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Electricity Prices and Consumer Behavior, Case Study Serbia—Randomized Control Trials Method †

Iztok Podbregar [1], Sanja Filipović [2], Mirjana Radovanović [3], Olga Mirković Isaeva [3] and Polona Šprajc [1,*]

[1] Faculty of Organizational Sciences, University of Maribor, Kidričeva cesta 55a, 4000 Kranj, Slovenia; iztok.podbregar@um.si
[2] Faculty of Business, University Singidunum, Danijelova 32, 11000 Belgrade, Serbia; sfilipovic@singidunum.ac.rs
[3] Faculty of Security Studies, Educons University, 87 Vojvode Putnika Street, 21017 Sremska Kamenica, Serbia; mirjana4444@gmail.com (M.R.); administracija@rulek.rs (O.M.I.)
* Correspondence: polona.sprajc@um.si; Tel.: +386-40-802-222
† This paper is based on pilot study prepared for the project Enable.EU which received funding from the European Union's Horizon 2020 research and innovation program under grant agreement number 727524. Olga Mirković Isaeva is a PhD student in Educons University, Faculty of Security Studies, Serbia.

Abstract: The aim of this research was to identify energy saving instructions effect on household's electricity consumption. The research was conducted using *Randomized Control Trials*, which implied defining a treatment and control group on a sample of 330 households. The research was carried out in Republic of Serbia, where electricity prices are the lowest in Europe and electricity is used inefficiently. For quantitative analysis of data, the *Difference in Difference* method was used, which compares the changes in electricity consumption over time between the treatment and control group and estimates the overall impact of the energy saving instructions. The research showed that in situations where electricity price is very low, energy saving information does not have the significant impact on change in consumer behavior. However, inefficient use of electricity might be due to the different efficiency of heating devices used. Not only that the low impact of information on energy saving habits may be a consequence of the low will to change habit, but also of the impossibility to change the habit (unless changing the heating device, but this implies expenditures). Results can be used for consideration of changes in organization and regulation of the electricity market in all South Eastern European countries (SEE).

Keywords: electricity consumption; consumers' behavior; *Randomized Control Trials* method; *Difference in Difference* method; case study Republic of Serbia

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1. Introduction

The European Union (EU) actively promotes a cost-efficient energy transition that can deliver secure, sustainable, and affordable energy to all European consumers [1]. The new energy legislative framework set new targets for the EU for 2030—to increase energy efficiency of at least 32.5% [2], to reduce greenhouse gas emissions by at least 40% in comparison with 1990 level, and to increase the share of renewable energy in energy consumption of at least 32% [3]. In the first half of 2019, the European Commission adopted the 'Clean Energy Package for All Europeans,' which consists of eight different legislative texts (as of December 2018) where the regulation of electricity market and improvement of energy efficiency plays an important role.

The continual rise in energy consumption in the world is the driver of development, but also the cause of significant pollution and climate change. The social aspects of these phenomena are studied in particular, and there is a significant number of studies on "determinants of energy poverty, sociotechnical systems, theories and philosophies of energy justice, and much more that helps explain and understand everyday energy use and gradualist policy change" [4]. However, it must be noted that established consumer habits are slowly changing [5]. Despite the fact that is "problematic to observe how householders actually perform electricity-using practices in their everyday lives" [6], this study gives contribution to "a growing interest in how norms, routine habits and social networks influence energy-consumption behavior" [7]. In general, "household energy conservation is both a challenge and an opportunity" for the future energy polices and decisions [8,9]; therefore, decision makers and researchers alike should pay more attention to the consumer behavior [10].

There are a number of measures with potential to stimulate the efficient consumption of electricity in households, and they can all generally be classified as a group of financial measures (e.g., subsidies for the purchase of energy-efficient home appliances) and non-financial instruments that have an informative and educational role (e.g., education on efficient use of electricity). Determining the effects of these incentive instruments can greatly contribute to defining an adequate policy for improving energy efficiency in households.

