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Changing Energy Suppliers of Residential Consumers: The Case of Poland

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1. Introduction

For individual customers, energy security means, first of all, "uninterrupted availability of energy sources at an affordable price" (Schultz et al., 2015; Wo et al., 2022). But energy security (as understood in 1990) requires the simultaneous fulfilment of three conditions: ensuring the security of energy supply, minimizing environmental damage, and maintaining socially justifiable energy prices, which are fundamental elements of the policy of any state (Kaczmarek et al., 2022). This is because energy is an important impetus for the socio-economic development of society. However, many countries, such as Poland, have relatively small deposits of energy resources and are forced to import fuels from third countries. Therefore, in the era of dramatic changes threatened by energy shortages (Booysen et al., 2022) it becomes more important in the face of Russia's attack on Ukraine (Mróz, 2022) moreover, Poland's political conditions have caused the development of renewable energy sources to

slow down, although natural conditions are favouring investments in this sector of the economy (Sulich & Grudziński, 2019). Poles currently pay the highest for electricity from all European countries due to the government's preference for coal (Wo et al., 2022). In the fourteenth week of 2022, the average customer demand for electricity in Poland increased by 9.3% compared to the corresponding week of 2021 (Polish Development Fund Group, 2022) and amounted to 14.74 TWh (Statistics Poland, 2022). Today, there are more than 8.7 million total household customers who take advantage of free market offers. In 2022, 9,622 residential customers changed their individual electricity seller (Energy Regulatory Office, 2022).

Research shows that advances in energy utilization technology will make the effect of the production structure, play a more significant role as the ratio of total demand for energy industry products in various industries continues to decline (Li et al., 2022). Hence, the role of individual consumers in this sector is growing, as they are willing to change suppliers in search of savings during the increase in energy prices and the simultaneous increase in inflation. The role of consumers as price-sensitive participants in electricity markets is considered essential to ensure efficient and secure operations of electricity systems (Fatras et al., 2022). In recent years, research on forecasting electricity load and setting prices for individual households has been particularly advanced. In developed countries, this is partly due to uncertainty in communication and reduction strategies caused by the application of a digital strategy and the increasing use of smart meters that record individual electricity consumption in real-time, which has resulted in changes in the current energy sector (Schultz et al., 2015; Trzaska et al., 2021). Predicting future residential electricity demand allows electricity generators, distributors, and suppliers to effectively plan. It can also promote energy conservation among users as they become aware of their own energy needs. (Kizilcec et al., 2022). In a changing environment, energy prices increase, and the price level of energy products becomes a kind of red line, above which prices become less affordable, which opens up new challenges (Knez et al., 2022). Such a situation would suggest a high turnover of individual customers looking for a cheaper energy supplier. Especially that in the Polish market they have had the opportunity to switch suppliers for 15 years. This situation is new and not fully understood in the literature, and in business practice, there are currently no identified and developed standards for consumer behaviour in such a turbulent environment.

In summary, it is reasonable to understand what are the causes that customers decide to change energy sellers in a turbulent environment? The purpose of the article is to create a model of barriers and a model of preferences for switching energy suppliers of individual customers depending on the level of their satisfaction in the dynamically changing post-pandemic environment.

2. Literature Review

The authors did not find in the literature the construct of a model of barriers and a model of preferences for changing energy suppliers among individual consumers depending on their level of satisfaction in a dynamically changing post-pandemic environment and taking into account the impact of the outbreak of the Russian-Ukrainian war, therefore this research can be considered pioneering. What can be considered a research gap that needs to be filled? This is due to the specificity of the topic undertaken and the beginnings of the description of the impact of turbulent changes associated with it in the literature. Nevertheless, the authors, wishing to capture the effective context of the literature, will begin by identifying research on the specifics of pricing in the energy market in Poland. They will then discuss the context of competition in the retail energy market also in terms of security and continuity of supply assurance. Against this background, they will describe the history of the exercise of the right to choose an energy seller in Poland to date. Then they will show the impact of the turbulent environment on the horizon of future research on the energy market in Poland. They will then move on to identify the characteristics and awareness of individual energy market consumers of their preferences and level of satisfaction with the services provided.

In Poland, as in many countries, energy companies enjoy the support of government policy and occupy a dominant position in the energy pricing mechanism. Ensuring continuity of electricity supply in the face of the Russia-Ukraine conflict is an important area of electricity quality (Popa, 2022) and an energy security challenge resulting from, among other things, sectoral sanctions on energy imports from Russia (Nasiri et al., 2022). Consequently, problems in ensuring reliable electricity supply may occur during peak demand (Andruszkiewicz et al., 2021). This market interaction causes price distortion, leading to customer confusion in the energy market, which cannot accurately

reflect the relationship between supply and demand (Yang et al., 2018). Furthermore, liberalization of the electricity market has significantly increased the level of competition in the energy markets, forcing more accurate demand forecasting (Bernardi & Lisi, 2020). However, unlike the top-down pricing model used in conventional energy systems, Poland still lacks a fully effective energy trading mechanism where energy suppliers and users can actively participate in the trading process (Zhang et al., 2020).

Retail competition is relatively mature in the electricity market. In this mode, both parties can compete freely, competition between sellers is most intense, and the buyer has the greatest choice (Wang et al., 2022). However, the development of a competitive energy market in Poland itself is taking place with some delay compared to other EU countries. This is mainly due to the need to protect final consumers from abrupt changes in energy prices and the need to build modern production solutions based on renewable energy sources (Energy Regulatory Office, 2023).

