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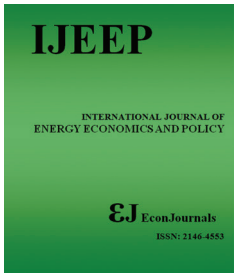

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Incentives for Green Consumers on the Liberalised Energy Market of Romania in the Context of the Transition to Green Economy

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ABSTRACT

The liberalisation process of energy markets has been progressing since 1990 and starting 2012 it has also begun in Romania, being finalised in January 2021 and granting the household consumers the possibility to choose an energy supply company. Together with the context of an ongoing transition towards a green economy, it is important to analyse and understand the criteria of consumers when choosing their energy supplier in order to design appropriate policies which will ensure the success and efficiency of the transition. This research targets the household consumers of Romania and the methodology consists of a questionnaire, whereas the data gathered was analysed using SPSS. The first hypothesis, of a correlation between the income of the consumer and the willingness to pay additionally for renewable energy, was not validated. Therefore, an increased standard of living does not translate to the willingness of consumers to invest in green energy. However, the second hypothesis, of an association between the level of education and the criteria of the consumers when they choose an energy supplier, was validated, indicating that the incentive in changing the criteria of consumers is to work together for the green economy transition and to develop a stronger educational background.

Keywords: Household Consumers, Greeen Economy, Energy Market, Liberalisation, Consumer Behaviour, Education Level
JEL Classifications: A19, P18, O44

1. INTRODUCTION

Starting with 1990, the liberalisation of energy markets has been progressing among OECD countries. After the decision from 1996 of the EU Council of Ministers to adopt a new EU directive on liberalisation of the electricity market the process accelerated in Europe. The goal for a liberalised market was to increase commercial competition which in terms would lead to higher efficiency and lower consumer prices (Meyer, 1998).

In January 2007, Romania became member of the European Union and five years later, starting 2012, the liberalisation of the energy market began, only to be completed in January 2021, granting the household consumers the possibility to negotiate the price with a list of over 50 energy supply companies (Pricopie, 2014; Haar and Marinescu, 2011).

In order to establish if the above mentioned goals of the liberalisation are met (Alder, 2001), what must be underlined is the fact that in a liberalized market, consumers exercising their ability to choose a utility provider is the main factor which determines the outcomes of deregulatory reform (Shin and Managi, 2017). Therefore, the consumer should be studied and understood in order to insure a successful liberalisation of the energy market (Jegen and Wüstenhagen, 2001; Owen, 2014).

Moreover, given the long time which has passed between the target imposed in the ninties and the completion of the process in the year 2021 for Romania, the changing context is another subject which must be taken into consideration, namely the goal of transitioning towards a renewable energy based economy (Ali et al., 2021).

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These are the two contextual factors which are considered in the paper (Xiang and Zheng, 2013).

The energy transition, from a global perspective, is equivalent to a transformation of the current energy system consisting of a set of production and consumption subsystems dependent on energy obtained from fossil fuels (in particular coal, oil, natural gas) in a production and consumption system that is supported by renewable energy types – "clean" energy (wind, solar, hydrogen-powered systems, rechargeable lithium-ion batteries, etc.). (Directive of EU, 2009)

The global legislation, through United Nations documents, introduces and defines the process of energy transition. In has become legally binding through the European Directives, which consider the year 2050 as the target for transforming the economy in order to accomodate production and existence methods where communities and their members live in a zero-carbon environment (Baye et al., 2021).

Such an energy transition project is directly dependent on a partnership between different parts of society, as this complex and costly phenomenon needs support from the whole society in order to implement the necessary measures. This starts with creating a general understanding of the challenges involved, solutions and potential measures, together with the reasoning behind them. (Valkhof, 2020)

The transition from an economy based on hydrocarbons and pollutant emissions to a progressively clean economy (Golombek et al., 2013) and to the target of the European Union's carbon-zero energy strategy, which requires zero net greenhouse gas emissions by 2050 must be achieved while ensuring it is both socially equitable and cost-effective. Therefore, this cannot be achieved without being aware which are the needs and the priorities of the people (Mealy and Teytelboym, 2020).

The strategy of the European Union is directly dependant on the transition to the use of progressively less polluting energy sources (COM, 2018). Our assumption is that, in fact, the success of such an economic transformation does not depend solely on the funds invested and the modeling of the energy industry toward increasing the infrastructure for the production of renewable energy, but also on the level of information and education of the population in order to adopt this type of energy in private consumption.