A large number of studies in the literature analyze how electricity prices affect the change in the level of electricity consumption in households [11,12]. Given the empirical results, it is generally known that electricity is highly inelastic in terms of price, i.e., the percentage increase in the price of electricity will be accompanied by a smaller percentage decrease in the required quantity. The reason lies in the fact that electricity is one of the basic assets, so far that it is impossible to imagine a modern society without electricity. However, the elasticity coefficient might have changed over time due to changes in energy efficiency requirements and standards for electric devices [13,14]. As Labandeira et al. (2017) showed in his study [15], there are a number of empirical estimations of electricity elasticity that estimate different elasticity coefficients based on what the analyst can observe. In other words, it was assumed that the perfectly-informed consumer is purchasing at the point where the consumer's marginal value of energy service is equal to (or below) the marginal price of electricity.

Analyzing how the change in the price of electricity affects the change in the level of electricity consumption is greatly significant for defining an adequate policy for promoting efficient consumption. Jacobsen (2015) claims that in conditions of unused opportunities for investment, the increase in the price of electricity does not necessarily imply a loss for consumers [16]. Moreover, if price increases encourage consumers to invest in energy efficient devices, they can profit. On the contrary, if consumers respond to the rise in electricity prices by reducing electricity consumption, the loss can be considerably higher, by abstracting all benefits from reducing electricity consumption externalities (e.g., CO_2 emissions). The presence of anomalies in consumer behavior (e.g., lack of interest in electricity saving) can lead to consumers not behaving in accordance with expectations, i.e., the price increase does not necessarily mean a consistent application of the principle of minimizing costs [17]. Hence, financial incentives based on the increase in electricity prices do not necessarily have to stimulate investments in the energy efficiency of household appliances [18].

Meanwhile, there has been a growing recognition that consumers make decisions with limited information, attention, and cognitive abilities [19,20]. What is more, there is empirical evidence that information provision helps US consumers respond more sensitively to price changes [21,22], while Matsukawa [23] found similar results for Japan and Gans [24] for Northern Ireland consumers.

As the impact of electricity prices is fairly analyzed in the literature, the subject of this research is focused on the analysis of the impact of information on how energy can be efficiently and without large investments saved in households. As "implementation of household energy efficiency policies is highly dependent on country context" [25]—case studies on different countries (especially in those with low energy efficiency performance, which is the case of Serbia) can be considered the best way to spot conditions, problems, barriers, and ways to overcome them. An additional motive for the analysis of non-price factors is the fact that Serbia (where field research has been conducted) has the absolute lowest price of electricity in Europe.

The aim of this research was to identify how non-price factors such as energy saving instructions affect household's electricity consumption. The research was created using the Randomized Control Trials (RCT) method, which is unique because, to the best of the authors' knowledge, this method has not been used for these purposes in Serbia. Furthermore, the RCT method has been only recently used in the world to analyze factors that affect consumer behavior. Previous studies were based on small pilot studies that had difficulty identifying causal effects and significant results [26,27]. An empirical research study has been only recently carried out based on the method of large-scale RCTs [28–30]. This research revealed that prices and information, and behavioral factors, such as social norms and inattention, greatly affect electricity demand. A comprehensive study from China shows that "residents prefer incentive policies, in which the energy-saving effect is 57.7% larger than that of increasing electricity prices" [31].

The paper is structured as follows: the second chapter describes the methodology of the research including RCTs method and its implementation in interventions examining electricity consumption, and the *Difference in Difference* method, which is used for estimation; the third chapter presents the research results and short discussion of the results, while the conclusion part summarizes results of the research.

2. Methodology of the Research

2.1. Randomized Control Trials (RCT) Method

RCT is "a prospective, comparative, quantitative study/experiment performed under controlled conditions with random allocation of interventions to comparison groups. RCT is the most rigorous and robust research method of determining whether a cause–effect relation exists between an intervention and an outcome" [32]. Randomization is seen as optimal approach for studies that include behavioral change caused by certain interventions and incentives [33].

RCT aims at identifying the causal effect of a policy intervention (which is randomly assigned to households) on an outcome variable (in our case, this is electricity consumption). Households with policy intervention are denoted "treatment group" and households without the intervention are called "control group." Due to the random intervention assignment and given a large sample size, it is expected that all households in the treatment group will be on average identical to all households in the control group. The causal effect of the intervention can thus be determined by comparing the average electricity consumption of the treatment group with the average electricity consumption of the control group.

