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THOUGHTS ABOUT THE CLEAR ENERGY

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The life of humanity has become faster in the 20th century. Due to globalization technology has improved a great deal, every decade had its own revolutionary invention. However, globalization has its drawbacks as well, which have an impact on every field of life. These challenges must be met by humanity. One of these global challenges is the energy crisis and energy dependency.

In the last decade a research involving experts was carried out which ranked the challenges humanity faces. The problems analysed involved such key fields as education or discrimination. According to the findings the highest ranked issue is energy supply, which means, according to experts, this is the most crucial problem for what we need a solution.

In this research we introduce how university students look at alternative energy sources. The findings are compared to the results of two previously carried out researches. Providing information about alternative energy sources is an excellent solution to change attitudes and such a change is absolutely necessary since the students of one of our most reputable universities, the Corvinus University of Budapest, have much less knowledge of the topic than the desireable level.

Making up for the shortcomings is an extremely important task as it is required for a social cooperation which is needed in order to solve humanity's most important problem in the 21st century, the energy crisis.

Keywords: association, attitudes, energy sources, knowledge

The aim of the survey

If we want every layer of society to cooperate for success we need society to believe in alternative energy sources and acquire the basic knowledge related to it.

A longitudinal study was carried out in 2006 and 2009, the topic of which was residential attitude to alternative energy sources. The two surveys touched upon basic knowledge of these sources as well.

The findings of the 2006 study can be found in the 4th edition, 2006 of Marketing & Management (henceforth the 2006 research) , while the results of the 2009 study were published in the 1st edition, 2010 of Gazdálkodás (henceforth the 2009 research). Analysing these results we have come to the conclusion that it would be important to carry out a residential attitude survey in 2010 [1].

In this study we present the findings of a research whose topics match those of the aforementioned two researches. Our main aim was to compare the longitudinal study to our findings, which is the reason why we put similar questions similar to the mentioned study.

Research methodology

The residential attitude research was carried out in the form of a survey. We used the PAPI method. No interviewer was used in the process, the interviewees worked individually. The target group involved day students of the Corvinus University of Budapest who attended the 2010/2011 autumn term. The research was carried out from the 20th December to the 23rd in 2010 and also during the last five days of the year. The forms were filled in two buildings of the Pest campus which belongs to the university.

296 of the 314 handed out forms were processed for the research. The students' willingness to answer were variant, but all things considered three out of five perople agreed to fill in the forms. The sample of approximately 300 people is larger than the sample of the 2009 research. Let's suppose that the population can be divided into three groups concerning their knowledge. We believe we can assume that the students of the Corvinus University of Budapest are better informed than the average since a proportion of these students already have a degree of higher education, which makes them more well-informed and gives them better accessibility to information. This better situation is important because if we categorise the interviewees of the 2009 attitude research based on their own information about the subject and we suppose that the distribution of the participants of this research in north Hungary is uniform, we get about the same proportion of interviewees who are better informed than the average as in my research (~267 people).

During the planning stage we found it important to represent the sex ratio as well as we can in the sample. We acquired the student list of the campus that contains

their sex distribution and we used it as a pattern to be followed during the analysis of my research. The data were collected in October, 2010, so they were relevant to our research. The data base contains the sex distribution in every faculty. This two dimensional data base made it possible for us to carry out a survey which is representative regarding qualification also since the ratios of the total population and the sample differed by a maximum of 7%.

The findings of the research

„Association"

One of the methods of attitude research is "free association" In the survey we were interested in the interviewed young adults' associations with the term "alternative energy sources". The 2009 research contained an association-related question and the findings were published by the authors. This question is the same as in the 2010 research, with the exception of a methodological difference. We asked the interviewees to write down the first maximum three words that come into their minds when they hear the words "alternative energy sources". The question was open, there were no predefined answers were given, but for the sake of simplicity and better comparability we coded these answers as *numeric values* and not as *strings* in the data base. During the coding phase the "mentioned it" category was treated loosely (e.g. economization ~ cheap).