2. LITERATURE REVIEW

Each country can experience different processes of energy transition, depending on the policies applied for this purpose (Saum et al., 2020). A complete transition towards renewable energy could be technically possible, but politically difficult to manage in energy markets which have been liberalised, due to the face that it requires different business models (Namahoro et al., 2021). There is a change in the preferences of consumers that is determined by their willingness to pay for renewable energy (Blazqueza et al., 2020).

The members of the community, the public – made up mainly of individual consumers for private households and car owners, must be regarded as an important partner in the energy transition, along with the institutional and economic partners that are usually addressed in energy conventions and regulatory acts (Cole et al., 2021).

The project of this energy transition, which is supported by society as a whole, is often thought to be feasible through a political-economic partnership and expertise involving four categories of societal actors, from policymakers to business, public and private expertise (Gao et al., 2018):

1. Governments and policy makers
2. Business (private sector through massive investment in the low-carbon economy)
3. International organizations (UN, International Energy Agency, World Bank and World Economic Forum, for the purpose of carrying out global evaluations and policies)
4. Think tanks (e.g. Energy transitions Commission, European Climate Foundation, World resources Institute, Rocky Mountain Institute, the Columbia SIPA Center on Global Energy Policy, etc.). (Valkhof, 2020).

The present paper addresses the above mentioned partnership that is being discussed at international and regional decision-making levels, through the perspective that it lacks one of the key global players whose role is fundamental in the energy transition and which can be decisive in the successful transition to a green economy: the population of private consumers. This represents the grassroot segment from which the members of each individual organisation involved will grow and therefore should represent the starting point of the transition to green economy.

The current paper proposes a case analysis of limited methodological value, given the size of the sample being investigated and the fact that it concerns only one country - Romania, but it could nevertheless be considered a pilot study raising questions on the importance of factors which, for the time being, do not propose private consumers as an important active player involved in the energy transition.

The fundamental argument that we are proposing to broaden this partnership is a utility-pragmatic one: The population is a consumer of energy who is in a position to choose the type of energy they want for consumption. We believe that these individual consumers – households, entire communities that contract categories of energy in a free market are a national, regional and global player with a decisive role in generating the pace and speed of transition from traditional fossil energy to green energy (Kraana et al., 2019). Ultimately, as a consumer, the population can increase the pace of change and renewal of energy production infrastructures for consumption in private or non-public housing or Community establishments (Bergius et al., 2020).

The intervention of the government is generally required in order to address environmental problems or market failures regarding pollution or investment in green technologies. National policies remain to this day the main tool in fighting global warming and climate change and the politico economic model which is optimum

in order to insure energy efficiency and promote renewable energy use while transitioning to a liberalised market, is the one where both citizens' preferences and lobbying power are taken into consideration. (Nicollia and Vona, 2019).

The most important requirement from electricity systems with important shares of renewable energy is that they must become flexible (Jacobsen et al., 2006), therefore requiring significant investments. In this context, evaluating the market design and providing the right incentives to invest in flexibility must become a priority (Oscar et al., 2019). This research can be the starting point for evaluating the expectations and incentive methods for one important segment of the market, namely the household consumers.

According to a study performed in 2020 by Uzar, income inequality negatively affects renewable energy consumption, therefore fairer income distribution would lead to an increase in renewable energy consumption, but pure economic factors are not sufficiently explanatory in stimulating the consumption of renewable energy. But the study was performed using datasets from 43 different countries, and it was concluded that the research performed on individual countries could help formulate more specific policies in supporting the transition to a green economy. (Uzar, 2020).

Therefore, the main objective of the research presented is to understand the priorities of the households in the transition to green energy and to identify the appropriate incentives for their involvement, specifically for Romania. For this purpose, first the criteria of the consumers when they choose an energy supplier were determined. Then, the second two objectives were formulated in accordance with the two main determinants for the consumer regarding the choice of renewable energy in the liberalised market, according to the literature review performed.

Firstly, greater levels of income have been associated with the ability of the consumer to bear eventual additional costs in terms of taxes and tariffs for energy (Li et al., 2021), but it was found that income measures such as GDP per capita will show positive effect on renewable energy consumption for developed countries, but not for developing countries (Oluoch et al., 2021).

Therefore, one secondary objective of the present research is to perform a test of correlation between the monthly average income of the consumer and the disponsibility of the consumer to pay an additional price for renewable energy (Lucas Jr., 1988).

Secondly, it is known that education has a significant positive effect on economic growth, as a higher education level insures knowledge and skills, and also changes peoples daily behaviors and contributes to people's views and values. There is a substantial contribution of higher education in promoting green economic growth and transitioning to a green economy (Wenjuan et al, 2019).