RCT as a field experiment has been relatively recently used to address resource conservation and depletion of environmental externalities in the economy. Several field experiments have been carried out with the aim to determine effectiveness of interventions in household's electricity consumption [34]. Allcott (2011) showed that provision of social norm information to households can lead to an average 2% savings in electricity use [35]. Other research found that the messages are most effective among households with the highest consumption and that the frequency of messaging matters [36].

A pilot study found an average reduction of electricity consumption by 7% in households with in-home-displays providing real-time usage data [37]. Other field experiments showed that effect will be reduced over time and the impact will be minor after four weeks [38]. In their research from 2015, the authors tried to define whether the reduction in energy usage is a consequence of a salience effect or is caused by a learning effect [39]. The research revealed a significant but decreasing learning effect while a significant saliency effect could not be identified. Therefore, the authors suggested that information campaigns are more cost-effective in reducing electricity consumption than installing costly in-home-displays.

The empirical results showed that effect of information provision on consumption can vary over time. The study conducted by Allcott and Rogers (2014) revealed that households immediately reduce their consumption after they receive a home energy report, but this effect reduces over time and returns to its previous level [40]. Up to now, there is no significant research that systematically analyzes how the frequency of information provision affects consumption, and how the length of treatment affects the persistence of the energy savings. Taubinsky (2013) showed that inattention towards energy conservation actions could be mitigated either through a reminder or through engaging in repeated energy conservation actions since reminders and habits are substitutes [41]. This idea was also supported by Allcott and Rogers, who reported a decreasing effect of home energy report on electricity reductions.

In this research, the characteristics of the Serbian electricity market were taken into account when developing the field experiment. With the share of 50% in total final electricity consumption, households have a dominant position [42]. However, electricity consumption in households is not efficient since electricity is mostly used for heating. The Eurostat data indicate that average electricity consumption per capita is a little above the EU-28 average (1582 kWh), but average electricity consumption per unit of GDP is almost five times more than the EU-28 average [43]. A high level of CO_2 emission is the consequence of Serbian electricity production being mainly based on lignite-fired thermal power plants (thermal power plants account for 73% of total electricity production). According to International Energy Agency data for 2018, the level of CO_2 emission per capita was at the EU-28 average (6.1 and 6.4 tons of CO_2), but the emission of CO_2 per unit of GDP was five times higher in Serbia [44].

Given that electricity prices in Serbia are the lowest in Europe, the preliminary hypothesis of this research was that low household's electricity price is the main reason why electricity is inefficiently used. Starting from this assumption, the idea of this research was to analyze whether the energy saving information can change electricity consumption behavior.

The research hypothesis is that energy saving information represents an effective means for affecting the energy behavior of Serbian households and reduction of electricity consumption. The research was designed with the aim to determine the effect of energy saving instructions on household's electricity consumption. In other words, the idea of this research was to analyze whether the energy saving information can change electricity consumption behavior in Serbia.

The starting sample consisted of 3528 households that recorded similar average levels of electricity consumption during the previous year. This criteria was a prerequisite in order to enable comparison of the obtained results upon terminating the experiment. The selection of the starting sample was provided by the company responsible for electricity distribution. The research sample comprised 330 households in the capital Belgrade (and suburbs) with similar average levels of electricity consumption. To equally represent households with different heating solutions, the total sample was divided into three strata:

1. Households in buildings with district heating,
2. Households in smaller and older buildings without district heating, where electricity is mainly used for heating, and
3. Households in suburbs, mainly houses, where various energy sources are used for heating (electricity, wood, etc.).

The paper uses the type "Simple randomization" for selection of the sample. This is a commonly used and intuitive procedure, similar to "repeat fair coin-tossing," proposed by Shculz and Grimes in the Lancet journal [45]. Also known as "complete" or "unrestricted" randomization, it is robust against both selection and accidental biases. However, its main drawback is the possibility of imbalanced group sizes in small RCTs. It is, therefore, recommended only for RCTs with over 200 subjects [46].

Maximization of statistical power (goal 1 of the RCT): equivalence of the control and experimental group is a prerequisite for the RCT, which was respected so that 50% of households were part of the experimental and 50% part of the control group.

Covariance minimization (goal 3 of RCT): the initial list of 3528 users (households) with very similar monthly electricity consumption, was divided in 3 categories, dependent on way of heating (use of electricity, district heating, and mixed sources for heating).

