never, Rarely, Occasionally, Frequently, Very Frequently)

- Developing your career
- Discussing or researching automobiles
- Helping the environment
- Home remodelling or “fix-it” projects
- Nature and the outdoors
- Playing sports, recreation or exercise
- Religious or spiritual practices
- Researching or trying new technology
- School, lectures or other education
- Shopping
- Socializing with others
- Taking care of/spending time with family
- Using the internet for fun or leisure

- Volunteering or giving to charity
- Watching TV or movies

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