Exploring the role of higher education can be important not only when discussing economic growth, but also when discussing the transition to green economy (Gao et al., 2019). The third objective of the present research is therefore to correlate the level of education with the criteria of the consumers when they choose an energy supplier.

The importance of this research consists not only in achieving the abovementioned objectives, but also to contribute with conclusions which will be tailored to the current situation in Romania, in the context of both transitioning to a green economy and to a liberalised energy market.

Such results will further aid to formulating appropriate policies which take into account the main criteria which the consumers have in choosing their supplier and how the education level contributes to the way the preferences of the consumers are shaped. Moreover, this research is also important for the business sector, as their business models appropriate will be tailored should be tailored on the profile of the consumer on the market in order to achieve the transition to a green economy, as the literature research revealed.

3. RESEARCH METHODOLOGY

The research consists of a semi-structure questionnaire containing a list of both close ended questions, as well as questions with the possibility for the respondents to add answers to the list, which was answered by 207 people, with a balanced gender and age distribution, as seen in Tables 1 and 2 below. The answers which were not valid were removed from the analyzed data prior to the statistical tests being run. The data related frequencies and percentage figures presented throughout this paper are considered valid in proportion of 100%. The data obtained was analyzed using SPSS Statistics and the output is discussed in the Results section of the paper.

Regarding the background of the population, the majority (86%) live in urban areas and 53% of the population has a high level of education (Master's degree) as seen in Table 3 and 4 below.

Table 1: Gender distribution

Gender	Frequency	Percent
Female	91	44
Male	116	56
Total	207	100

Table 2: Age distribution

Age group	Frequency	Percent
<18 years old	3	1.4
18–30 years old	52	25.1
31–40 years old	71	34.3
41–50 years old	51	24.6
>50 years old	30	14.5
Total	207	100

Table 3: Education overview

Last finished school	Frequency	Percent
High School	21	10.1
Bachelor's degree	53	25.6
Master's degree	111	53.6
PhD	22	10.6
Total	207	100

Another indicator regarding the population is the average monthly income, which is in accordance to the education level, as more than half of the population – 58%, have a net income level higher than the national average, which is approximately RON 3400 as presented in Table 5 below.

Also, the majority of the respondents (97%) are aware of the liberalisation of the energy market.

4. RESULTS OF THE RESEARCH

4.1. Spearman's Rank Correlation Between the Monthly Average Income and the Willingness of the Respondents to Pay a Higher Price on the Energy Bill for Green Energy

According to the research performed, the most important criteria when choosing an energy supplier is represented by the lowest price (38%), followed by the relationship with the supplier (19%) and the trustworthiness and the reputation of the supplier (18%). The distribution of the criteria is presented in Figure 1 below. As it can be observed, the distribution of the responses shows the willingness to pay additionally for green energy (1 representing "strongly disagree" and 5 representing "strongly agree") and the energy production method as a criteria for the following professions predominantly: IT/Telecom, Engineers, Services and Sales.

Additionally over the criteria suggested in the questionnaire, the respondents mentioned additional ones, such as: how easy/fast it is to sign the contract, the prior relationship with the energy supply company, other services provided by the company, etc.

Considering the diversity of professions and the different options listed as criteria, the present research was limited to the criteria which was predominantly chosen by the respondents, namely the lowest price, in order to understand the incentives behind this choice and place it in the wider context – of both the energy transition as well as the transition towards a green economy.

The fact that the most important criteria is the "lowest price" generated the first research hypothesis, namely that there is a positive correlation between monthly average income and the willingness of the consumer to pay an additional price for renewable energy. The assumption behind the hypothesis was supported by the literature, as the research in this field suggests a positive correlation between the income levels and the willingness to use renewable energy.

In order to test this hypothesis, a Spearman rank correlation between the two categorical variables was used.

As seen in the illustration above, the significance coefficient is 0.2, which is significantly higher than the P = 0.05 for the test. Moreover, the correlation coefficient is 0.087, as seen in Table 6 above, indicating that there is no correlation between the two variables. Therefore, the monthly average income is not correlated with the willingness of the respondents to pay a higher price on the energy bill for green energy.

4.2. Cross-tabulation and Chi-squared test of Correlation Between the Level of Education and the Criteria when Choosing the Energy Supplier on the Liberalised Market

The second hypothesis states that there is a correlation between the level of education and the criteria when choosing the energy supplier. As the literature review indicates, a positive correlation exists between a higher level of education and the green economic growth. Therefore, given the fact that the first hypothesis was not confirmed, and the willingness to pay additionally for green energy was not explained by an increased income level, the second hypothesis analyses the possibility that the criteria people have in choosing their energy supplier are influenced by their education level.