The primary objective of a competitive electricity market is to ensure the energy security of the country and rational energy prices for its citizens (Qader et al., 2022; Roozbeh Nia et al., 2021; Sánchez-Durán et al., 2019), by enabling and sometimes even forcing economical and rational use of fuels and energy (Mikhno & Koval, 2021) which is currently happening in Poland. As a rule, the competitiveness of the generation, transmission, and distribution sector leads to a reduction in total production costs and the assurance of energy supplies with high-quality parameters (Kluczek et al., 2021). However, the creation of an efficient operating market under turbulent conditions is intended to ensure the proper development of the energy economy in Poland (Kluczek et al., 2021; Ministry of Climate and Environment, n.d.). This should result in a decrease in electricity prices in the future, improve its quality, and increase the competitiveness of the whole economy (Kluczek et al., 2021; Sánchez-Durán et al., 2019). Research shows that energy sources are less important to consumers compared to energy prices (Sulich & Sołoducho-Pelc, 2022).

Historically, consumer activity in exercising the right to choose an energy supplier has been rather low for more than 15 years (table 1). The main reason for the low interest of consumers was the lack of a sufficient number of competitive offers for electricity sales and the long process of signing distribution service agreements, as well as unjustified changes to the rules of providing these services after the consumer exercised its right to choose a supplier (Energy Regulatory Office, 2023).

Table 1. Vendor change statistics in Poland from 2007 to 2023 in light of statistical data

Year	Number of customers using of the TPA principle			Energy delivered (99.5%) to TPA customers (GWh)
	Individuals	Institutional	Total	
2007	541	62	603	9 415
2008	905	85	990	8 980
2009	1062	1537	2 599	12 920
2010	1340	7611	8 951	26 611
2011	14341	21716	36 057	35 607
2012	76470	65327	141 797	44 798
2013	135619	92626	228 245	42 525
2014	287727	122778	410 505	56 714
2015	391351	158596	549 947	59 305
2016	462630	173858	636 488	64 853
2017	546867	188231	735 098	71 573
2018	604612	201005	805 617	75 090
2019	657223	209935	867 158	75 269
2020	690310	216508	906 818	74 852
2021	718 505	223 636	942 141	78 877
2022	741 700	230 300	972 000	80 973
2023	753 000	237 000	990 000	No data available

Sources: own studies based on Urząd Regulacji Energetyki (2022).

In the first year of the pandemic, the number of supplier changes in businesses at the end of December 2020 was 216,498 GWh, which increased from the end of December 2019 by 6,563 GWh, an increase of only 3.13%. In contrast, the number of home TPA customers as of December 2020 was 690,309 GWh, which has increased since December 2019 by only 33,086 GWh, an increase of 5% (Energy

Regulatory Office, 2022). This was the lowest performance in 10 years. Only in the second half of 2020 did consumers' interest in changing electricity providers gradually increase. Although it was not as high as in the corresponding months before the pandemic, a consistent upward trend was observed with each month. A total of 78 852 GWh of electricity was supplied to TPA customers in the year, that is, 3 583 GWh more than in the previous year (Energy Regulatory Office, 2023).

The specific characteristics of households show that they are willing to manage their behaviour; and their daily lives are amenable to simple change (Burchell et al., 2016). The Smart Communities study emphasizes the importance of understanding the conscious efforts of households to change behaviour as a time-consuming process that unfolds gradually over time (Department of Energy & Climate Change, 2015).

Increased awareness of individual energy consumers fosters and motivates many research efforts on home energy conservation, ranging from making homes smarter and more energy friendly to increasing awareness of householders, triggering important behavioural changes in daily household activities. The impact of information and feedback on energy consumption on consumer habits and behaviour (Kowalska-Pyzalska et al., 2020) has already been studied (Anderson & Lee, 2016; Bernardi & Lisi, 2020; Liebe et al., 2018). Looking at the literature, the authors noted that over the last 40 years there has been research on influencing people towards more sustainable behaviour, with a large number of studies focusing specifically on energy consumption behaviour (Šćepanović et al., 2017). Some of the studies have argued that incentives and corresponding nonmonetary incentives work well because they are based on people's general behavioural tendencies, such as status quo orientation and loss aversion. Such nonmonetary incentives appear to be inexpensive, easy to implement and therefore an effective contribution to combating resource overconsumption and climate change (Liebe et al., 2018). Researchers have begun to develop simulation models as a rapid and cost-effective means of exploring and advancing our knowledge of interventions related to energy consumption behaviour. These models have provided unique insights into potential energy savings from improved user behaviour, but have not yet reached the potential for predictive modelling (Anderson & Lee, 2016).

Although the literature has shown correlations between energy savings and normative comparisons, the intrinsic motivating factors behind the observed energy savings behaviour of users are still unknown (Jain, Gulbinas et al., 2013). Researchers have so far established that community-level variables can be much

more powerful than population behaviour at the individual level (Maibach et al., 2008), although knowledge from research often accumulates, it still does not necessarily lead to changes in behaviour (Burchell et al., 2016), (Simcock et al., 2014). The wide range of previous research indicates a lack of understanding among researchers and practitioners of what specific components contribute to significant savings and why some eco-feedback systems are more effective (Jain, Taylor et al., 2013).