We put every category that was present in the 2009 research in our database and we broadened the scale with expressions frequently mentioned by the students. The first ten variables were crucially important because they made findings of the two researches comparable. The following diagram shows the proportion of the answers the interviewees mentioned in both researches.

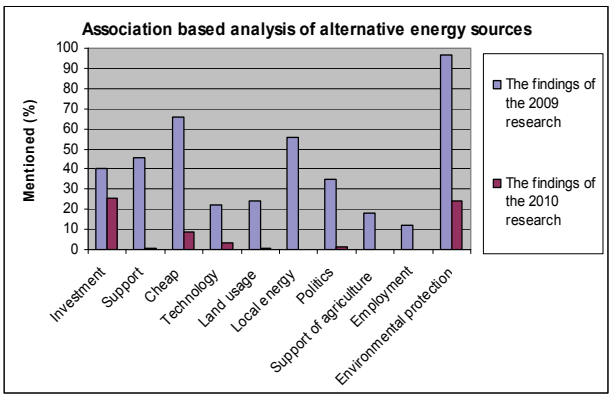

Figure 1: Association based analysis of alternative energy sources

The diagram clearly shows that the 2009 research in North Hungary has different findings from ours. Every category of the x-axis is a motivation factor (cheap) or an expression that makes the alternative energy source well-known (agricultural support). Investment is the only category where my findings are near the 2009 data. The findings for the rest of the categories are shown in the following diagram.

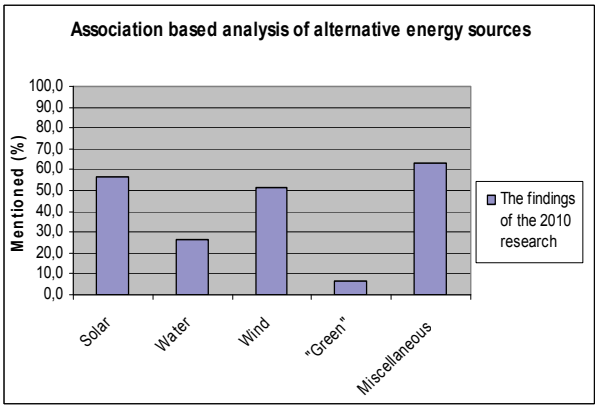

Figure 2: Association based analysis of alternative energy sources

The interviewees mentioned the words or expressions in *Fig. 2* apart from the categories in *Fig. 1*. It is clear that the most frequently mentioned expressions are types of alternative energy sources. The most frequently mentioned alternative energy sources in the "miscellaneous" category are geothermic energy and biomass. The conclusion we can draw based on the above mentioned is that the interviewees associate the term with different types of sources rather than factors that promote their more widespread use.

Factors promoting the widespread use of alternative energy sources

In order to make alternative energy sources more widespread several conditions, which we tried to analyse, have to be met. We took ten factors to be analysed, which can be categorised into three groups:

- Factors related to the environment
  - Economic environment
  - Legal background
  - Political background
  - Financial support system
- Factors related to the economy
  - Willingness to invest
  - Sense of responsibility
  - Lack of profit orientation
- Factors related to society
  - Trust among members of the society
  - Conventional practices of the individuals
  - Cultural standards of the individuals

We believe that the above mentioned ten factors are not enough for a complex attitude analysis, so we also analysed how the youth look at the present Hungarian situation considering factors, which are important for them. Both of the questions could be answered on a scale of five. In terms of importance meant that the interviewee did not consider the factor important at all while 5 meant „very important". The more important the

factor was considered, the higher number the interviewee chose. The results are shown in the following chart.

