Environmental Knowledge and Willingness to Change Personal Behavior: An American-Austrian Comparison of Energy Use.

Claudia Kitzmüller, University of Salzburg

The increase of world population and the push of industrialization in developing countries are significant reasons for the steadily growing demand for energy and natural resources. Thus ecological problems are emerging. These problems – such as the greenhouse effect – increase every year, every month, and even every day, and threaten to damage the world permanently. The average person knows the consequences but is in denial about the permanent damage. Even though we know that the burning of fossil fuels causes carbon dioxide emissions, which releases greenhouse gases and in turn leads to global warming, people do not avoid fossil energy sources, like oil, coal, or gas. How can we, as a global community, persuade ourselves, however, that renewable energy sources, such as wind, water, biomass, and sun, should become the commonly used and preferred energy sources? The present study investigates these basic conditions, which are needed to act in a more pro-environmental way.

Fietkau-Kessel grid model

The willingness of the world population as well as the availability of incentives to use alternatives are necessary fulfillments to cope with the ecological crisis. If one of these factors is missing, there will be no chance to make a long-term-change. Fietkau and Kessel (1981) explained in their model factors which are necessary and have a significant influence on pro-environmental behavior.

If we want to create pro-environmental behavior, we will have to define the term first. Kollumuss & Agyeman (2002) described “pro-environmental behavior” as “behavior that consciously seeks to minimize the negative impact of one’s actions on the natural and built world (e.g. minimize resource and energy consumption, use of non-toxic substances, reduce waste production)” (p. 240).

After defining the construct, we want to reach, we can search for factors which lead to pro-environmental behavior. There are already studies which

incorporated the model of Fietkau and Kessel (1981) for finding strategies and starting points to change the behavior of individuals.

Description of the model of Fietkau and Kessel (1981)

The model of Fietkau and Kessel (1981) was very useful in the present study because it was directly applicable to the field of environmental awareness. Although the model is no image of the reality (Schahn & Giesinger, 1993), it includes the most important factors to change or affect individuals' behavior. While there are always different influencing variables, this model concentrates on the main factors, which lead to environmentally relevant behavior. Every society (e.g. different countries, cultures) can include its own, special influencing points and make it work for them.

Pro-environmental behavior can be evidenced through sociological and psychological factors (Fietkau & Kessel, 1981). Kollumuss and Agyemann (2002) have established that these are variables which have a direct or indirect influence on pro-environmental behavior; furthermore, these sociological and psychological factors are usually unrelated. It is possible to influence and/or change these variables.

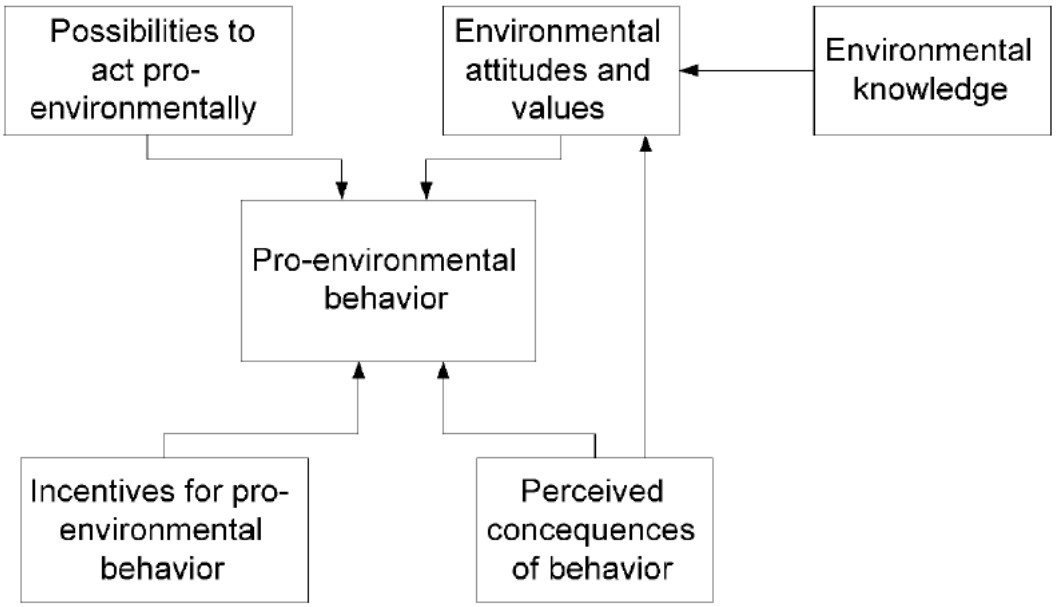

Figure 1. Model of ecological behavior by Fietkau and Kessel, 1981. (Kollumuss & Agyeman, 2002).