According to this research, customer satisfaction is the ultimate goal of all product and service providers (Rotileanu, 2020). Therefore, analysis of customer satisfaction in terms of preferences is a key element in understanding the quality of products and services (Desmal et al., 2022), which benefits the loyalty of individual customers (Caggiani et al., 2019) of the energy market. There are several barriers and preferences that can influence individual customers when it comes to changing energy suppliers. These include financial gains, location and housing data, inefficient design of the switching process, consumer inertia, and subconscious preferences (Cornago, 2021; He & Reiner, 2015, 2017; Hinterstocker et al., 2018; Liebe et al., 2018; Meuer et. al., 2019). An analysis of the retail energy market in Poland in 2022 revealed that customers have preferences when it comes to their energy consumption (Energy Market Agency, 2022). The Polish electricity market is characterized by the rights and obligations of its participants, including individual customers (Competition and Consumer Protection Office, 2011). Research has shown that customers value different levels of products on the electricity market, forming a hierarchy of values (Kinelski, 2015). Furthermore, previous studies have indicated that customer values play an important role in the Polish electricity sector (Kozieł, 2020). The growing requirements of customers for the composition of products and production processes have been reflected in the creation of labels that confirm compliance with social criteria. Similarly, consumers using electricity can decide on the supplier choice, taking into account the company's commitment to respecting the natural environment and implementing sustainability strategies (Sulich & Sołoducho-Pelc, 2021). Factors that influence the preferences of individual customers in the energy market include psychological, social comparison (Gołębiowska et al., 2021), cultural, personal, and economic include: factors of customer satisfaction with the quality of energy services (Rosak-Szyrocka et al., 2022), energy policy reviews (International Energy Agency, n.d.) adaptation strategies in the regulated markets of power companies (Borowski, 2019), and marketing factors such as organic food preferences (Melovic et al., 2020). Furthermore, consumer preference heterogeneity can be affected by buying power, demographic group,

housing characteristics, nutrition, harmful effects of products, and availability (Udomkun Patchimaporn et al., 2018; Dolšak et al., 2020; Meuer et al., 2019; Bahety et al., 2022). Therefore, the question becomes more relevant: Will such a situation of poststained inflation and the turbulent environment of the Russia-Ukraine war affect customer satisfaction perceived after purchasing Energy? (Park et al., 2019), which is a measure that helps organizations enable their products or services to meet or exceed consumer expectations (Othman & Razak, 2010; Desmal et al., 2022).

Therefore, the aim of the article is the main research problem. In the face of a turbulent changing environment, will individual customers change their energy retailers when they have the opportunity to do so? That is, Q1 Create a model of barriers and a model of preferences for changing the energy supplier among individual consumers depending on the level of their satisfaction in the dynamically changing post-pandemic environment.

3. Materials and Methods

Taking into account the research problem, which consisted of understanding the barriers and preferences for changing the energy supplier of individual groups of recipients depending on the level of their satisfaction. To understand and identify the impact of the level of satisfaction of individual customer groups (divided for three different groups: critics, promoters, and the neutral) in the turbulent post-pandemic environment, taking into account the war recession in Ukraine, on preferences and barriers to switching energy supplier in Poland, it was necessary to create models of their dependencies. The research methods used were based on literature research and quantitative research, and, above all, verification of hypotheses through the statistical development of questionnaires leading to the generation of models. The choice of quantitative research was dictated by their positive impact on cognitive function issues, including identifying weak signals and understanding what mechanisms governing the area of research (Breitmayer et al., 1993).

The survey questions were developed based on an analysis of previously published studies on the impact of barriers and preferences on customer satisfaction with the energy market as Paweł Korytko "Application of supplier selection rules on the electricity market in Poland" in 2019. An in-depth analysis of the literature on the subject was carried out in the following paper. Literature studies have shown that the variable of consumer preferences in choosing an energy seller is described by the following factors: price level, choice of tariff,

advice on the best product, payment terms, response time to customer needs, accessibility and ease of contact, correctness and transparency of energy bills, and staff competence. Barriers in the process of changing energy seller are characterized by the following factors: price increase, difficulty in choosing the most favourable offer, incomprehensible procedure for changing the seller, lack of information helpful in choosing another seller, loyalty and satisfaction with the current seller, lack of time to analyse offers and decide to change the seller, duration of the process of changing energy seller, lack of information about the profitability of changing energy seller, lack of correctness of energy bills - I feel cheated.

The phenomenon studied is, of course, multidimensional, so it is the statistical research method of multivariate statistical analysis. For the purpose of this study, an exploratory factor analysis was applied using the principal component method. The main purpose of using this method was to extract the most important significant factors from the set of primary variables. This made it possible to reduce the number of variables to a smaller set that represents the variability of the same factors, i.e., that the random variables in a given group are to some extent dependent on each other and to develop models for each of the customer satisfaction groups in a turbulent post-pandemic environment.

To achieve the purpose of the article, we conducted survey research based on the author's questionnaire. The questionnaire consisted of an instruction part, three groups of questions (1. Assessment of the importance of consumer preferences when choosing an energy seller, 2. Assessment of the importance of barriers to the process of changing energy sellers) and a metric (assessment of the level of satisfaction with the current electricity seller, age, residence, education, and the average monthly household income per person). The questions from groups no. 1 and 2 were evaluated using the 5-point Likert scale (1- very unimportant, 2- unimportant, 3 – neutral, 4- important, 5- very important). The level of satisfaction with the current electricity seller was measured using 9 Point Scale where 1- very dissatisfied, 9- very satisfied.