According to the cross-tabulation in Table 7 below, it is observable that the more the education level increases, the criteria in choosing the energy supplier becomes more diversified. The perspective is shifted from the "lowest price" towards other options, such as the services provided, the relationship with the supplier and the impact on the environment. 50% of the population who answered that the most important criteria was the impact on the environment had a Master's degree.

Table 4: Residence of the population

Residence area	Frequency	Percent
Urban	178	86
Rural	29	14
Total	207	100

Table 5: Monthly average income

Monthly average income	Frequency	Percent
No income	1	0.5
< RON 1000	3	1.4
RON 1001–2500	14	6.8
RON 2501–4500	64	30.9
> RON 4500	120	58.0
Do not wish to answer	5	2.4
Total	207	100

Table 6: Spearman's rho for correlation of the monthly average income with the willingness of the respondents to pay additionally for green energy

Spearman's rho	Monthly average income	To what extent do you agree to pay a higher price on the energy bill for green/renewable sourced energy?
Monthly average income		
Correlation coefficient	1.000	0.087
Sig. (2-tailed)	.	0.212
n	207	207
To what extent do you agree to pay a higher price on the energy bill for green/renewable sourced energy?		
Correlation coefficient	0.087	1.000
Sig. (2-tailed)	0.212	.
n	207	207

In order to validate a possible correlation between the variables, a Chi-squared test was used, as seen below in Table 8. The reason for choosing a Chi-squared test was that both variables are categorical.

Due to the fact that the Pearson's Chi-squared assumption was violated, according to Table 8 below, and 13 cells (i.e. 54.2%) have expected count <5, the likelihood ratio is considered. The asymptotic significance according to the likelihood ratio below is 0.009, below $\alpha = 0.05$, therefore it can be concluded that there is a statistically significant correlation between the two variables: education level and criteria when choosing the energy supplier on the liberalised market.

Further, in order to determine the correlation coefficient between the two variables, the Phi and Cramer's V values were determined. As the Phi value is relevant for measuring the strength of the association between variables with only two categories, and it is not the case here, the Cramer's V value was considered.

The Cramer's V value measures the association of one nominal variable (in this case the criteria for choosing the energy supplier) and one ordinal variable (education level) and as it can be observed in Table 9 below, the correlation value which results is 0.218. Therefore, the correlation between the education level and the criteria of the household consumers when choosing the energy supplier is weak to moderate.

Figure 1: Chart of consumer criteria when choosing an energy supplier according to their profession and their willingness to pay additionally for green energy

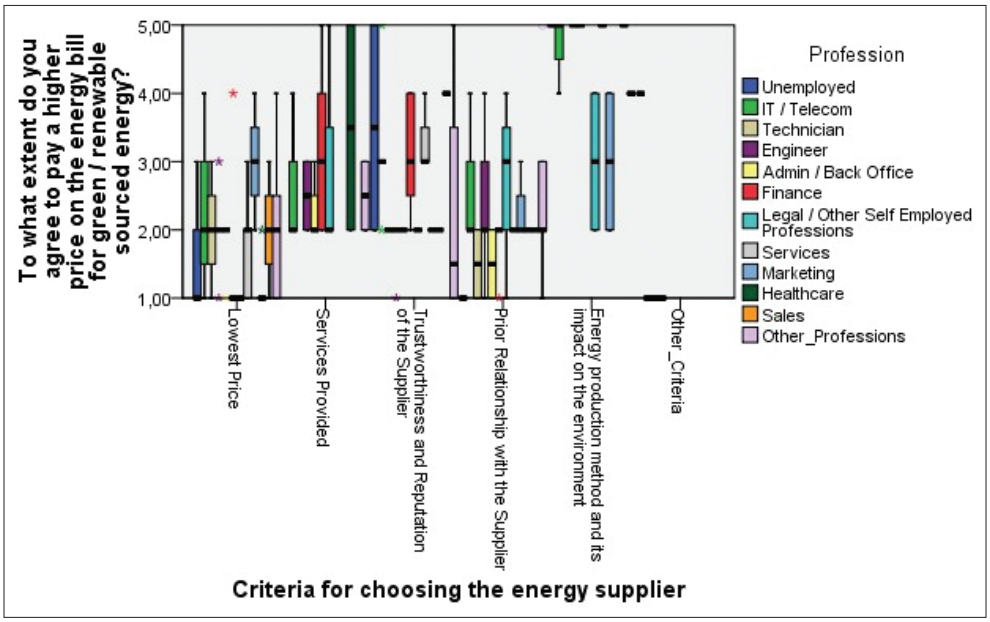

Table 7: Cross-tabulation of the criteria of the respondents when choosing an energy supplier and their education level