Figure 1. shows an English translated version of the model of Fietkau and Kessel from Kollumuss and Agyeman (2002, p. 246). The first factor is "Environmental Knowledge," which influences pro-environmental behavior in an indirect way. The task of "Knowledge" is to affect the factor "Environmental Attitudes and Values" and this leads to positive or negative environmental behavior. With the factor "Possibilities to Act Pro-Environmentally," Fietkau & Kessel described aspects that are external, infrastructural and economic, and ones that are a barrier for people. If there is no bus or any other public transportation available, people will have to take their own car to go to work or shopping. Also internal factors, such as social desirability, quality of life or monetary savings, can lead to or increase pro-environmental behavior, as illustrated by "Incentives for Pro-Environmental Behavior". The last factor of Fietkau and Kessel's model is "Perceived Consequences of Behavior". To encourage a target behavior, positive feedback is very useful. The feedback can be targeted on intrinsic – e.g. satisfaction of 'doing the right thing' – or extrinsic – e.g. social: recycling is a socially undesirable action; and economic: receiving money for collected bottles – motivation (Kollumuss & Agyeman, 2002).

Previous results

The five variables of the Fietkau-Kessel model are used in different studies concerning environmental problems. From the results of previous research we can develop new ideas and strategies to improve pro-environmental behavior.

The variable "Knowledge" is often used in campaigns to improve environmental awareness or behavior. The model of Fietkau and Kessel, however, reports that knowledge has no direct influence. Knowledge works as a moderator between attitudes and values and pro-environmental behavior. According to Schahn and Giesinger (1993), although there is no direct influence of knowledge, it is a necessary variable because pro-environmental action is only possible if people know what they can or could do. Without this knowledge, there will be no chance to act in an environmentally friendly way.

"Incentives'" "Availability," and "Positive Feedback" are also important starting points to develop environmentally relevant behavior. Despite this fact, public

relations and campaigns often concentrate on knowledge and ignore that there are other potentially affective factors.

Schahn and Giesinger (1993) applied the Fietkau-Kessel-grid-model to different environmental problems. Furthermore, they gave an example of how it can be used in public relations. They also suggested implementing all five variables of the Fietkau and Kessel model in intervention programs.

In this study I tried to embed the previous research results in my investigated hypothesis and support, complement, or renew the findings of the previous research.

Transfer to the present study

The current investigation follows the suggestions of Schahn and Giesinger (1993) that it is important to include all five variables of the model of Fietkau and Kessel. Therefore, I tried to investigate, using a multidimensional survey, the factors which have an effect on people's environmental awareness.

The advantage of using the model of Fietkau and Kessel (1981) was that it is directly applicable to the field of environmental studies.

In the present study the five variables of the model of Fietkau and Kessel (1981) are called "Environmental Knowledge," "Personal Motivation," "Availability of Alternatives," "Incentives to use Alternatives," and "Positive Feedback," as shown in Figure 2. The names of the variables have been alerted for the purpose of the study.