The analysis confirmed the statistical reliability and validity of the questionnaire. In 2021, there were 690,309 individual customers on the Polish market, with a 95% confidence interval, and the minimum research sample is 384 people. The survey was conducted in 2022-2023 after Russia invaded Ukraine using a GOOGLE questionnaire prepared electronically using online distribution channels (the CAWI technique was used to conduct survey research). This allowed the authors to verify the reliability of the collected

information and eliminate incompletely completed forms. Moreover, the data collected during the study is stored in the cloud, so the study authors had access to them on any device, without fear of accidental deletion or loss as a result of destruction of the data carrier. Such data collection allows the process to be carried out on many devices simultaneously and the results are saved in the form of a spreadsheet, which, after coding, can be easily implemented into SPSS. The introduction of this data collection method also made it possible to conduct research online and in a traditional printed form. In this way, it was possible to collect 401 correctly completed research questions after. The aim of the article was to create a model of barriers and a model of preferences for changing the energy supplier among individual consumers, depending on the level of their satisfaction in the dynamically changing post-pandemic environment. To achieve the goal, we formulate hypotheses as follows:

H1: Differences between variables that describe barriers to the process of changing energy suppliers are important for the distinguished groups of recipients (critics, neutral promoters).
H2: Barriers to energy suppliers change influence the level of customer satisfaction.
H3: Differences between variables that describe consumer preferences when changing energy supplier for distinguished groups of recipients (critics, neutral promoters).
H4: Customer satisfaction level influences their preferences when switching energy supplier.
H5: Barriers to the process of changing energy suppliers influence consumer preferences when changing energy supplier.

Confirmation or rejection of research hypotheses will verify the correctness of the theoretical model. The first two hypotheses represent the barriers to the process of changing the energy suppliers model. Hypotheses three and four description of consumer preferences when changing energy supplier. The last hypothesis presents a mutual relationship between barriers to the process of changing energy suppliers and consumer preferences when changing energy supplier.

4. Results

To verify the hypotheses, 401 observations were divided into groups. Detractors (97), neutrals (257), promoters (47). Detractors are people who

declared a low level of satisfaction with the current energy supplier. Neutrals are people who declared a neutral attitude to the current energy supplier. Promoters are people who have declared a high level of satisfaction with the current energy supplier. The respondents of the detractors are dominated by people 41-50 years of age (28.95%) and 21-30 (23.7%), most of them living in cities with more than 200,000 inhabitants (43.3%), they have higher education (62%) with a per capita household income of more than 1,653 PLN (66%). Neutral respondents are dominated by people aged 31-40 (46.7%), most of them living in cities with more than 200,000 inhabitants (72.8%), with higher education (77%), whose household income per capita exceeds PLN 1,653 (81.7%). Among Promoters, people aged 41-50 (29.8%) and 31-40 (23.4%) dominate, most of them living in cities with more than 200,000 inhabitants (34%) and cities with 51-100,000 inhabitants (23.4%). They have higher education (59.6%) and their household income per capita exceeds PLN 1,653 (61.7%). Before verifying the hypotheses, normality tests were carried out for the distribution of answers given by respondents to individual questions. In the promoters and detractors groups, where the sample size was $n<100$ for each group of respondents, the Shapiro-Wilk test was used. For each question in these two groups, the p value < 0.05 for this test, so the distributions of the variables were significantly different from the normal distribution. In the neutral group, the sample size was $n>100$, the Kolgomorow-Smirnow test with Lilliefors significance correction was used. For each question, the p value < 0.05 for this test, so the distribution of variables deviated significantly from the normal distribution. This means that to verify the research hypotheses, we used non-parametric tests, which are adequate for variables that do not have normal distribution characteristics. The results of the Kruskal-Wallis tests allowed us to check whether there were statistically significant differences between customer groups. The research was supplemented by checking which pairs these differences occur between (detractors- neutral, detractors-promoters, neutral- promoters) using Dunn's post-hoc test with Bonferroni correction. In the study of the relationship between variables, the non-parametric Spearman rho correlation test was used. Due to the fact that the studied variables were expressed in different measurement quantities (quantitative and nominal variables), we also used the Eta index to examine the relationships between them.

A. The Barriers to the Change Process:

a. Hypothesis H1 Verification

The Kruskal-Wallis test (table 2) showed that the hypothesis of lack of differences between variables that describe barriers in distinguished groups should be rejected.

Table 2. The Kruskal-Wallis test result. Grouping variable: the level of satisfaction with the current energy supplier

Variable	Kruskal - Wallis, H.	df	Asymp. Sig.
increase in prices	9,321	2	0,009
difficulties in choosing the most favorable offer;	24,879	2	< 0,001
incomprehensible supplier switching procedure;	54,527	2	< 0,001
lack of information to help with choosing another seller	13,256	2	< 0,001
No time to analyze offers and make a decision to change the seller.	46,766	2	< 0,001
duration of the energy supplier switching process	48,884	2	< 0,001
lack of information on the profitability of changing electricity supplier	16,236	2	< 0,001
lack of correctness of energy bills	66,441	2	< 0,001

Source: own study

Differences in the perception of variables that describe barriers between detractors, neutrals, and promoters are statistically significant.

After decoding the mean values of the responses, we moved the scale: assessment of the importance of barriers to the process of changing energy sellers; from 1 to 5 to the range from -2.5 (very unimportant) to 2.5 (very important), where 0 means a neutral impact for respondents.