Table 1: The opinion of university students considering a few factors and the present Hungarian situation

Factor	Judgement on importance		The present situation in Hungary	
	Average	Deviation	Average	Deviation
Willingness to invest	4.51	0.694	2.78	1.065
Confidence among the members of society	3.72	1.127	2.43	1.011
Conventional practices of the individuals	3.39	1.167	2.73	1.080
Cultural standards of the individuals	3.61	1.043	2.07	0.955
Sense of responsibility	4.34	0.904	2.67	1.064
Economic environment	4.35	0.824	2.83	1.046
Legal background	3.88	1.007	3.14	1.014
Political background	4.01	1.028	2.73	1.078
Lack of profit orientation	3.35	1.171	2.58	1.087
Financial support system	4.49	1.538	2.88	1.084

As the chart shows we managed to choose factors that most of the interviewees considered important. However, taking the deviation into account we could define that there is a big difference in opinion among the interviewees. Based on the answers some factors have primary importance, while others are considered secondary. In order to make the following results more illustrative we have created a deviation diagram as well.

Figure 3: The attitudes of students

It is clear that there is no factor in the upper right quadrant, which means that none of them are considered important or that they are not satisfied with them. It is essential to recognise the most important factors required to make renewable energy sources more widespread. With this knowledge the given factor should move from the bottom left quadrant to the upper right. It is also clear that, with the exception of a few factors, three groups of these factors move together. The interviewees have already realised the importance of the global environment-related factors, namely the economic environment, the financial support system and the political background, but they feel that the present situation is unsatisfactory. The legal background is considered an exception in this group since most of the interviewees found it satisfactory. The enterprise-related factors are in the bottom right, while the environment-related factors are in the bottom left quadrant. The only factor that the interviewees have not found important, is the companies' lack of profit orientation. The less positive image we got was in the case of society-related factors – the only factor the interviewees found important was the sense of responsibility. However it is possible that many considered this factor to belong to the group of enterprise-related factors and that is the reason why they attached great importance to it. The purely society-related factors are presently not considered important, although they are not negligible since both enterprises and the state consist of individuals.

The demographic variables used during the analysis had no significant effect on the results. There was only one difference in terms of classification based on sex and location. With respect to sex, men generally place politics into the bottom right quadrant while women place it into the bottom left. The position of the legal background in the diagram is much more diverse in the case of men – it falls closer to the bottom left quadrant.

In terms of location the greatest difference was caused by the fact that the "financial support system" factor was close to the optimal top right quadrant in the case of countryside residents. However, Budapest residents are not so optimistic about presently available financial support. In terms of "legal background" the answers of Budapest residents are much more diverse – the results based on the answers are close to every quadrant, while in the case of countryside residents the results fall into the upper left quadrant.

All things considered we've come to the conclusion that according to the students' opinion the state is the only macro-economic actor that promotes the spread of alternative energy sources. The administration tries to discourage the private sector (households and enterprises) from using fossil energy sources. The enterprises are adapting business characteristics that support the spread of alternative energy sources, but this change of attitude is yet to come in households.

Setting up plants producing alternative energy sources

In our research we were also interested in the attitude of Corvinus University students towards the setting up a plant that produces alternative energy sources. 70% of the respondents thought that setting up such a plant would be beneficial both from a financial and an environmental point of view. Another quarter of the respondents believed that their settlement would benefit either financially or environmentally from the setting up of such a plant. A mere five percent found the setting-up indifferent or harmful. Based on the distribution of the answers we can claim that the interviewees find it beneficial to set up plants using renewable energy sources.

However, a positive attitude is not enough to carry out such a project since its operation is expensive and it requires a lot of work. As a consequence it was necessary to put the following question concerning attitudes. The question concerned whether the interviewee would support the setting up of a plant producing alternative energy.

Almost fifty percent of the respondents would support the setting up of a plant only if it required no contribution

from them. Almost 70% of these students admitted the financial and environmental importance of such a plant in one of the previous questions. 30% of the respondents recognise the importance of the plant but they are not willing or able to contribute either by offering labour or financial support. One out of four students would support the setting up of the plant with a further 25% contributing their own work. Only 2% declared their unwillingness to contribute to the setting up in any way. Comparing the two researches we concluded that the respondents of the 2006 research had more negative attitudes since the rate of those who didn't support the setting up of the plant was higher.