Way of heating has been chosen because of the following main reasons:

- Electricity is often used for heating purposes in Serbia. There are no official data of the number of households to use electricity for heating in Serbia.
- Heating participates to a large extent of energy consumption in Serbia. There is no official quantification of this matter either.
- Way of heating is not the choice of the household, but rather is consequence of location of the household and available infrastructure.
- Price of electricity is at the low or lowest level in Europe for decades.
- Price of electricity has been seen as a social, rather than economical, category in Serbia for decades.
- District heating covers only 10% of the households in Serbia, with no signs of increase (no investments planned).
- Use of natural gas for heating is limited because absence of infrastructure and high natural gas prices for the consumers.
- Investment in other sources of heating (RES, heating pumps, or similar) are too high for the average household in Serbia, with no significant support by the Government.
- Improvement of energy efficiency in Serbia is minor, reasons of which should be subject of future comprehensive study.

In order to get a clearer insight into consumer behavior, households located in the capital (district heating and electricity for heating) and nearby rural areas (other sources for heating) were selected.

The original group of 3528 households was, therefore, based on the method of heating, divided into 3 groups, and in each there were 1176 households. Random selection determined 110 households from each group. The selection was made on the basis of the Randomized Control Trials setting, which involves the application of a software Random generator, which divides the current time in nanoseconds (which each computer has) by determining 10% of each group—given the resources engaged to conduct the experiment. Thus, the final sample of 110 households in each group was obtained—110. Within it, 55 households were included in the experimental group, and 55 in the control group.

This division is important since heating appliances are often consuming the largest amount of energy, and, therefore, may affect the overall possibility of households to apply energy-saving instructions. Households in each stratum were randomly chosen and informed about the study and asked for participation in RCT research. Those that agreed to participate were randomly divided in treatment and control group (50:50). The control group was not exposed to the "treatment," and this group was used for making a comparison with the experimental group. Participants in the treatment group received a brochure with energy-saving instructions. Such intervention was used to increase the consumer's awareness, and observe if the adoption of new consumption patterns has an actual impact on consumption reduction. Households in the treatment group should adopt and implement simple energy-saving instructions given in the brochure. Those instructions for saving energy in households refer to more efficient use of home appliances for everyday use (heating stove, boiler, washing machine, cooker, fridge, and lighting in the apartments). By simply changing the habit of using these appliances, it is possible for households to reduce consumption, which is to be demonstrated with this research. The expected impact of this intervention reflects households' adoption and implementation of given instructions during the experiment.

Such interventions were also used by other authors. As it was noted by Abrahamse et al. (2015), the "antecedent interventions" were used in this research, which include "providing households with information about energy-saving options" that "may result in energy savings, because people have acquired (more) knowledge." Monthly consumption by consumers in the treatment group was compared with the households in the control group on monthly basis. Such comparison of the electricity consumption between treatment and control group allows us to determine the effect of information on behavioral change, and consequently, electricity consumption.

2.2. Difference in Differences (DnD) Method

DinD method was selected in accordance with the previously defined aim of the paper (whether differences in consumption habits exist in three strata of households in the research sample), as it allows sample stratification [47], as well as definition of whether the impact of a particular factor (in this case, obtaining information about energy saving options) causes a different reaction in each of the strata. In this case, the research sample comprises 330 households in Serbia, which are divided into three strata.

The Difference in Differences methodology is based on the application of the following model:

$$Y_{it} = \beta_0 + \beta_1 \cdot X_i + \beta_2 \cdot T_t + \beta_3 \cdot X_i \cdot T_t + \varepsilon_{it}, \quad (1)$$

where:

Y_{it}—total electricity consumption in the total research sample over time t,

X_i—dummy variable, expressed as value 1 in the experimental group, i.e., as value 0 in the control group of households,

T_t—dummy variable (has a value of 0 for the first month of research, and a value of 1 for the following months),

$X_i \cdot T_t$—dummy variable that neutralizes Xi and Tt, taking the value 1 after the experimental group of households receives energy saving instructions, and

ε_{it}—random error.

In the first phase, the Least Squares Method was used to estimate the values of parameters for the application of the model (in order to determine the parameters β0, β1, β2, and β3, which is shown in Table 1. Then, the general linearity of the DinD regression model was checked, since it is necessary to get the best possible unbiased estimates.

