

MODELLING CONSUMER BEHAVIOUR ON THE ENERGY MARKET

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Abstract: Consumer behavior models make it possible to visually present in charts researched entities and the processes they go through, as well as the changes which occur should some variables which affect those processes change. The **objective** of this paper is to design a meaningful model which may be employed to describe in detail consumer behavior in the process of purchasing energy. The **subject** of the research is energy consumers, while its **objects** are the models which could be employed to describe consumer behavior when consuming energy. The analysis we conducted indicated that in order to accomplish our objective we need to account for emotional responses, norms and social factors and major economic variables (prices, incomes, prices of substitute goods).

Key words: consumer behavior; behavior model; energy consumption.

JEL: D11.

Introduction

Scientists and experts have been researching both practically and theoretically consumers' individual and group behavior in the decision-making process for years. They have also designed a plethora of consumer behaviour models for different goods and services. A model can be defined as a simple, yet clear and organized representation of a real economic system or process. The design of a model that accurately presents the factors which affect consumer behavior as well as the relationships and the interaction between these factors will be helpful in establishing the nature of an economic phenomenon and will render it easier to study the different aspects of a phenomenon. The model will then be used to identify the key indicators, the research methods and the baseline data required. The model will also be helpful in making the research process meaningful and systematic from the stage of collecting data to the stage of formulating research findings and conclusions.

The **subject** of this research is energy consumers.

The **objects** of the research are the theoretical models which are used to describe consumer behavior in the process of energy consumption.

The **objective** of the research is to design a model so as to integrate the major factors which determine consumer behavior in the process of purchasing and consuming energy by accounting for the mechanisms of interdependence and interaction between these factors. By designing such a model we will be able to study in greater detail the causal links between energy consumption and its influencing factors. To accomplish our objective we have set the following scientific tasks:

- To review existing theoretical concepts about consumer behavior;
- To analyse and evaluate the models which could be employed to our survey;
- To identify the factors which have an impact on consumer behavior on the energy market;
- To design a model of consumer behavior in energy demand.

Consumer behavior in terms of energy consumption has attracted serious scientific interest. According to Swan and Urgusal (Swan & Urgusal, 2009), two major approaches have been employed in the research of energy consumption patterns – the top-down approach and the bottom-up methods. The top-down approach is based on macroeconomic theories and the interaction between the energy sector and the economy at large. It uses aggregate economic variables to predict consumer behavior and prospective changes in energy consumption. Top-down methods employ econometrics and multiple linear regression methods to account for the variance between dependent and independent covariates (Kelly, 2011). The focus of these methods is on identifying causal relationships between aggregate variables (i.e. between macro-economic factors and energy consumption). Their findings might be used in the implementation of certain macro-economic policies.

Bottom-up methods study energy consumption by using various physical, social, behavioural and demographic properties of households. Bottom-up models focus on the impact of micro-level factors. Our analysis of consumer behavior employs a complex approach and used both the top-down and the bottom-up method.

1. A Review of Consumer Behaviour Theories

Research of consumer behavior is an evolving scientific field. At this stage, there seems to be no uniform or irrefutable body of knowledge established in the area. The research conducted so far employs a wide range of approaches, while the subjects of research are highly dynamic and constantly changing. Consumer behavior research predominantly relies on the knowledge accumulated in other social sciences, such as psychology, sociology, economics and philosophy. Consumer behavior theory combines the

approaches and methods of these sciences into a specific integrated approach which determines the complex, multidimensional and multidisciplinary nature of consumer behavior (Laskova, 2012).

Being a complex social phenomenon, consumer behavior has been researched by sociology and economic sociology in particular. M. Weber defined consumer behavior as a type of social behavior which is subjectively meaningful and relates to the behavior of other individuals (Georgiev, Chonova, & Ganeva, 2009). The umbrella term 'behavioural sciences' is used for all social sciences which focus on the research of people and human. As such, they represent 'a body of systematized knowledge about human behavior and why people behave the way they do' (Paunov, 1998, p. 11).

Freud's psychological concepts are fundamental to the theory of consumer behavior and have had the most powerful impact on formulating the contemporary principles and models of that behaviour. According to Freud, human behavior is motivated by three distinct agents in the psychic apparatus, or the psyche: the ego, the id and the super-ego, which is also called 'the perfect ego'. Freud claimed that people are mainly driven by their instincts, inclinations and desires. He defined instincts as the psychical representation of the human needs which govern human behavior (Stoyneshka & Peev, 1999). Historically, the science of marketing fully developed in the 1960s, when the classical marketing concept was formulated about determining consumer needs and desires. In order to study more thoroughly consumers and their behaviour, marketing theory and practice relied on sociology and psychology as early as back then. Consumer behavior has thus become a research area in marketing, yet one of a marked interdisciplinary nature (Laskova, 2012).

Microeconomics is another branch of economic science which studies consumer behavior. It approaches consumer behavior as an input in the economic system. The results of an economic system are primarily determined by the degree in which that system operates in line with consumer behavior. The degree in which an economic system is adequate is reflected not only by the efficient performance of economic entities but also by the standard of living of the population (Avramov, 2001). Microeconomics explains consumer behavior with the utility theory. According to that theory consumers are rational decision-makers who are only concerned with self-interest.

