COMPARATIVE ANALYSIS OF CONSUMER BEHAVIOR IN ELECTRICITY USAGE IN HOUSEHOLDS AND WORKPLACES

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Keywords: consumer behavior, electricity usage patterns, energy demand

Summary. The aim of the paper is to present results of the research that was taken in 2014 by the authors. The scope was to investigate electricity usage patterns among consumers in Poland and Czech Republic. In the next step, the differences and similarities behavior models in households and workplaces were defined and motivations of respondents in activities related to energy efficiency were described. The paper describes current literature review, research methodology along with its' organization as well as results and conclusions.

1. INTRODUCTION

"Ecology". A term treated few years ago as the domain of international organizations, abstract activities on a global scale and unconventional projects activist groups. Today, ecology enters the households: segregation and reduction of waste, biodegradable household chemicals, re-use of raw materials or saving water and electricity. It becomes more often a part of everyday life for the average person. Information campaigns broadcast on television, radio or published in the press and on the Internet also raise awareness of becoming eco-friendly.

But what are the most common reasons for average consumer to take actions to save electricity? Saving natural resources, protecting the environment or reducing own expenses? For the purpose of this study there was carried out a survey to verify attitudes towards saving energy, both in households and in the workplace. The aim of the research was to detect the differences and similarities in models of behavior in both places. The results, and the conclusions will be presented in the work.

The paper is organized as follows. The first part is an introduction to consumer behavior in terms of energy saving and the review of current literature or research in this field. Then the methodology of the study and its results were described. The third part is the findings followed by conclusions.

2. PREVIOUS WORKS AND RESEARCHES

Energy saving in the workplace begins to enjoy increasing popularity, which is reflected in literature, as well as periodic campaigns educating employees. Among the described researches the RWE "Energy Awareness of the Poles 2013" report [11] should be mentioned. According to this work, more than twice less people are looking for new ways to save energy in the workplace rather than in their own household. Another example is the study presented in [7], in which the analysis of energy usage reduction by employees of offices and factories. A similar issue is taken into consideration in [13], [14], [15]. Behavior patterns of employees and their "energy habits" were described, among others, in [21], which points the causes of excessive consumption in lack of information, incentives and fixed behaviors. Attempts of changing consumers' habits were described in [16] and [22].

Customer behaviors as well as attitudes towards green energy were described in [3] and [17], where also a need to identify gaps in knowledge were outlined.

Combining customer behavior theory with psychological, behavioral sciences was made in [10] and [12]. [19] provides evidence for people's susceptibility to the symbolic significance fallacy when judging energy-related behaviors. The term fallacy means people's tendency to rely on symbolically significant behavioral attributes though neglecting other information.

The role of consumer energy-usage behavior patterns in smart grids were characterized in [9] where a real time pricing model for smart grid considering consumers' behavior, real time price elasticity, and exogenous price were presented.

Among other papers explaining this subject, which should be mentioned are: [1], [2], [4], [5], [6], [8], [18], [20].

Analysis of the current literature led the authors of this paper to attempt to carry out its own research in the field of energy saving in the workplace in relation to similar behavioral expression of the household.

3. ORGANIZATION OF THE RESEARCH AND RESPONDENT PROFILE

Between from April 2014 up to June 2014 the online survey was conducted. Total number of 244 responses was obtained. The purpose of this survey was to iden-

tify the motivations and behaviors of respondents in activities related to energy efficiency. The research aimed to identify, in particular, to confirm or detect differences in the behavior of people in the workplace compared to the behavior at households.

The survey consisted of three parts: defining motivations, habits in workplace as well as in household and demographic data describing participants and companies in which they work.

In the first group there were questions about motivations to energy savings such as:

- taking actions by respondents to save energy (in their opinion),
- defining causes of reducing energy usage,
- participating in company energy policy (if present).