Table 1. Input data for the application of regression analysis to estimate electricity consumption in 330 households in Serbia (January–April 2019).

	Y	**X**		**XT**
Variables	**Average Electricity in Three Groups of Households**	**(1—Experimental Group, 0—Control Group)**	**T**	**(1—Experimental Group after Instructions, 0—Others**
Households that use electricity for heating				
January 2019	841	0	0	0
February 2019	973	1	0	0
March 2019	609	0	1	0
April 2019	722	1	1	1
Households that have district heating				
January 2019	385	0	0	0
February 2019	381	1	0	0
March 2019	248	0	1	0
April 2019	348	1	1	1
Households that use mix of energy sources for heating				
January 2019	740	0	0	0
February 2019	804	1	0	0
March 2019	623	0	1	0
April 2019	669	1	1	1

Based on the methodology and expected results, **null hypothesis** has been defined as: There is no statistically significant difference in group means (p-value > 0.05) between experimental and control groups of electricity consumers.

3. Results and Discussion

3.1. Data Analysis

Research on the impact of obtaining instructions on energy saving on the behavior of electricity consumers in 330 Serbian households was conducted for the months of February, March, and April 2019, whereby in January 2019, only energy consumption was measured, without stratification of the sample. The households that were covered by the research were divided into 3 strata (depending on the heating method they use). This division was made due to the fact that electricity in Serbia is largely consumed for heating, which creates a significant room for change and application of energy saving technologies. The first strata include households that use district heating, and the second strata include households that mainly use electricity for heating. The third strata consist of households that use combined heating models. Each group consists of 110 households.

In each of these strata, a control group is defined. By applying RCT, the seasonal effects were reduced, which occur as a consequence of weather conditions. Using RCT based on the control and experimental group, the seasonal effects were eliminated (temperature and other weather effects).

Households that use district heating actually have the lowest values of electricity consumption. First, electricity consumption was measured in January 2019, before the start of the research (provided instruction on energy saving). No differences were found in electricity consumption between the experimental and control subgroups. An average consumption of 385 kWh and 381 kWh per month per household was recorded in the experimental and control group for the month of January 2019, respectively. For the month of February 2019, the average consumption of 350 kWh was recorded in the experimental group, and 348 kWh in the control group. In March 2019, consumption was 363 kWh and 368 kWh, respectively, and in April 2019 it was 219 kWh in both subgroups. It can be concluded that in this research group there are no differences in electricity consumption in all months of measurement and research.

Households that use electricity for heating show significantly higher electricity consumption in the observed period, compared to the previous group. In January 2019, consumption of 969 kWh was recorded in the experimental group, and 841 kWh in the control group. For the month of February 2019, electricity consumption of 980 kWh and 871 kWh was recorded. In March, consumption was 843 kWh and 731 kWh, respectively, and 344 kWh and 229 kWh in April. During February, March, and April, when households received instructions on energy saving, higher electricity consumption was recorded than in the control group. The only conclusion that can be drawn from this data is that these households did not follow the obtained energy saving instructions, although they belong to the group of households with the highest consumption (and therefore, the highest costs) of electricity.

Households that use combined energy sources for heating record a slightly larger difference in electricity consumption in the case of the experimental and control groups. For the month of January, consumption of 805 kWh per household was recorded in the experimental group, and 740 kWh in the control group. Furthermore, in the month of February, 709 kWh and 655 kWh were recorded, respectively. In March, consumption was 744 kWh and 714 kWh, respectively, and 551 kWh and 502 kWh in April, respectively.

Results of the electricity consumption in the defined 3 groups of households is presented at Figure 1.