According to the generally accepted definition, consumer behavior is the activity of individuals which relates directly to the purchase, consumption and disposal of products, services, experiences and ideas which are expected to satisfy some specific needs of theirs (Blackwell, Miniard, & Engel, 2001). Hence, the research of consumer behavior is studying individuals, groups and the processes they go through when selecting, purchasing and consuming products and services which will meet their demands. Consumer behavior then refers to all processes which individuals go through when recognize their needs; identify ways to satisfy them; interpret available information and make a purchase or a consumption decision.

Consumer behavior means how individuals make decisions to expend their available resources like time and money on the consumption of products and services (Jisana, 2014). Walters defines consumers as 'individuals who purchase, have the capacity to purchase, goods and services offered for sale by marketing institutions in order to satisfy personal or household needs, wants or desires' (Walters, 1974, p.4).

Within a broader context, consumer behavior is part of the overall behavior of individuals, therefore the factors affecting people's daily activities are believed to influence their behavior as consumers as well (Loudon&Bitta, 1993). Hence, consumer behavior may be approached from different perspectives according to specific research objectives and the field of knowledge of the researcher (Daniela, 2011).

2. Major Consumer Behaviour Models

According to Avramov (Avramov, 2001), the major consumer behavior models are: conceptual-structural; psychological; activating; cognitive; sociologically oriented and economic. In terms of this classification, some fundamental models are:

1. The Marshallian Economic model;
2. The Pavlovian Learning model;
3. The Freudian psychoanalytical model;
4. The Veblenian Social-Psychological model;
5. Maslow's Needs Hierarchy Theory.

Due to the focus of our research we will review in greater detail the Marshallian model (i.e. his theory of marginal utility). A. Marshall elaborated further the doctrines developed by Adam Smith and Jeremy Bentham by combining different economic theories about consumer behavior and employing the marginal utility concept. The Marshallian model of consumer behavior is concerned with the analysis of a single factor – the price of products and services. Using as an example the famous tea case, Marshall claimed that consumer demand for tea depends only on changes in the price of tea, as long as other variables, such as the price of substitute goods, or consumer preferences or the variety of available products remain constant. Marshall also studied consumption as a consequence of changes in consumer income. The marginal utility of money is different for consumers on different incomes: 'the richer an individual becomes, the lower the marginal utility of money will be for him' (Marshall, 1920). Hence, an increase or a decrease in consumer income will result in a higher or lower price which a consumer is willing to pay for a particular good. This model approaches all individuals as rational consumers whereas the market is considered to be the place where homogeneous buyers meet. Marshall believed that consumers act in a similar manner in certain

circumstances and that their ultimate goal is to maximize the benefit they gain in exchange for the expenditure they make.

According to Kotler (Kotler, 1979), the contribution of the Marshallian model to the behavioural science can be viewed from a number of different viewpoints. One point of view is that the model is tautological and can therefore be defined as neither true nor false. Another view is that the model provides logical norms for buyers who want to be rational and is therefore a normative rather than a descriptive model of behavior. Consumers can hardly be expected to employ an economic analysis for all purchases, but are selective in using an economic theory. A third view is that economic factors should be included in any comprehensive analysis of consumer behavior since these factors operate, to a greater or lesser extent, in all markets.

The Marshallian model provides a number of useful hypotheses about consumer behavior. One of them is that the lower the price of a product is, the greater the sales for that product will be. Another useful hypothesis is that the lower the price of a substitute product is than that of a specified product, the greater the sales of the substitute product will be. The third hypothesis refers to the utility of the product. When real incomes go up, the consumption of a product will increase, too, provided that it is not an inferior product.

We should point out that these hypotheses are intended to describe the average effect, rather than class all individuals. As Hicks, noted: 'the assumption that a consumer acts as a perfect consumer is a hypothesis which should be tested; to assume that a real person, a Mr. Brown or a Mr. Jones who lives across the street actually operates in a similar manner is not worthy a minute of scientific attention' (Hicks, 1959, p, 55). The major shortcomings of the Marshallian model are that it cannot provide an explanation as to how a particular consumer will behave on the market; that it cannot be considered to be exhaustive and that it lacks a broader perspective.

Economic factors themselves cannot account for all alternatives in the supply and demand process of a product. Rather, they should be complemented by such factors like habits, emotions, social norms, moral behavior, etc. Contemporary models for studying consumer behavior take into account precisely such factors. Some of the most comprehensive models are the Howard-Sheth model (the Theory of Buyer Behaviour); Nikosia Model and the Engel-Kollat-Blackwell model (the Consumer Decision Model).