Table 3. Interpretation of responses for variables of the model of barriers to the change process of energy suppliers

Variable	Detractors	Neutrals	Promoters
increase in prices	very important barrier (1,92)	very important barrier (2,01)	very important barrier (2,27)
difficulties in choosing the most favorable offer	important barrier (1,22)	very important barrier (2,01)	important barrier (1,44)
incomprehensible supplier switching procedure	important barrier (1,31)	neutral barrier (0,45)	very important barrier (1,63)
lack of information to help with choosing another seller	important barrier (1,35)	very important barrier (1,70)	very important barrier (1,39)
no time to analyze offers and decide to change the seller	important barrier (1,20)	very important barrier (1,84)	important barrier (1,24)
duration of the energy supplier change process	important barrier (1,01)	neutral barrier (0,13)	important barrier (1,20)
lack of information on the profitability of changing electricity supplier	important barrier (1,44)	very important barrier (1,71)	important barrier (1,33)
lack of correctness of energy bills	important barrier (0,94)	neutral barrier (-0,11)	very important barrier (1,63)

Source: own study

Table 3 shows the differences in perception of the variables that explain the barriers to the process of change of energy suppliers. The basis for the presentation of the results was the post hoc Dunn test with Bonferroni correction.

b. Hypothesis H2 Verification

To verify the second hypothesis, the calculation of the Eta index was used. This indicator allows to calculate the relationship between the quantitative variable (barriers) and nominal variable (the level of customer satisfaction). The Eta index takes values from 0 to 1, where the value of 1 means full dependence of the variables examined. For the directional measures studied, Eta = 0.351, so the relationship between barriers and customer satisfaction is not a strong relationship. By squaring the Eta value, we obtain information that the barrier variable explains 12.32% of the variability in the level of customer satisfaction.

B. The model of consumer preferences when choosing an energy seller

a. Verification of Hypothesis H3

The Kruskal-Wallis test (table 4) showed that the hypothesis about the lack of differences between the variables that describe barriers in the distinguished groups should be rejected with the exception of one variable.

Table 4. The Kruskal-Wallis test result. Grouping variable: the level of satisfaction with the current energy supplier

Variable	Kruskal - Wallis, H.	df	Asymp. Sig.
price level	5,713	2	0,057
tariff selection	30,950	2	< 0,001
advice on the best product	23,886	2	< 0,001
terms of payment	20,960	2	< 0,001
response time to customer needs	39,351	2	< 0,001
availability and ease of contact	34,409	2	< 0,001
correctness and transparency of energy bills	24,868	2	< 0,001
employee competencies	25,251	2	< 0,001

Source: own study

Differences in the perception of variables describing preferences between detractors, neutrals, and promoters are statistically significant. It should be noted that, for the price level variable, there are no statistically significant differences in how it is perceived by respondents in the distinguished groups.

After decoding the mean values of the responses, we moved the scale: assessment of the importance of consumer preferences when choosing an energy seller; from 1 to 5 to the range: from -2.5 (very unimportant) to 2.5 (very unimportant), where 0 means a neutral impact for respondents.

Table 5. Interpretation of responses for variables of the consumer preferences model when choosing an energy vendor

Variable	Detractors	Neutrals	Promoters
price level	very important preference (1,79)	very important preference (1,94)	very important preference (1,84)
tariff selection	important preference (0,96)	important preference (0,54)	important preference (1,33)
advice on the best product	important preference (0,54)	neutral preference (0,41)	important preference (1,22)
terms `of payment	important preference (0,79)	neutral preference (0,42)	important preference (1,05)
response time to customer needs	important preference (1,12)	important preference (0,58)	important preference (1,41)
availability and ease of contact	important preference (1,07)	important preference (0,66)	very important preference (1,54)
correctness and transparency of energy bills	important preference (1,31)	important preference (0,78)	important preference (1,35)
employee competencies	important preference (1,05)	important preference (0,56)	important preference (1,20)

Source: own study

Table 5 above shows the differences in perception of the variables that explain consumer preferences when choosing an energy supplier. The basis for the presentation of the results was the post hoc Dunn test with Bonferroni correction.

b. Hypothesis H4 Verification

To verify the fourth hypothesis, the calculation of the Eta index was used. This indicator allows to calculate the relationship between the nominal variable (level of satisfaction) and quantitative variable (preferences when switching energy supplier). The Eta index for the directional measures studied is 0.268, so the relationship between customer satisfaction and their preferences when switching energy supplier is not a strong relationship. By squaring the Eta value, we obtain information that customer satisfaction explains 7,18% of the variability in the level of preferences when switching energy supplier.

c. Hypothesis H5 verification

Due to the nature of the studied variables (lack of normal distribution), we had a limited portfolio of statistical tools to verify this hypothesis. We used Spearman's rho correlation analysis, which does not provide answers about the influence of one variable on the other. However, we obtained information about the strength of the relationship between the studied variables. When interpreting the results, we used the following assumptions: rho (0-0.30): no correlation; rho (0.31-0.50): moderate correlation; rho (0.51-0.70): strong correlation; rho (0.71-1.00): very strong correlation.

In the **Detractors group,** the Spearman correlation coefficient rho was calculated between the barriers and preferences of individual customers in the energy market: rho = 0.421, $p<0.001$. The correlation is statistically significant ($p<0.05$). There is a moderately positive relationship between both variables. High values of one variable are accompanied by high values of the other variable.

In the **Neutral group**, the Spearman correlation coefficient rho was calculated between barriers and preferences of individual customers in the energy market: rho = 0.478, $p<0.001$. The correlation is statistically significant ($p<0.05$). There is a moderately positive relationship between both variables. High values of one variable are accompanied by high values of the other variable.