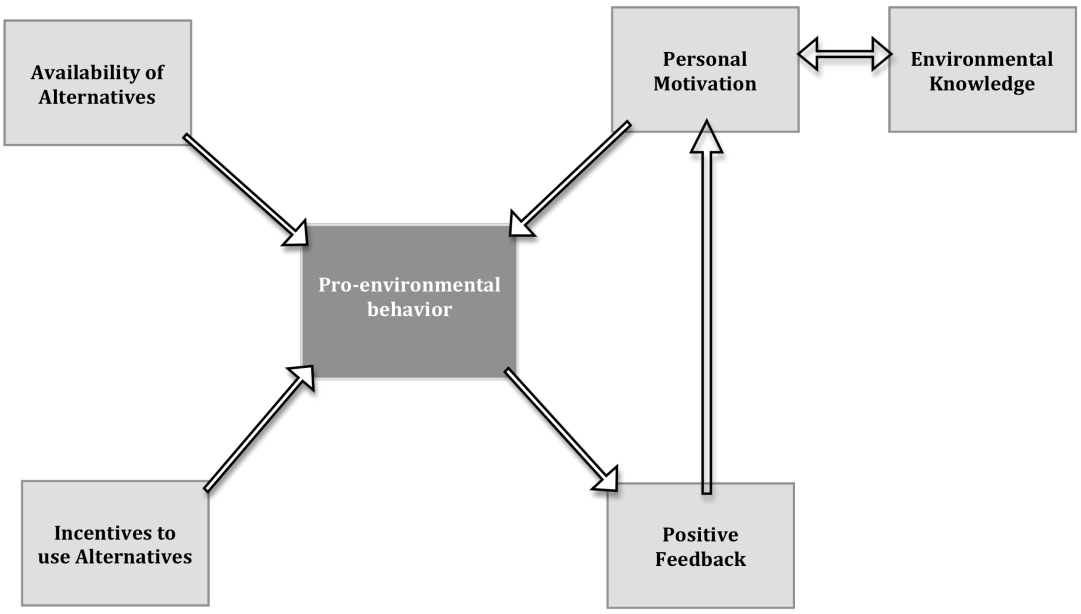

Figure 2. Application of the model of Fietkau and Kessel (1981) to the present study.

Energy and electricity as special resources

The abstract construct of electricity and energy is often tiresome, confusing, boring, or even minatorial, as Keul (2009) in his lecture of "Introduction in Environmental Psychology" stated. Moreover, he declared that personal experiences and abstract-scientific descriptions – from chemistry, physics, economy, or politics – cannot be integrated with the concept of energy. People use a "fuzzy logic" to speak about energy. For example, when cooking eggs words like "cold," "hard," "right," "cooked too long," etc. are used.

Most of the concepts and constructs related to energy and electricity are completely incomprehensible for non-professionals. Only specialists can understand the science of electrodynamics. Non-specialists use a mental model in which they think that electricity comes directly out of the pipe (Keul, 2009). In reality, there is no flow of substance. When individuals order or buy electricity in the form of alternating current, the electrons oscillate, but there is no flow of substance from the electricity provider to the consumer (Keul, 2009).

As electricity is an abstract resource which cannot be described, seen, or even directly felt, it is complicated to understand this construct or to notice it consciously.

Frey, Stahlberg, and Wortmann (1990) explained that people save more energy when getting feedback about their consumption. If individuals get regular feedback about their usage of energy, they will have a better feeling for the source "electricity" and therefore, understand its implication. Also financial incentives build a way to heighten people's awareness of saving energy (Frey et al., 1990).

Cross cultural studies: Position of Austria and America

The reason this study concentrates especially on the two countries Austria and America is that, according to previous studies, they seem to be very different. However, the data of the two countries can complement one another.

The difference between America and Austria is documented in the Environmental Sustainability Index (ESI) 2008. The ESI 2008 reported that Austria comes in the sixth place and the United States ranked behind in the 39th position (Esty, Levy, Kim, de Sherbinin, Srebotnjak & Mara, 2008). The reason for the poor performance of the United States was due to in the unfavorable results in climate change and air pollution (Esty et al., 2008).

Not only the ESI 2008, but also the Ecosystem Wellbeing Index (EWI) shows the difference between Austria and America. The EWI demonstrates that Austria reached the eighth best position among 40 countries and America was situated somewhere in the last ranks. Prescott-Allen (2001) report that the "Ecosystem Wellbeing Index (EWI) is the average of indices of land, water, air, species and genes, and resource use, or average of indices of land, water, air, and species and genes, whichever is lower" (p. 59).

Reasons for the present study, Hypotheses, Research questions

In general, this study should demonstrate the status quo in Bowling Green, Ohio, and identify variables, throughout the Fietkau-Kessel model, for citizens of Bowling Green to establish their pro-environmental behavior.

Furthermore, I wanted to investigate the environmental knowledge and behavior of Americans compared to Austrians in the field of energy consumption.

In order to make a pilot comparison study between Austria and the United States, a measurement instrument is needed which uses the same items in both countries. Thereby I drew questions from Keul and Biermayr (2005), who conducted an environment-and-energy-study in Austria. Further questions are developed to suite the conditions and circumstances of people from Bowling Green, Ohio.

After giving an overview about the actual environmental situation of Bowling Green's citizens, as reflected in the data collection, the following hypotheses are investigated:

Hypothesis # 1:
In the US, individuals who are members of a conservation or environmental group show

a) higher environmental knowledge
b) more pro-environmental behavior (green product use, energy saving, green energy use)

than non-members.

Hypothesis # 2:
In the US, women show

a) higher environmental knowledge
b) more pro-environmental behavior (green product use, energy saving, green energy use)

than men.

Hypothesis # 3:
In the US, older people show

a) higher environmental knowledge
b) more pro-environmental behavior (green product use, energy saving, green energy use)

than younger individuals.

Hypothesis # 4:
In the US, individuals with a higher educational level show

a) higher environmental knowledge,
b) more pro-environmental behavior (green product use, energy saving, green energy use)

than individuals with a lower level in education.