The Howard and Sheth Model uses the concept of 'stimulus-entity-response' to explain the consumers' choice of a particular brand when they have insufficient information or finance available. According to the authors of this model, purchase stimuli include price, quality, design, service and advertising. Their significance varies for different products (quality and service, for example, are essential for machines and equipment, while advertising and design are more important for consumer goods such as cosmetics, clothes, luxury goods, etc.) (Howard&Sheth, 1969). This model helps better understand customer behavior through the major variables which affect consumers' choice of a particular product. The model has four basic components:

- Input variables
- Output variables
- Hypothetical constructs
- Exogenous variables

Some of the constraints of the model refer to the lack of clear distinction between exogenous variables and the other variables; the abundance of variables; the difficulty to measure the variables which have not been adequately defined. This renders the model rather complex and cumbersome to deploy.

The Nikosia Model approaches all variables as interdependent and assumes that none of them can be defined as dependent or independent. Thus, in practice, there is a closed cycle of interaction in which each component is an input for the next one. The Nikosia model seeks to explain consumer behavior through the relationship which is established between an organization/company and a prospective consumer. In this model, an individual is analysed as a system in which stimuli are inputs and human behavior is an output of the system. The model employs four basic components or area-fields:

- Consumer attitudes to the advertising messages of companies;
- The search for the product and its evaluation in terms of alternatives on behalf of consumers;
- The actual purchase of a product;
- Consumption and consumer feedback about the company.

The Nikosia Model has some shortcomings which render it less applicable: for example, it does not take into account a number of inherent consumer factors. Another limitation is the assumption that consumers' decisions to purchase a particular brand of products are not influenced by any prejudice or preferences. Overlapping of company and consumer attitudes and approaches is an issue as well.

The Engel-Kollat-Blackwell Model focuses on five activities in the decision-making process of consumers. Those are:

- Problem recognition
- Information search
- Evaluation of alternatives
- Choice
- Outcome

The model is flexible and easy to employ. It is based on the assumption that consumers will not always go through all stages, especially when it comes to products which are not purchased regularly. A major limitation of the model is the inclusion of environmental factors, yet without clearly indicating the impact of those factors on consumer behavior.

The three models provide useful guidelines and foundations for designing our model, yet the contents of the model we want to design and the objectives of our research go beyond their scope. We therefore need to review other theoretical models as well, since some of their elements may be employed in modeling consumer behavior and energy consumption itself. Such

models could be: the Rational Choice Theory; the Theory of Reasoned Action; the Theory of Planned Behavior; the Value Theory and Triandi's Theory of Interpersonal Behaviour (Martiskainen, 2007).

The Rational Choice Theory is based on the notion that consumers compare the expected costs of and benefits from different actions and choose the actions which would be most beneficial or least costly to them. This model is also based on the principle that in order to weigh the costs and benefits of various options, consumers need information which will help them make rational choices. The theory was widely employed in the research of household energy conservation in the 1970s. A major shortcoming of the theory is that fails to take into account factors like habits, emotions, social norms, moral behavior, etc.

The Theory of Reasoned Action was developed by M. Fishbein and A. Ajzen and is one of the most influential theories of social behavior (Jackson, 2005). The underlying thesis is that people expect certain benefits as a result of their behavior. The theory also takes into account a number of subjective norms, for example other people's perceptions of an individual's behavior. The model is graphically presented in Figure 1.

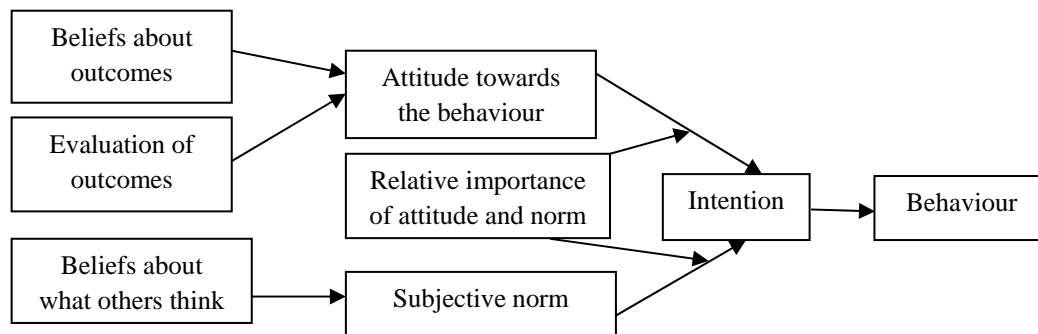


Figure 1. The Theory of Reasoned Action

Source: Jackson, T., Motivating sustainable consumption. A review of evidence on consumer behavior and behavioral change, Centre of environmental strategy, University of Surrey, 2005, p. 170.

The model may be employed when researching consumer behavior primarily in terms of protecting the environment by reducing energy consumption. Similar to the previous model, this one has a few shortcomings as well. It does not, for example, take into account consumers' individual habits or the impact of emotional and moral factors.

The Theory of Planned Behavior is an extension of the Reasoned Action model. The major difference between the Theory of Planned Behaviour and the Reasoned Action Model is in terms of consumer perception. The underlying principle of the Theory is that the attitude of individuals towards a certain type of behavior has a direct impact on their choices as consumers. This model is frequently used in the literature to explore pro-environmental

behavior, for example, recycling, energy consumption, water conservation and food choice (Stem, 2000). The model is presented in figure 2.