In the **Promoters group,** the Spearman correlation coefficient rho was calculated between the barriers and preferences of individual customers in the energy market: rho = 0.437, $p = 0.002$. The correlation is statistically significant ($p<0.05$). There is a moderately positive relationship between both variables. High values of one variable are accompanied by high values of the other variable.

5. Discussion

The aim of the article was to create a model of barriers and a model of preferences for changing the energy supplier among individual consumers, depending on the level of their satisfaction in the dynamically changing post-pandemic environment. The data obtained have been divided into three groups, according to customer satisfaction: detractors (Fig. 1), neutrals (Fig. 2) and promoters (Fig. 3) customers.

Figure 1. Model of barriers to changing the energy supplier - unsatisfied customers

Source: own study

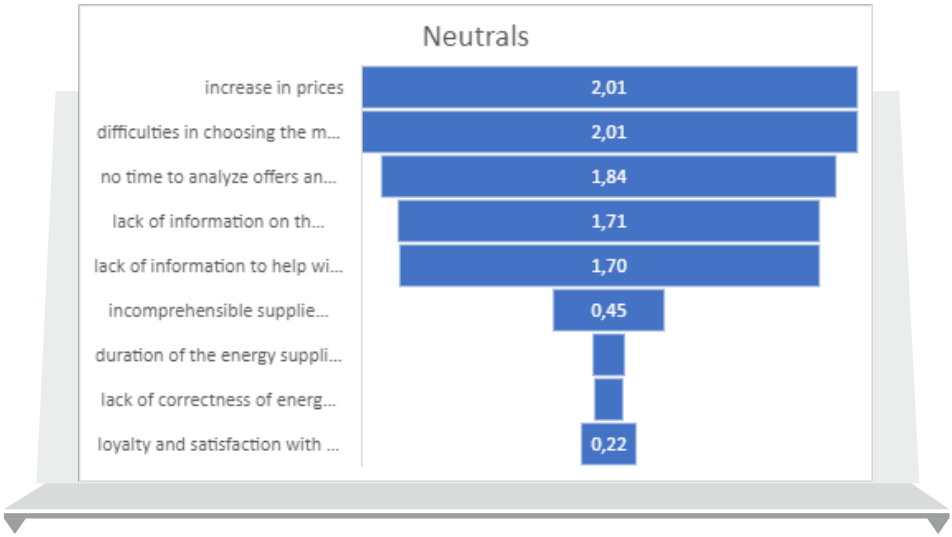

Figure 2. Model of barriers to change the energy supplier – neutral customers

Source: own study

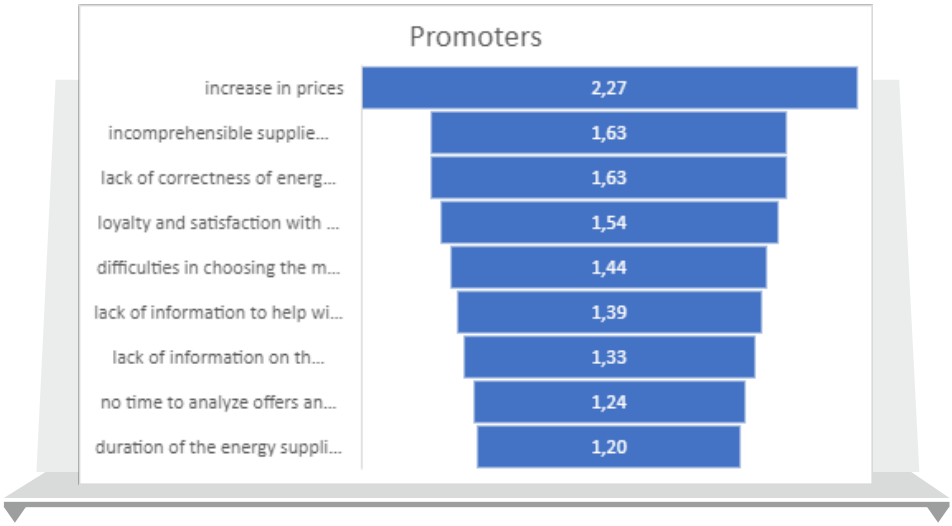

Figure 3. Model of barriers to changing the energy supplier, satisfied customers

Source: own study

When discussing the factors that build the model of barriers to change the energy supplier, we noticed that 'increase in prices' is the most important factor in every group. The result of the post hoc Dunn test with the Bonferroni correction showed statistically significant differences between Detractors and Promoters, as well as between Neutrals and Promoters. Detractors and Neutrals customers perceive the "increase prices" barrier as equally important. It should be noted that this barrier was rated the highest among the most satisfied customers. About the previously presented literature background, the research results obtained regarding the perception of the importance of the price level of the study contradict the view of Sulich and Suchodoł-Pelc.

The assessment of the barrier of 'difficulties in choosing the most favourable offer' is not statistically different between Detractors and Promoters. This means that it is an equally important factor for both groups. Neutral customers perceive this barrier as very important as 'increase in prices'. Which is in line with the opinion presented in the study of H. Wang (2022) and X. Wang (2022).

The next factor 'lack of information to help choose another seller' like the previous one is not statistically different between Detractors and Promoters, although they perceive it as an important barrier. Neutral customers perceive this barrier as very important and the difference in assessment between the other groups is clearly higher.