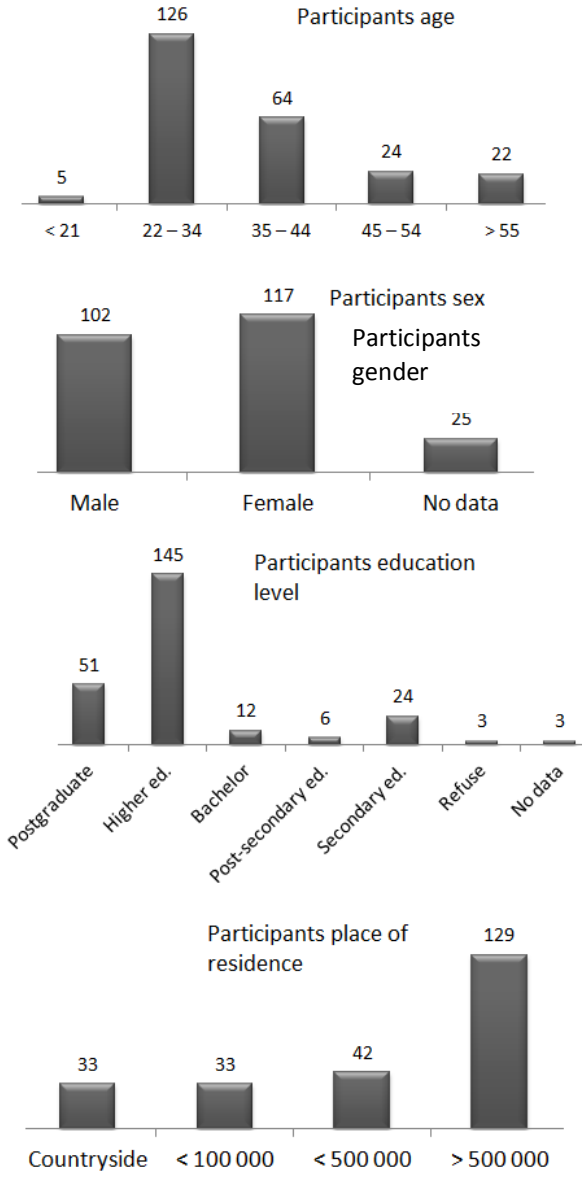

Fig.1. Participants demographic profile.
Source: own evaluation

Questions about habits included list of actions that lead to reduction or growth in energy usage. Respondent had to state how often (in five points scale) takes these actions.

Demographic data described participants taking into consideration their:

- age,
- gender,
- place of residence,
- education.

Next, some data about workplace were required, including:

- participant position in a company,
- company legal form,
- company business profile (production, trade, service),
- company range (local, national, international),
- number of employees,
- company line of business (among 22 defined).

Collected data helped to define respondent average profile. Most of them were women (48 %), had higher education (59,4 %), age from 22 up to 34 years (51,6 %) and lived in a city with over 500 000 inhabitants (52,9 %). Detailed data are presented in the following pictures.

4. RESULTS AND CONCLUSIONS

The responses were reviewed in terms of their dependence on demographic variables. In that purpose the chi-square test of independence was held. This test, also called Pearson's, is used in practice to examine the relationship between two variables occurring by comparing the nominal value of the empirical and theoretical. If the difference between the values of the empirical (observed) and theoretical (expected) is statistically significant, it can be concluded that there is a relationship between the study variables.

Demographic variables analyzed with Chi-square test were: gender, age, place of residence, education. Additionally, selected data relating to the workplace: participant position in a company, legal form, type of activity, range, number of employees and the line of business. Followed questions were taken into consideration of the analysis:

- taking actions – in respondent's opinion – to save energy in a household and in a workplace,
- list of activities taken for providing energy usage reduction in a household and in a workplace,

- list of activities taken for providing energy usage growth in a household and in a workplace,
- willingness to actively participate in an energy-saving policy in the workplace, if present.

After combining all demographic variables listed in the previous paragraph to the above list of questions and analyze so formed pairs of variables with Chi-square test, the following conclusions were achieved.

Gender of the respondents did not affect the majority of the studied phenomena. The only dependency is detected by a lack of willingness to save energy in the workplace. At a significance level of 0,05, it can be concluded that there is a relationship between gender and the lack of eagerness to save energy. Men more often than women declared not to save energy in the workplace.