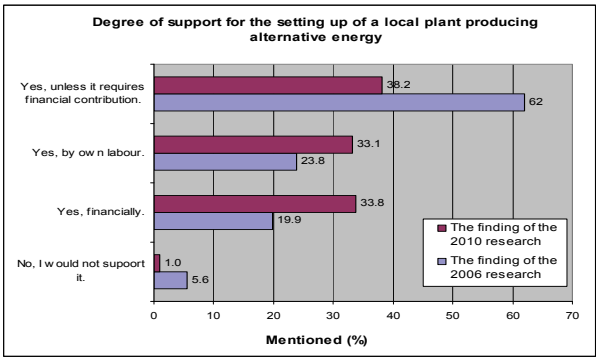

Figure 4: Degree of setting up of a local plant producing alternative energy

Fossil - nuclear - renewable energy sources

Beside an attitude analysis the well-informedness of the respondents is also an important factor. We asked the students of the Pest campus what they thought of the proportion of nuclear, fossil and renewable energy in Hungary in 2009.

With the evaluation of the answers we took into account the publication called KSH Statisztikai tükör (The statistical mirror) [2] and a register provided by Éva Richter (the information manager of Energia Központ Nonprofit Kft.). [3] Based on the two sources we came to the conclusion that the mentioned three types are in the following distribution: fossil energy sources: ~80%, nuclear energy sources: ~14% and renewable energy sources: ~6%.

Of all the 296 interviewed students only a single one knew, or guessed correctly, the correct distribution. The average of the estimations was 52.15% with fossil energy sources, 36.66% with nuclear energy sources, while 11.21% with renewable energy sources. This means that the respondents greatly underestimated the proportion of traditional energy sources while "overpositioning" nuclear energy sources.

All things considered we believe that this question has properly shown the students' lack of information even though we supposed that university students are more well-informed than the average.

Knowledge of alternative energy sources

During the survey we were also interested in the well-informedness of students regarding different types of alternative energy sources. These questions in my research regarding well-informedness were also present in the 2006 and 2009 research. We'll compare the findings published in 2010 to the findings of our results. We asked the respondents to name alternative energy sources that they had heard of. No alternatives were provided here, it was an open question. When evaluating the answers we only took those answers into account which were present in the 2009 research in order to ensure comparability. The following diagram shows the results of the mentioned categories in the 2009 and our research.

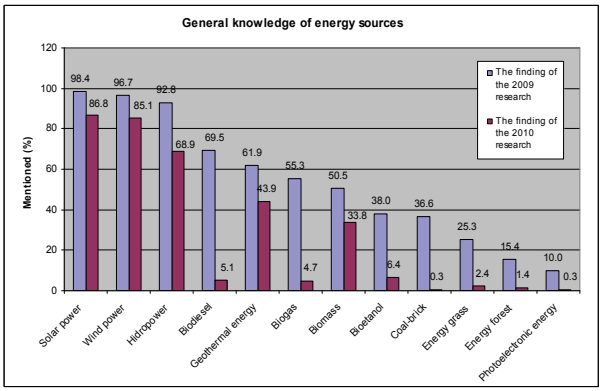

Figure 5: General knowledge of energy sources

The results of the two researches clearly differ. The rate of references in the case of all alternative energy sources was higher in the 2009 research. The smallest difference can be seen in the case of solar power and wind power (~10–15%). With regards to biomass and geothermic energy this difference is medium (~30–35%). The energy sources we have not put into any of these groups show great difference in terms of how well-known they are. The findings of the two researches differ so much that the t-test of the two samples showed significant difference in both cases, which means that the difference is not coincidental. We also performed an analysis with using several divisions (male-female, secondary qualification - higher education qualification, Pest-countryside), but found no significant difference.

The other question regarding knowledge aims to show how well the respondents know the respective energy sources. During the research we also wanted to know those energy sources that the students have some basic knowledge of. Since the previous question was an open question, the respondents could only choose from the answers they had given to the previous question. The following diagram shows the rate of how well the respondents knew the energy sources during the 2009 and the 2010 survey.