The assessment of the factor of 'loyalty and satisfaction with the current seller' is statistically different between each group of consumers. Neutral customers perceive it as neutral barrier, for Detractors this barrier is important, Promoters assessment it as very important.

Another factor: 'no time to analyse offers and decide to change the seller' is perceived by Detractors and Promoters as important and there is no significant difference between these two groups of customers. However, for Neutrals clients, this factor is one of the very important barriers to changing the energy supplier.

The barrier "Duration of the energy supplier changing process" is not statistically different between Detractors and Promoters. This means that it is an equally important factor for both groups. Neutral customers rated it as neutral, so they do not perceive it as a barrier to changing the energy supplier.

The assessment of the barrier of 'lack of information on the profitability of changing electricity supplier' is the same from the Detractors and Promoters groups. In the case of these customers, this factor is important, while for Neutral customers it is very important.

The last factor that describes barriers to changing the 'lack of accuracy of the energy bill' of the energy supplier is statistically different between each group of

consumers. Neutral customers perceive it as neutral barrier, for Detractors this barrier is important, Promoters assessment it as very important.

The model is complemented by conclusions from the verification of the hypothesis. Barriers to energy suppliers change influence the level of customer satisfaction. We obtained the information that the barrier variable explains 12.32% of the variability in the level of customer satisfaction. The level of relationship between barriers and customer satisfaction was rated moderate.

The model of preferences to change the energy supplier among individual customers. The data obtained have been divided into three groups, according to customer satisfaction: Detractors (Fig. 4), Neutrals (Fig. 5) and Promoters (Fig. 6) customers.

Figure 4. Model of preferences for changing the energy supplier - unsatisfied customers

Source: own study

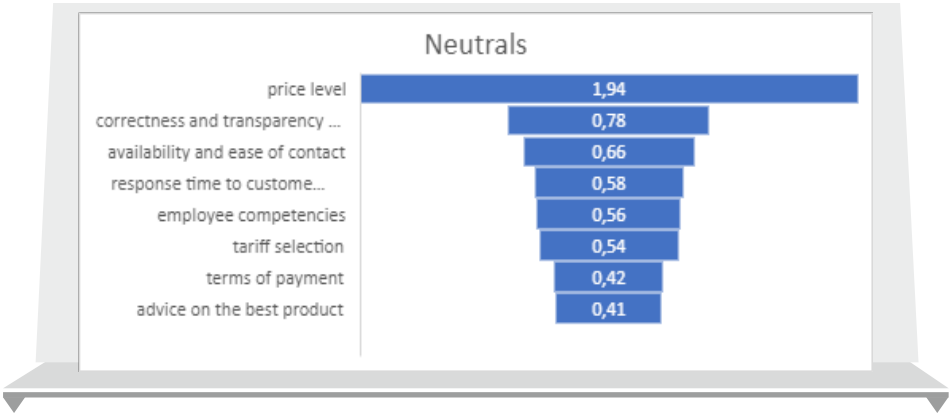

Figure 5. Model of preferences for changing the energy supplier – Neutral customers

Source: own study

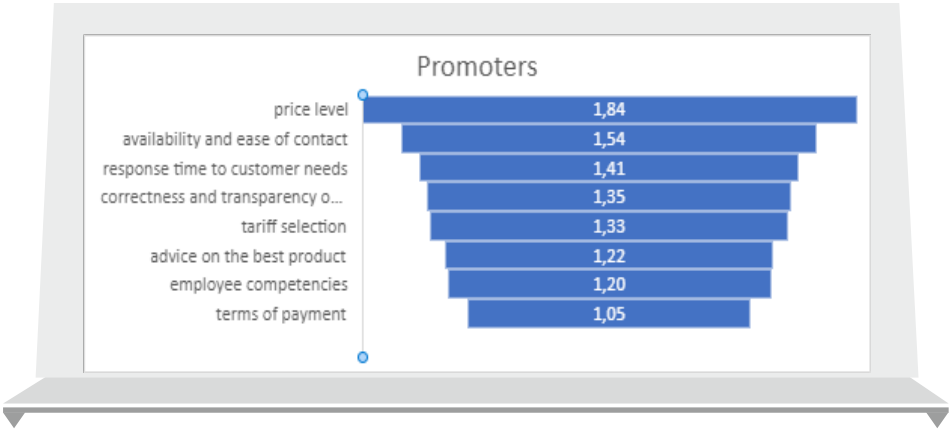

Figure 6. Model of preferences for changing the energy supplier, satisfied customers

Source: own study

The first factor of the model: the 'price level' is considered a very important variable and received the highest level of indications. Research has shown that there are no statistically significant differences between customer groups in terms of their level of satisfaction.

The ability to choose a tariff ("tariff selection") as a preference for choosing an energy supplier does not differ significantly between Detractors and Promoters. In the case of these customers, this factor is important. The factor is also perceived by Neutral customers as important, but the level of assessment is much lower, and the difference in the studies turned out to be statistically significant.

The evaluation of the preference 'advice on the best product' is not statistically different between Detractors (important factor) and Neutrals (neutral factor). It should be emphasized that for Promoters this preference is important, and the rating level is more than twice as high as for the other two groups of customers.

"Terms of payment" is a preference rated as important by Detractors and Promoters customers, while others consider it neutral. There is no statistically significant difference between Detractors and Promoters indications.

The next factor "response time to customer needs" like the previous one is not statistically different between Detractors and Promoters, although they perceive it as important preference. Neutrals customers perceive this barrier also as important but close to the neutral level.