Stronger correlation was detected for the analysis of the respondents' age. With a significance level of 0,05 there was a correlation between age and:

- respondent's sense that saves energy in the workplace (this phenomenon was strengthened with the age of the respondents),
- tendency to save energy in the workplace and household, with the greatest share of respondents between 35 and 44 years,
- taking activities that lead to energy usage increase in the workplace, the most common group were participants in age between 22 and 34 years,
- taking activities that lead to energy usage increase in the household, the most common group were participants in age between 45 and 54 years.

Place of residence had the potential influence on the willingness to actively participate in an energy-saving policy in the workplace. At this point, the biggest percentage made up respondents living in rural areas (91% of them expressed the wish to respect the policy), followed by participants from the cities with a population between 100,001 and 500,000 (90%).

In the case of education level, Chi-square test showed no statistically significant dependence.

Demographic variables relating to the profile of the companies in which respondents were engaged, indicated the following correlations. Firstly, position at which the respondents were employed, turned out to be statistically significant. It had an impact on:

- tendency to save energy in the workplace, with the highest willingness demonstrated by managers and ordinary employees,
- tendency to save electricity at household, with the greatest desire manifested by respondents working at ordinary and administrative positions,
- performing activities that lead to energy usage growth in the workplace and household, the most common group were respondents running their own business or working in the IT department,
- willingness to actively participate in energy saving policy, particularly among the administrative staff.

Legal form of the company (partnership, private company, the state company, association, cooperative, foundation) showed a relationship in the absence of tendency to save energy both in the workplace and at home. Persons employed in partnerships were the least likely to save energy in the workplace and in their own households. At the same time, respondents employed in partnerships were the most willing to participate in the energy-saving policy.

Analysis of the company's business profile (trade, service, production) found no statistically significant relationships. However, a range of the company (local, national, international) showed the possibility of impact on the tendency to save energy in the workplace – the highest percentage of respondent employed in international companies showed respect for energy saving.

The number of employees in the company proved to be correlated with a tendency to save energy at workplace (with most share of companies that do not exceed 50 employees) and at household (companies with 51 to 250 people). At the same time the most in companies ranging in size from 51 to 250 employees showed a tendency to lack of electricity saving in the workplace.

The company's industry (line of business) also showed some statistically significant relationships in terms of tendency to not save energy at household and in the workplace. And so, employees of energy companies frequently took actions to reduce energy usage in the workplace (employees in the entertainment industry were the least likely) and telecommunications companies in their own households.

Presented statistical correlations are not representative for Poland and Czech Republic due to the small research sample (244 respondents). This is one of the limitations of taken study. Yet, they can be an indication for employers and companies. The introduction of new (or upgrading of current) energy saving policies may be more effective, if employees energy behavior and habits will be taken into consideration. Moreover, during carrying out information campaigns about energy saving methods, results may be better, if

campaigns are targeted to specific demographic segments. Examples of such segments are indicated in the above analysis.

5. SUMMARY

In the first section of the paper, a review of current literature about customer behavior was made. The aim was to present the role of customer behavior and habits for companies, also in energy sector. The next step was to describe the range and organization of the research that was the main part of the paper. Results and conclusions were presented in the fourth section.

Authors are aware of the study limitations and so for future work a similar research – but at larger scale – can be held. But yet, current results may be useful for energy companies as well as for employers to determine the direction of further efforts to improve energy efficiency in their organizations.

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ANALIZA PORÓWNAWCZA ZACHOWAŃ KONSUMENCKICH W ZAKRESIE ZUŻYWANIA ENERGII ELEKTRYCZNEJ W GOSPODARSTWACH DOMOWYCH I W MIEJSCACH PRACY

Słowa kluczowe: zachowania konsumentów, wzorce zużywania energii elektrycznej, popyt na energię

Streszczenie. Celem pracy jest przedstawienie wyników badań, które zostały podjęte w 2014 roku przez autorów. Była to próba zbadania wzorców użytkowania energii elektrycznej wśród konsumentów w Polsce i Czechach. W następnym kroku, zostały określone różnice i podobieństwa w modelach zachowań w gospodarstwach domowych i miejscach pracy oraz motywacje respondentów do podejmowania działań związanych z efektywnością energetyczną. W artykule przedstawiono przegląd bieżącej literatury, opisano metodologię badań, jak również uzyskane wyniki i wnioski.

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