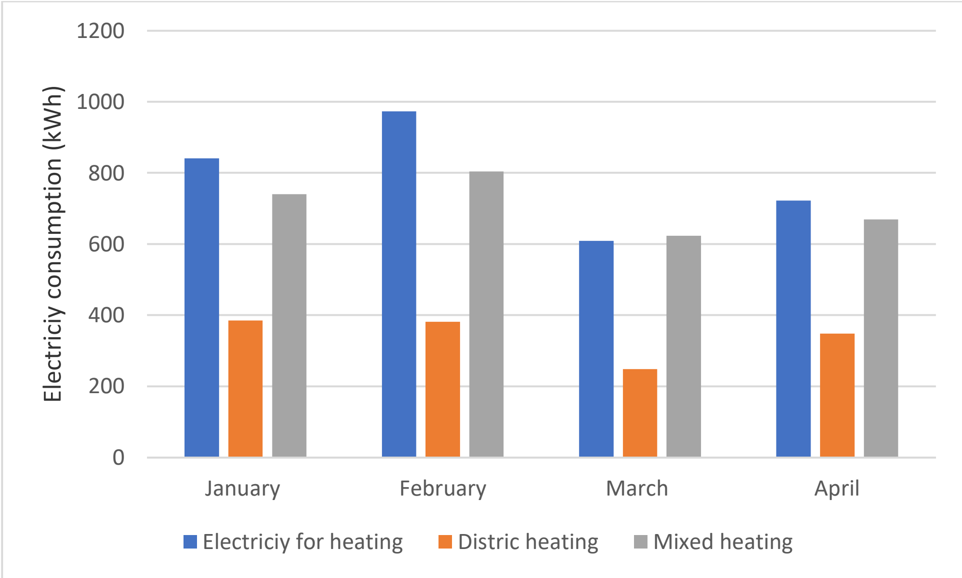

Figure 1. Electricity consumption in selected household groups in Serbia, depending on the heating energy source (2019).

The main assumption of the research was that consumers will recognize the need to follow energy saving instructions, in order to reduce electricity consumption, which would result in reduced costs. This assumption was not realized. Actually, Serbia has historically very low electricity prices compared to European Union countries. In 2019, the price of electricity in Serbia was 7.05 eurocents per kWh, which is more than 4 times lower than the price of electricity in the same group of consumers in Europe (20.49 eurocents per kWh). The reasons for this low price are numerous, and can be particularly found in the fact that the price of electricity in Serbia is primarily a social category. One of the few studies on this topic was done by UNDP in 2004 [48]. Before or after that, no comprehensive research or analysis has been done on this topic, although there is a clear obligation for Serbia to make an adequate energy transition as part of EU accession [49].

Research results revealed that the low price of electricity has a major impact on its inefficient consumption and non-acceptance of instructions on energy saving options. In the case of both the experimental group (that was clearly instructed on energy saving options for three months) and the control group, no changes in the habits of electricity consumers occurred. Consumers in 330 households in Serbia, covered by this research, did not show interest in applying the obtained energy saving instructions in practice. Electricity savings would be manifested by small savings with a significant effect on the electricity bill from the consumer's point of view.

3.2. Results of Difference in Difference Method Application

The Difference in Differences (DinD) method compares the changes in outcomes over time between the treatment group and control group. It compares the before-and-after changes in outcomes for treatment and control groups and estimate the overall impact of the incentives (in our case energy saving instructions). Firstly, it considers the before-after difference in treatment group's outcomes. In comparing the same group to itself, the first difference controls for factors that are constant over time in that group. Secondly, in order to capture time-varying factors, DinD takes the before-after difference in the control group, which was exposed to the same set of incentives as the treatment group. Finally, DinD "cleans" all time-varying factors from the first difference by subtracting the second difference from it.

The DinD method was applied for further analysis, since the research results were not in accordance with the established hypothesis. The basic input data are provided in Table 1.

Table 2 presents the data processing results obtained using the DinD method, whereby the following input data were used. In January 2019, the average electricity consumption in the control group was 651.468 kWh, while the difference in average electricity consumption between the experimental and control group was 67 kWh. During the research, a difference was recorded between electricity consumption in the months when consumers received energy saving information (February, March, and April) and January 2019, when they did not receive information. Given the above criteria, the average difference in electricity consumption was 124.343 kWh. A difference of 16 kWh in the average electricity consumption between the control and experimental group was recorded in the observed period.

Table 2. Results of DinD data processing on electricity consumption in 330 households in Serbia (January–April 2019).

Source	SS	df	MS	
Model	63,967.4333	3	21,321.778	Observation number = 12 F (3, 8) = 0.4 Prob > F = 0.7599
Residual	431,127.666	8	53,891.7333	R squared = 0.1291
TOTAL	495,096	11	45,009.6363	Adj. R squared = −0.1972 ROOT Mse = 232.13

Predictors	Coef.	Std.	*t*	*p* > *t*	95% Conf. Interval	
X	67	188.5448	0.35	0.833	−370.092	505.092
T	124.333	188.5448	−0.66	0.528	−563.4245	310.7677
XT	16	269.0569	−0.66	0.955	−633.1402	601.1402
β0	651.468	133.0283	4.88	0.001	343.5866	962.7366

Source: Authors' results.