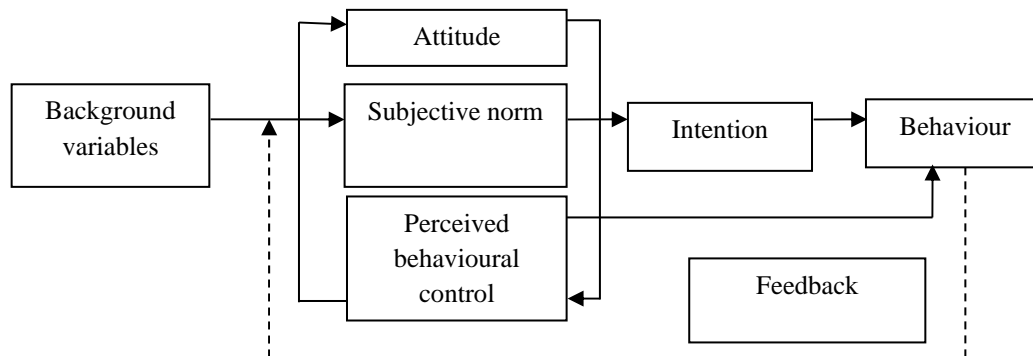


Figure 2. The Model of Planned Behaviour

Source: Egmond, C., R. Bruel, *Nothing is as practical as a good theory.*

Analysis of theories and a tool for developing interventions to influence energy-related behavior, SenterNovem, 2007, p. 16.

According to this model, attitudes, subjective norms and perceived behavioural control might predict the intention, which, in turn, might be helpful in predicting the behavior. Background variables like demographical factors, for example, influence consumer behavior through the three determinants and the intention. Feedback is essential, too. This model is based on the assumption that the most accurate predictor of consumer behavior is their intention to behave in a particular way (Egmond & Bruel, 2007). The major disadvantage of the model is that while it may be employed to explore the relationship among attitudes, intentions and behavioural perceptions, it cannot measure actual consumer behavior or changes in it.

The Value Theory is linked to the normative and moral aspects of human behavior. It is mainly employed in the research of pro-environmental behaviours. According to the Value Theory, consumers who mainly hold egotistic and self-interested values are less likely to behave pro-environmentally and reduce their energy consumption. On the other hand, individuals with pro-social behavior are more likely to be rational in their energy consumption patterns. Pro-social attitudes, however, do not guarantee lower energy consumption.

Triandis' Theory of Interpersonal Behaviour. According to that model, human behaviour in any given situation is a function of a person's intentions and habits, as well as the situational factors and the conditions in which that person operates. The model is presented in figure 3.

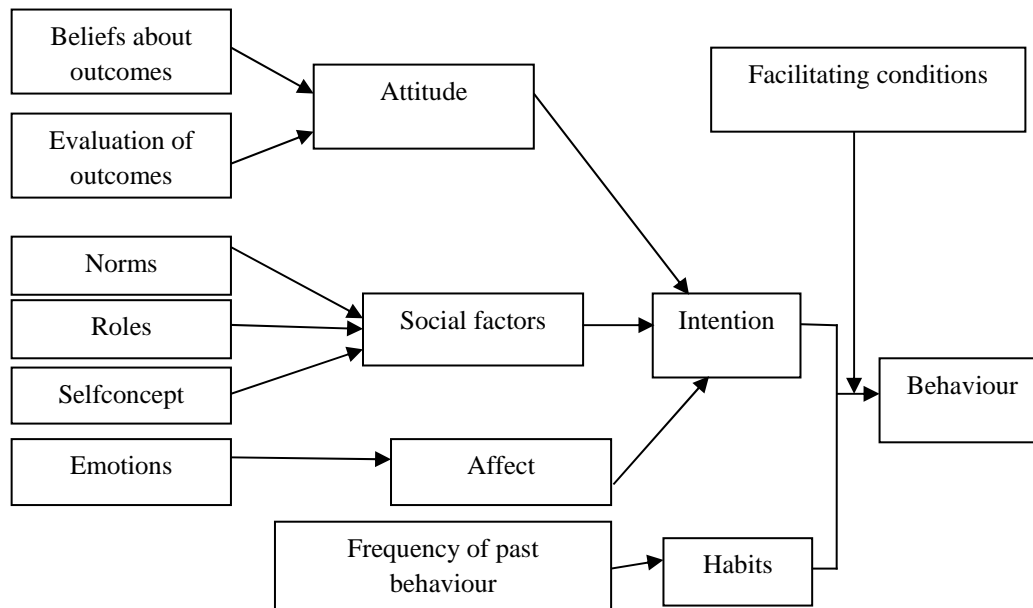


Figure 3. Triandis's Theory of Interpersonal Behaviour
 Source: Egmond, C., R. Bruel, *Nothing is as practical as a good theory. Analysis of theories and a tool for developing interventions to influence energy-related behavior*, SenterNovem, 2007, p. 16.