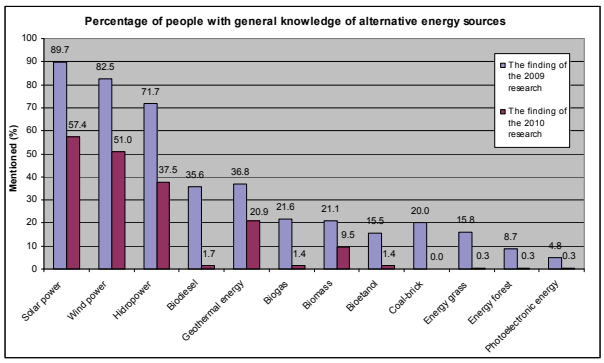

Figure 6: Percentage of people with general knowledge of alternative energy sources

The diagram above shows similarly big differences. The most extreme figure is represented by the coal-brick, where the difference between the two studies is 100%. The smallest difference -30% - is represented by those energy sources which showed similar results in the previous diagram.

Conclusions

During the research the main aim was to give a comprehensive overview of the knowledge and attitude of Budapest Corvinus University students concerning alternative energy sources.

The findings of researches show significant differences. The 2006 and 2009 research assumes a higher knowledge and more positive attitude. In terms of attitude fewer than expected respondents claimed that they would only support the setting up of a plant if they didn't have to contribute but this answer was still the most common. We believe that, during the year that passed between the two researches, the respondents' attitude could have changed enough to explain most of the differences between the findings. Based on our research however, the attitude towards alternative energy sources is rather neutral than positive. This claim is supported by those two questions that showed that the respondents recognise the advantages of such plants but they are unwilling to support its setting up either financially or by offering labour.

According to the students' views the spread of alternative energy sources nowadays is supported by the state. The social factors are the furthest behind, which leads me to the conclusion that society is not yet motivated enough to promote the spread of alternative energy sources and not open enough to tolerate the attitude, which required for them. If we accept the condition that university students are more informed than the average, a question arises: Is it possible that an information-wise homogenous group, the students of Corvinus University, do not reach the level of well-informed group, that the information-wise heterogeneous residents of North Hungary do? Another question is: Is such a difference in knowledge between regions plausible?

Possible explanations to the differences

This research has shown that the findings published by Domán - Fodor - Tamus and our research differ greatly. There is more than one reason for these differences.

One of the most important differences is the total population of the two researches, which might have caused this contrast. The 2009 and the 2006 research samples were taken from the residents of seven different counties (Heves, Jász-Nagykun-Szolnok, Borsod-Abaúj-Zemplén, Nógrád, Pest, Szabolcs-Szatmár-Bereg and Hajdú-Bihar counties) while in our research the samples were taken from the relatively small group of students attending the Corvinus University of Budapest. Another reason might be the fact that the authors of the 2009 research interviewed 0.02% of the total population [4, 5], while in our research 296 people represented 10 000, which means that we interviewed a greater proportion of the total population. The fact that neither of the samples were bigger than 1000 people might be another reason for the differences. The size of the sample is important because in smaller samples people with more radical views get more emphasis (outliers) than in samples of over 1000 people.

Another source of the contrasts can drive from differences in methodology. According to the authors the interviews were oral and took place in the homes of the respondents, while in our research the interview was written and voluntary at Corvinus University. The authors of the 2009 research did not indicate the methodology used by the research assistants, which can also explain some of the differences. If we read the questions related to association or knowledge the explanation is even more relevant. It is assumable that fewer people would mention energy sources when open questions are used than with predefined answers. If the 2009 research had used open questions we can't explain the differences by a difference in methodology.

We have mentioned the homogeneity of the respondents as the third option. It is possible that a proportion of Corvinus University students are not more well-informed than the average or interviewees with higher knowledge were overrepresented in the 2009 research. Both explanation can be valid, they do not exclude each other.

Finally, the most obvious cause of the difference can be caused by the fact that the contrasts regarding attitudes and knowledge are real. In this case we have to draw the conclusion that a part of the higher layer of our future society do not have as much knowledge concerning alternative energy sources as an average resident of North Hungary.

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