Education Level	Lowest price	Services provided	Trustworthiness and reputation of the supplier	Prior relationship with the supplier	Energy production method and its impact on the environment	Other criteria	Total
High school							
Count	15	0	2	2	0	2	21
% within criteria	19.2%	0.0%	5.3%	5.0%	0.0%	50.0%	10,1%
Bachelor's degree							
Count	21	10	10	5	6	1	53
% within criteria	26.9%	32.3%	26.3%	12.5%	37.5%	25.0%	25,6%
Master's degree							
Count	35	18	23	26	8	1	111
% within criteria	44.9%	58.1%	60.5%	65.0%	50.0%	25.0%	53,6%
PhD							
Count	7	3	3	7	2	0	22
% within criteria	9.0%	9.7%	7.9%	17.5%	12.5%	0.0%	10,6%
Total							
Count	78	31	38	40	16	4	207
% within criteria	100,0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 8: Pearson's Chi-squared test and Monte Carlo significance

Statistical tests	Value	df	Asymptotic Significance (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Significance	99% Confidence interval		Signifi-cance	99% Confidence interval	
					Lower bound	Upper bound		Lower bound	Upper bound
Pearson Chi-square	29.410[a]	15	0.014	0.018[b]	0.014	0.021			
Likelihood ratio	30.991	15	0.009	0.014[b]	0.011	0.017			
Fisher's exact test	25.894			0.020[b]	0.016	0.024			
Linear-by-linear association	4.061[c]	1	0.044	0.049[b]	0.044	0.055	0.025[b]	0.021	0.029
N of valid cases	207								

a. 13 cells (54.2%) have expected count<5. The minimum expected count is 0.41. b. Based on 10,000 sampled tables with starting seed 221,623,949. c. The standardized statistic is 2.015

Table 9: Phi and Cramer's V

Association measure	Value	Approximate significance	Monte Carlo significance		
			Significance	99% Confidence interval	
				Lower bound	Upper bound
Phi	0.377	0.014	0.018[c]	0.014	0.021
Cramer's V	0.218	0.014	0.018[c]	0.014	0.021
N of Valid Cases	207				

c. Based on 10,000 sampled tables with starting seed 221,623,949

5. DISCUSSION

The household consumers from the urban area of Romania and with a high level of education have the following main criteria when choosing an energy supplier: lowest price (38%), followed by the relationship with the supplier (19%) and the trustworthiness and the reputation of the supplier (18%). According to the existing literature, the requirement from the companies involved in the energy field is to invest in becoming more flexible. This also means adapting to the requirements of the consumers.

This first result of the research can represent a guidance for the business sector in adapting their business models according to the expectations of the consumers in order to remain or become competitive. Also according to the existing literature, the intervention of the government is required in order to address environmental problems and also to facilitate a transition to green economy. When designing a policy, the above results regarding the criteria of the consumers can become a starting point of the appropriate policies to be implemented.

The first hypothesis of the research considered the willingness of the household consumers to pay additionally for green energy in correlation to the average net monthly income, assuming that while the income level increases, the more a consumer would be willing to pay additionally for a process such as the transition to a green economy. But, as the literature indicates, income measures can show a positive effect on renewable energy consumption for developed countries, but not for developing countries, such as Romania. Therefore, although raising the living standard and encouraging economic development are important aspects and are also a part of the Sustainable Development Goals of the United Nations, the simple increase of the income of consumers will not guarantee their willingness to pay additionally for renewable energy. This result is especially important and must be considered in designing a policy for transitioning to a green economy, as further aspects must be considered above the classical income-based indicators, such as economic development or GDP per capita.

The second research hypothesis is related to an assumption already discussed in the previous studies, namely that the education level has a positive effect on economic growth and also green growth. In the present research, a correlation was identified between the education level of the respondents and their criteria when choosing an energy supplier. Therefore, when designing policies for transitioning to a green economy, the factor which should be considered is the consumers' level of education.

6. CONCLUSION

Although some consumers from the urban area of Romania are financially capable of paying additionally for green energy, they will not do so unless they are given appropriate information about the importance of addressing environmental issues and about the process of transitioning towards a green economy and also which is the role of the household consumer in this transition.

In conclusion, we reiterate the importance of considering the household consumers and the general population a partner and an active player in the transition to a green economy, in order for this process to be successful and efficient.

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