Triandis' model focuses on social factors and emotions in predicting behavioural intentions. It also stresses the importance of emotional antecedents to present models of action. Similar to the other reviewed models, however, Triandis' model cannot be directly employed since it is primarily focused on the relationship between habits, intentions and behaviour, rather than on real changes in consumer patterns. Furthermore, the model does not take into account such important elements as feedback and environmental factors which are essential for designing an accurate model. As a concept, Triandis' model is similar to the Theory of Reasoned Action, yet it is certainly more complex. In addition to some elements of the Reasoned Action Model, Triandis' model also takes into account social factors and personal characteristics as determinants of consumer behaviour. The underlying idea of the model that a wide range of factors have their complex impact on consumer intentions is one of its strengths and is close to our concept about modelling consumer behaviour.

Designing a model of consumer behaviour requires profound knowledge about the most powerful theoretical models. Assessing the strengths of each model, the opportunities they provide and their limitations is essential, especially in terms of their applicability to a consumer behaviour model in energy demand. The objective then is to identify and employ those factors, interactions and causal links of the theoretical models which have a major impact on household consumption and could describe consumer behaviour

most accurately. To accomplish this, we need to take into account rational analysis as well as emotional reactions, norms and social factors.

3. Designing the Model

A model may be defined as an abstract representation of real phenomena and processes in the economy. In other words, a model is a simplified reflection of reality since it would be impossible to encompass all factors and details which have an impact on a given phenomenon. Therefore when designing a model, one has to face the dilemma what components (or factors) should be included in the model and which of them could be ignored. Should a model fail to account for factors with a significant impact upon a phenomenon, it will be neither accurate nor comprehensive. Including too many insignificant or minor factors, on the other hand, would result in designing a model which is too complicated and irrational.

Designing a meaningful model requires profound knowledge in Economics, its theoretical hypotheses and models, as well as knowledge acquired from one's own research of the factors, processes and mechanisms which govern consumer attitudes and decisions. It also requires insight into the specific attributes, situation and trends in the development of the electricity market and the nature of the product.

Electricity is a highly standardized product with uniform technical parameters and qualitative indicators, whereas the specific producer is always anonymous. Due to these (and other specific features of the product), electricity consumption cannot be affected through producers' advertising and the decision-making process which consumers engage in is different from the decision-making process related to other goods and services. Electricity is a non-storable product, i.e. it is not possible to build up stocks or inventories when prices are favourable, which deprives consumers of the opportunity to be flexible. Electricity needs to be consumed immediately which renders warranty and post-warranty considerations irrelevant and hence, not a factor affecting consumer behavior. Substitute products have only a small effect on electricity consumption which is only observed in households that consume electricity for heating. Possible substitute products are solid fuels, natural gas and central heating. Nevertheless, substitute products cannot be underestimated or ignored as a factor of consumption but need to be included when designing a consumer behavior model.

Electricity consumption is a regular process, which determines the specific characteristics of consumer attitudes and consumption decisions. For ease of exposition, consumption is approached as a composite process with two components. The first component is constant and is determined by the equipment and appliances with uninterruptable electricity consumption (refrigerators, freezers, and any appliances in a stand-by mode). 'Permanent'

consumption refers to the number of constantly plugged-in appliances, the total power they consume and prolonged periods of time. Changes in this component are infrequent and only tend to occur when there are some changes in the energy needs or the financial capability of households.

The second component of electricity consumption does not exhibit regular characteristics as it depends on household energy needs which occur in different situations and at different times and any estimate of the costs required for satisfying these needs is a rough estimate only. Consumption decisions depend on household attitudes which have been formed earlier under the combined influence of complex economic, personal, socio-psychological and situational factors. These attitudes are the criteria about the level of household energy comfort which household members have set. The decision to consume electricity in a particular situation is the result of a subjective assessment how to satisfy current needs in compliance with the criteria which a household has adopted.

One of the attributes of electricity consumption is the uncertainty about the 'cost' at which energy needs will be met. This uncertainty results in major discrepancies between actual monthly electricity bills and the estimates which households make in advance. It also relates to another essential feature of consumer behaviour – the regular readjustment of attitudes to electricity consumption. This process is highly dependent on the correlation between 'consumption assessment' and 'consumer attitudes'.

The electricity retail market nowadays is governed by free competition. Consumers are free to choose their electricity supplier and to negotiate the terms and rates of electricity supply. Active consumer behaviour and reasoned choice thus enable consumers to raise the level of their energy comfort and preserve or even reduce energy costs. Hence general market information is an essential factor of consumer behaviour. Obviously, specific market information is also a major factor which affects the investment behaviour of households in terms of energy efficiency. Both general and specific market information assist rational consumer behaviour and enable consumers to reduce their electricity costs without changing their consumption or to increase their consumption at the same costs.

An important factor which affects consumer lifestyles and, hence, consumer attitudes to electricity consumption is the dwelling and household characteristics. Obviously, a large household will need and consume more electricity than a small household on the same income and vice versa. A larger dwelling size is also generally associated with higher energy consumption. The type of dwelling (a flat, house, or villa) is another essential characteristic. Although we have not conducted our own research of the correlation between the characteristics of households and household electricity consumption, their significance is obvious and does not require any further arguments to assess them as an essential element of the general consumer behaviour model.