F-Statistic measures if the means of different samples are significantly different or not is called the *F-Ratio*. The F-statistic is simply a ratio of two variances. Variances are a measure of dispersion, or how far the data are scattered from the mean. Larger values represent greater dispersion. The lower the *F-Ratio*, the more similar the sample means are. In that case, the null hypothesis cannot be rejected. Variability value of 0.4 means that variability between groups is smaller than variability insight groups. The *Adjusted-R2* uses the variances instead of the variations. That means that it takes into consideration the sample size and the number of predictor variables. The value of the *Adjusted-R2* can actually increase with fewer variables or smaller sample sizes, which is the case in this paper.

The *t*-value measures the ratio between the difference in means and the standard error of the difference.

The *Confidence interval* helps to assess the practical significance of the results. With a 95% confidence level, results show that they are 95% confident that the confidence interval contains the group mean of 95%

Most important results of the analysis, important for acceptance or rejection of null hypothesis, can be explained by 3 key findings: *p*-value, *Confidence Interval*, and *t* value. The *p*-value is a probability that measures the evidence against the null hypothesis. Lower probabilities provide stronger evidence against the null hypothesis. After the data are processed, the *p*-value of 0.7599 was calculated, which shows that differences in group means noted in experimental and control groups have no statistical significance, which is in line with the null hypothesis. The *confidence interval* for all three variables include zero, which also means the difference between groups is not statistically significant. Absolute *t* values that are less than 1 (or close to zero) shows that the sample results fit the null hypothesis.

The obtained *p*-value of 0.7559 (>0.05) gives strong evidence that the null hypothesis was confirmed.

In addition, data on the value of *R square* of 12.91 show that only 12.92% of the change in electricity consumption within the groups can be explained by the variables used. It speaks that, in general, energy saving information given to the consumers in Serbia have no impact on electricity consumption.

4. Conclusions

The research showed that energy saving information does not affect the change in consumer behavior if the electricity price is very low. Given the analysis of statistical data and field research, it could be concluded that energy efficiency, as well as energy efficiency awareness, is still at low level in Serbia.

Lack of adequate knowledge about energy use and available devices reduce the quality of energy services, especially among the poor. The fact is that the majority of Serbian households consume electricity for heating, since the price of electricity is still more favorable than prices of other energy sources (e.g., gas). Furthermore, electricity is also used for heating because the district heating infrastructure is still underdeveloped in Serbia. The lack of alternative energy sources and energy-using devices severely constrains household consumption patterns and their ability to save electricity.

The strata of households having access to district heating (the lowest level of electricity consumption) recorded the lowest level of changes in electricity consumption, while consumption in both groups was at the same level at the end of the observed period. In the strata of households that dominantly use electricity for heating, the average electricity consumption is the highest. In this strata, the experimental group recorded lower electricity consumption than in the control group during the entire experimental period. These data indicate that the instructions were followed by households that usually have the highest average electricity consumption. In the strata of households that use different energy sources for heating, the experimental group recorded a higher level of electricity consumption than the lowest average household consumption in the control group during the entire observed period. Furthermore, the level of electricity consumption in the experimental group was higher than in the control group during the experimental period.

The biggest challenge in implementation of the RCT method was at the very beginning, prior to conducting the survey, to ensure that the experimental and control group have the same average electricity consumption. Despite using the sample of households with a fairly uniform consumption at the level of the strata, it was almost impossible to divide the experimental and control group on the basis of RCT so to have the same level of consumption before the start of the research. Since this criterion was fulfilled only in the first case (households with district heating), it seems that these data are the most reliable.

The RCT method open avenues of research that examine the impact of social norms from pure information provision in reducing consumption and the extent to which households are inattentive towards energy conservation actions. Additionally, it would be useful to empirically evaluate the extent to which the frequency of information provision affects habit formation and the persistence of energy saving behaviors.

Future studies should address the analysis of the willingness and the possibilities of the consumers to change the heating system. In this sense, deeper analyses of general energy, environmental, and social policy in Serbia have to be included as well.

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