The initial results showed that Detectors, Neutrals and Promoters are perceived "availability and ease of contact" as an important factor. However, the result of the post hoc Dunn test with the Bonferroni correction showed that differences between these customer groups are statistically significant.

Another factor: "correctness and transparency of energy bills" is perceived by Detractors and Promoters as important, and there is no significant difference between these two groups of customers. However, for Neutrals clients, this factor is also an important preference for changing the energy supplier but close to neutral level.

The last factor describing preferences for changing the energy supplier among individual customers "employee competencies" is not statistically different between Detractors and Promoters. Neutral customers perceive it as an important preference at a very low level, close to the neutral level.

The model of preferences for changing the energy supplier among individual customers is complemented by conclusions from the verification of the hypothesis. Customer satisfaction level influences their preferences when switching energy supplier. We obtained information that the level of customer satisfaction explains 7.18% of the variability in customers' preferences to change the energy supplier. The level of relationship between barriers and customer satisfaction was rated low.

6. Conclusions

The verification of the research hypothesis H1 showed that not for every variable there are statistically significant differences in the groups (Detractors, Neutral Promoters). It should be emphasized that the highest rated barrier, regardless of the level of customer satisfaction, is 'increase in prices'. Which is in line with the view presented in the Yang et al. (2018) and Qader, Junaid, Abbas and Mubarik studies (2022 a, b). With regard to the background context of the literature, the obtained research results relating to the perceived validity of the price level of the study clearly contradict the view of Sulich and Suchodol -Pelc (2019, 2021). Research has shown that for six of nine factors that build the barrier-to-supplier switching model, there is no statistically significant difference in their perception between the Detractors and Promoters groups. We also showed that the assessment of two barriers: 'lack of information on the profitability of changing the electricity supplier' and 'lack of correctness of the energy bills' is significantly different depending on the level of customer satisfaction. Which is consistent with studies by researchers such as Rotileanu (2020) and teams of researchers Desmal, Hamid, Othman, and Zolait (2002), and Caggiani, Camporeale, Marinelli and Ottomanelli (2019). Additionally, it was possible to demonstrate a moderate level of dependence between the impact of market barriers on the level of customer satisfaction with the current energy supplier.

The verification of the research hypothesis H3 showed that not for every variable there are statistically significant differences in the groups (Detractors, Neutral Promoters). It should be emphasized that the highest rated preference, regardless of the level of customer satisfaction, is the 'price level'. Which is in line with Sulich and Soloducho-Pelc's research. Research has shown that for five of the eight factors that build the model of preferences to change the energy supplier, there is no statistically significant difference in their perception between the Detractors and Promoters groups. The results indicate that there are no statistically significant differences in the perception of the "advice on the best product" factor between Detractors and Neutrals customers. We also showed that the preference assessment: 'availability and ease of contact' is significantly different depending on the level of customer satisfaction Furthermore, it was possible to demonstrate a low level of dependence between the impact of the level of customer satisfaction on customer preferences when switching energy supplier. Which is consistent with studies by Rosak-Szyrocka, Zywiołek and Mrowiec (2022)

and Golębiowska, Bartczak and Budzinski (2021) as well as Melovic, Cirovic, Dudic, Vulic and Gregus (2020).

The research process carried out allowed us to verify the hypothesis about the relationship between the barriers resulting from market conditions and the preferences of individual consumers on the electricity markets. Hypothesis H5 was verified from the perspective of individual customer satisfaction. The results show statistically significant relationships between these variables in all customer groups. These correlations are moderate and amount to Detractors 0.421, Neutrals 0.478 and Promoters 0.437, respectively. Therefore, market barriers have a moderate impact on customer preferences when changing energy supplier. Which is consistent with studies by Desmal, Hamid, Othman and Zolait (2022) and Meuer et al. (2019) as well as Bahety, Sarkar, Kumar, and Mittal (2022).

In conclusion, we managed to achieve the aim of the article and create the model of barriers and the model of preferences for changing the energy supplier among individual customers depending on the level of their satisfaction in the dynamically changing post-pandemic environment. Furthermore, we show the relationship between the barriers to switching energy supplier and the level of customer satisfaction, and we examine whether the level of satisfaction affects the preferences of individual customers when switching energy supplier. We have also demonstrated the relationship between barriers to switching energy suppliers and the preferences of individual consumers, considering the level of their satisfaction. The research results obtained can be an interesting and timely source of knowledge for energy suppliers and can be a basis and contribution to further discussion on the topic.

Abstract

During the Russian-Ukrainian conflict, energy prices are rising. Such a situation would suggest high customer turnover, especially since the environment has a strong influence on population behaviour at the individual level. The purpose of this paper is to model the barriers and preferences of individual customers in switching energy suppliers according to the level of satisfaction in a dynamically changing environment. We statistically designed the study using Eta index calculations, test: KruskalWallis, post hoc Dunn's test with Bonferroni correction. Two models were obtained: barriers and preferences for changing energy retailers among residential customers, depending on the level of satisfaction,

in a dynamically changing environment. We demonstrated the relationship between barriers to switching energy vendors and customer satisfaction levels. We investigated whether the level of satisfaction influences energy seller switching preferences among customers. We demonstrated the relationship between barriers to switching energy vendors and individual customer preferences and satisfaction levels.

Keywords: *barriers for change, preferences for change, individual energy behavioural changes, individual consumers, energy market.*

JEL Codes: D04, D11, D16, D12, D18, L69, P49, Q41, Q48.

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