Some of the indicators, like the number of household members and the size of the dwelling are quantitative data (numeric values), while other

indicators, such as the type of dwelling (a house, flat or villa) are qualitative data (non-numeric values). The latter can be subject to detailed econometric analysis, too, provided that they are adequately transformed into numeric values. Hence, formulating functional dependencies tends to be more complicated, yet not impossible. To do so, it is necessary to monitor the electricity consumption of a large number of households (a representative sample) and employ statistical methods to determine the correlation coefficient and the coefficient of determination between dependent variables and factor variables. Empirical laws which have been formulated through econometric research provide a sound foundation for the theoretical justification of the overall mechanism through which analysed factors exert their impact.

A similar approach is totally applicable when researching the correlation between electricity consumption and the personal characteristics of household members. The most considerable challenge is studying the dependence of electricity consumption on general and specific information. Those two factors cannot be attributed numeric values which renders very difficult, though not totally impossible, the deployment of econometric methods. The dependent variable, i.e. electricity consumption, can never fully measure the real impact of rational consumer behaviour since the effect produced by cutting costs will immediately be used to increase consumption and meet other needs. In other words, the achieved effect will be higher energy comfort (i.e. the same value of the dependent variable) upon an increase in energy consumption costs. This implies that in order to research general and specific information as factors of consumption we need to employ indirect assessment methods.

The major difference between the concept we adopt in this model and the theoretical models which we reviewed earlier is that most models consider purchases to be a one-time or regularly repeated activity. They deal with a limited range of consumer behaviour traits and tend to be narrow in scope. We adopt a different concept in our own model. We focus on studying a wide range of consumer behaviour aspects on a narrow market segment – the electricity market. Furthermore, our model approaches consumption and consumer attitudes not as fixed attributes but as a continuous and dynamic process, since such is the nature of electricity consumption itself.

Obviously, the differences between the model we propose and the models we reviewed earlier in this paper are not in terms of employed concepts only. The Howard and Sheth model, the Engel-Kollat-Blackwell model and the Nikosia model, for example, do not take into account the specific nature of electricity consumption. Rather, they focus on factors like the relationship between producers and consumers; design and promotion; warranty, maintenance and a number of other factors which bear no relevance to the formation of electricity consumption attitudes. Hence the low feasibility of these models or some of their elements in the model we are developing.

M. Fishbein and A. Ajzen's theory of Reasoned Action and the Value Theory are also limited in scope. The Reasoned Action model focuses on the importance of pro-environmental attitudes and of subjective norms to the

process of forming consumer attitudes. A research in this aspect may be helpful for identifying the mechanisms of forming pro-environmental attitudes in consumers or efficient approaches and tools to produce a desirable impact on consumers, yet that impact will mainly related to environmental protection. The economic effect from developing pro-environmental attitudes in consumers will be insignificant, i.e. it will not affect the balance of the economy.

Reducing the consumption of electricity due to environmental concerns is should be encouraged and supported, yet it also needs to be adequately approached. A similar pro-environmental behaviour can hardly be expected from energy poor households or from households that are struggling to meet their basic needs. Pro-environmental consumer behaviour is only affordable to households with higher income, whose electricity consumption substantially exceeds the electricity comfort criteria¹. In other words, this aspect of consumer behaviour is limited both in scope and in significance. The ideas proposed by the models of the Reasoned Action theory and the Value Theory are therefore not applicable to the model we are designing. Another argument in favour of omitting those ideas is to prevent our model from being excessively complicated or cumbersome.

The arguments we have developed so far about the specific characteristics of the product and the market; the process of forming consumer attitudes; the strengths and the feasibility of some elements of related theoretical models determine the focus and the essence of the model to be developed, as well as its scope, main points and the figure which presents the model graphically. Our model will be based on: A. Marshall's theory about the marginal utility of money; Triandis' Theory of Interpersonal Behaviour and the impact of habits and past behaviour on future consumption; the Theory of Rational Choice and the author's perception of consumer behaviour being multifaceted and dynamic in the process of consuming electricity.

In our model, economic factors are presented through ellipses at the bottom of the figure. These include household incomes, the price of electricity and the prices of substitutes. We also considered it appropriate to add to the model a number of elements (groups of homogeneous factors which affect consumer behaviour) such as the personal features, the demographic indicators and the socio-cultural environment of consumers; as well as the 'general and specific information' factor. The latter reflects the underlying idea of the Rational Choice Theory that consumer rational decision-making depends on information. The figure presents the most significant factors which have an impact on consumer behaviour, while the links between the elements of the model illustrate our concept about the processes and the mechanism through which factors produce their impact on consumer attitudes.

¹ There seems to be no clear definition of the concept of electricity comfort, therefore there are no uniform criteria to be employed in assessing the electricity comfort of households. Hence, each household sets its own subjective criteria. Obviously, the impact of the subjective norm upon consumer behaviour tends to be highly unpredictable.

Figure 4 presents our model of consumer behaviour in terms of electricity demand. The major characteristics of the model we have designed are:

1. The model is based on the assumption that all consumers are rational, therefore a constant feature of their behaviour is the effort to equalise the marginal utility of the products and services they consume. According to the model, economic factors are decisive to forming consumer criteria and attitudes, while personal factors (demographic, psychological and situational) are secondary, i.e. their impact is less powerful.

2. The model deals with the electricity market and electricity consumption in particular, rather than with consumption of products and services in general.

3. The model is complex – it includes exogenous and endogenous factors of electricity consumption, such as: general and specific information; subjective norms; the socio-cultural environment; personal and demographic characteristics; household and dwelling attributes.

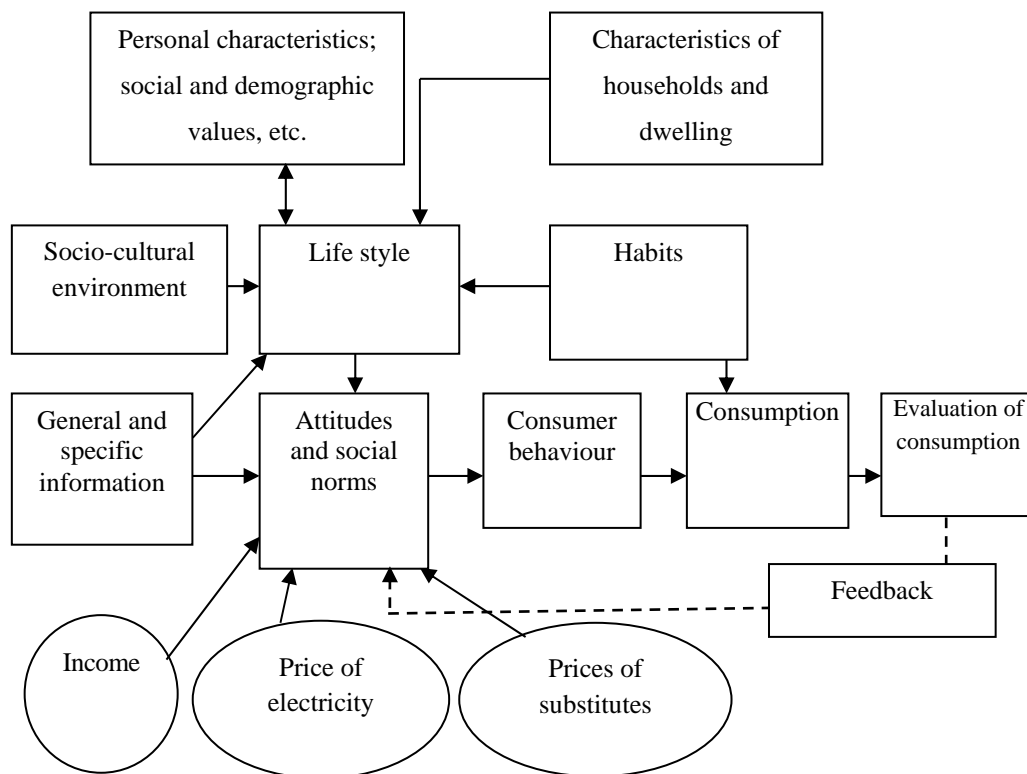


Fig. 4. Consumer Behaviour Model for Energy Demand
 Source: Chart designed by the author.

4. The model is up-to-date, i.e. it takes into account current trends in the development of energy and electricity markets and the mechanisms of forming consumer attitudes in response to ongoing processes.

5. The model presents in a simplified manner the set of relationships and interactions between different elements and factors in the process of electricity consumption.

6. The underlying assumption of the model is that general and specific information are a factor which contributes substantially to the active market behaviour of consumers, while increased activity combined with reasoned action result in high market activity.

7. The model is based on the concept that the aim of the global trend towards reforming and liberalizing electricity markets is to trigger market mechanisms, to encourage rational consumer behaviour and ultimately - to **increase market efficiency**. Market efficiency helps eliminate any asymmetries and maintain a sustainable balance by reducing the number of fluctuations in the economy, as well as their frequency and range. The sustainable balance of the electricity market is a crucial factor of the overall economic equilibrium, which in turn is a prerequisite for fact economic growth that is the ultimate goal of market liberalization.

4. Characteristics of the Components of the Model

1. The socio-cultural environment as a factor

A social environment is a large group of people who share similar beliefs, attitudes and values. Some of the major characteristics of a social environment are the education level, property, incomes and sources of income of its members. Representatives of different social groups have different needs of and different consumer attitudes to electricity. Culture relates to the level of intellectual development of individuals and is determined by their knowledge, beliefs, values and interests in science and arts (Avramov, 2001). Economists believe that consumer behaviour is the product of a particular culture. Furthermore, social and cultural environments set the norms of consumer behaviour while any violation of these norms is subject to public disapproval. Although these findings refer to the aggregate consumption of products and services, they are also valid for and applicable to consumer behaviour in terms of electricity consumption.

2. Households and dwellings characteristics

The number of occupants, their education level and employment status (presence in or absence from the dwelling) relate directly to the electricity consumption of a household. The floor area, the size and the type of a dwelling and their thermal performance are the other major factors of this component.

3. Personal characteristics

Personal characteristics have a direct impact on people's lifestyles and their consumer attitudes and behaviour. Major differences are in terms of the type of settlements (urban or rural), the age of consumers and the consumer style they have developed over the year – economical, rational or conspicuous.

4. Life style

Consumers' life style is a major component of the model of consumer behaviour we have developed. Economic factors and lifestyle determine consumer attitudes and criteria to electricity consumption. The component itself is the result of the combined impact of a group of elements: the socio-cultural environment; the personal, social and demographic characteristics, the characteristics of the household and the dwelling and the factors which have an impact on their formation. Life style also refers to the hobbies, scientific work, etc. which the occupants of a dwelling engage in at home.

5. General and specific information

General information provides consumers with awareness about the market; the manner in which it operates; suppliers and the offers available at present; contractual terms, their advantages and disadvantages. Information about substitutes for electricity and the terms of their supply is essential to the consumer attitudes of some individuals. General and specific information is a dynamically changing input variable which has a strong impact on the output variable – electricity consumption of households. Specific information provides consumers with awareness about the means and methods of improving the energy efficiency of their dwelling and reducing their electricity costs in result of optimizing their consumption.

6. Economic factors

These are the most powerful factors affecting consumer behaviour:

- Current incomes of consumers;
- The prices of electricity;
- The prices of substitutes;

7. Attitudes and social norms

Life style, general and specific information combined with economic factors determine people's attitudes to electricity consumption. Feedback about consumer evaluation of consumption and consumption attitudes also has a significant impact. Another factor which affects individuals' attitudes is the correlation between their demand for electricity comfort and their concern about the environment. This correlation forms the so-called subjective norm of consumer behaviour in the consumption of electricity. As we have already pointed out, this factor is of limited significance and is therefore not presented separately, yet our model allows for including further factors if necessary.

8. Habits.

In addition to attitudes and social norms which largely determine consumer behaviour, personal habits developed over the years also have a direct impact. Habits hardly affect the attitudes and criteria of households to consumption, yet they have an impact on the consumption itself, i.e. the quantity of electricity they consume.

9. Feedback

Advances in the electricity sector and the development of smart grids will enable consumers to constantly monitor the quantity and the cost of the electricity they consume. They will thus be able to adjust their consumption in

real time. Consumer attitudes will thus be re-adjusted constantly rather than periodically, while the significance and the impact of feedback as a factor of rational consumer behaviour will grow.

The model is **feasible and meaningful** as it illustrates the variety of factor variables which, to a greater or lesser extent, have an impact on consumer attitudes and electricity consumption. The model can be employed to studying various aspects of consumer behaviour so as to accurately systematize and rank influencing factors according to the power of the impact which they produce. The criterion for each factor variables is the value of its correlation to the resulting variable. The model ensures that conducted research will take into account the impact of all variables which renders research more efficient and easier to conduct.

The model we have designed is also a reliable basis for identifying the methods which could be employed to the analysis of variables. Some factor variables are qualitative and can therefore not be attributed numeric values. General and specific information and habits, for example, certainly have a significant impact on consumer behaviour. These factors cannot be expressed through numeric values however, therefore conventional statistical methods would not be helpful for identifying any functional dependencies or assessing the magnitude of their impact. Nevertheless, the model provides other options. It is obvious, for example, that the overall impact of those features upon changes in consumer behaviour may be researched and determined as the difference between 'one' and the value of the multi-factor coefficient of correlation between electricity consumption and the other, numeric, factors of consumer behaviour.

In the third place, the model is helpful for assessing the feasibility of employing various one-factor and multi-factor regression and dispersion analyses. It is also a prerequisite for providing adequate solutions to issues related to the adequate grouping of researched factors; the choice of appropriate grading scales and attributing numeric values to qualitative variables. The model is also helpful for identifying further empirical data to be included, as well as selecting the type and number of specific indicators and choosing appropriate research methods and models.

Conclusion

Consumer behaviour models vary widely. They could be economic, socio-psychological, psycho-analytical, etc. These models have different feasibility, advantages and disadvantages according to the type of research which is conducted, the goals which are set or the purposes they are employed for. The model we have designed is specific and narrow in scope. Its focus is on the study of consumer behaviour in electricity demand rather than on general demand for goods and services. The model combines different

elements from existing theoretical models, while taking into account the specific characteristics of electricity as a product and the electricity market, so as to accurately present the real economic phenomenon.

Obviously, the model we have designed is not exhaustive, since a number of factor variables affect consumer behaviour, and the correlations and interdependencies between them are complex in nature. The main objective of our research was to design a simple and logical model which presents the major factor variables and the interaction between them in the process of electricity consumption. The model can certainly be made more comprehensive and sophisticated through further research.

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