Hypothesis # 5:

Austrian and American electricity users more often change their cell phone providers than their electricity suppliers.

Hypothesis # 6:

In self-description, the American population is

a) less environmentally careful (behavior),
b) less environmentally informed (knowledge)

than the Austrian population.

METHODS

Participants

Survey data using a thematic questionnaire presented to 70 persons of America's general population and 30 University students was collected. The investigation includes an equal distribution between gender, and the age groups range from 18 to 72 years. All subjects had to be citizens of the U.S.A.

Procedure

The study was conducted in Bowling Green, Ohio, from January to March 2009, using a multi-thematic questionnaire. Surveys were distributed on the campus of the Bowling Green State University and in the city of Bowling Green.

Results for the Austrian population are drawn from Keul and Biermayr's work (2005).

Design/Material

Two sources were used for developing the items for a multi-thematic questionnaire. First, questions were generated by following the Fietkau & Kessel model to find factors that help to improve environmental awareness and behavior. Second, questions were also drawn from the research of Keul and Biermayr (2005) in their study about energy consumption in Austria. With these questions comparisons regarding knowledge or specific behavioral settings between people from Austria and citizens from Bowling Green, Ohio, could be made.

The five variables drawn from the Fietkau-Kessel model are listed below. To make the content of these variables more clear, examples are given:

- Environmental Knowledge (WI): “Which power supply voltage has your household?”
- Personal Motivation (MT): “I buy organic products even if they are more expensive.”
- Positive Feedback (FF): “Renewable (green) electricity would interest me if I knew more about its positive environmental consequences.”
- Incentives to use Alternatives (VR): “I would be interested in renewable (green) electricity if offered a bonus or gift (e.g. a free online electricity meter).”
- Availability of Alternatives (VA): “I would like to know a homepage which offers prices and companies of renewable (green) electricity.”

Other variables used in the questionnaire were “Self-reported Behavior” and “Contrast Behavior.” Following are examples for these two variables:

- Self-reported Behavior (VS): “To save energy in the heating season, I reduce room temperature at night and when nobody is at home.”
- Contrast Behavior (VG): “Do you have a mobile phone?”

The last part of the survey was a section about demographical data, such as gender, age, education, or type of living. Generally, the participants had to fill out 49 questions, including 8 demographical statements.

RESULTS AND DISCUSSION

The following chapter provides a summary of the results. On the basis of connecting results of relevant items, the hypothesis can be proven true or false. The status quo of Bowling Green citizens is demonstrated and afterwards compared with the Austrian results from Keul and Biermayr (2005).

Environmental Knowledge (WI)

The variable "Environmental Knowledge" should be an indicator for the knowledge people in Bowling Green have regarding environmental issues. Questions about power supply voltage, electricity prices, and energy consumption were asked.

On the basis of giving away one point for each correct answer and summation of all of the ten variables, a "Knowledge score" was built. The "Knowledge score" has a mean of 4.36 (SD=1.96), dispersed from 0 to 8 total points (maximum points=10), and shows a lightly right-skewed distribution. There are 23 persons who only reached points between 0 and 2 on the knowledge score scale, which means that they show a very weak environmental knowledge. However, just one of the 100 subjects had zero points. Nevertheless, 12 participants achieved 7 to 10 total points; thus they showed an excellent environmental knowledge. In between, with a moderate knowledge of 3 to 6 points, lie 65 people.

A Chi-Square test proved that gender is equally distributed in each category of the "Knowledge score." The results showed a $\chi^2(8)=4.524$, $p>.05$, which means that the amount of men and women is equal for each number of points reached in the "Knowledge score." Moreover, the "Knowledge score" does not demonstrate any correlation with age (Kendall's Tau). However, there is a correlation between the "Knowledge score" and the education (Kendall's Tau, $r=-.177$, $p<.05$). This means, the higher the educational level, the lower the score of environmental knowledge. The number of people who are or who are not members of an environmental/protection group is equally distributed between the "Knowledge score"-scale (Chi-square test: $\chi^2(8)=13.209$, $p>.05$). This means that there is no difference between members and non-members of an environmental/protection group regarding their "Environmental Knowledge."

The assumption of hypothesis # 2 a that women show higher environmental knowledge than men, cannot be supported with the selected data. There is also no support for hypothesis # 3 a, which assumed that age is associated with environmental knowledge. This means that older people are as much informed about environmental and energy topics as younger people. These results support Haron, Paim & Yahaya

(2005) who also did not find a relationship between knowledge and gender, as well as knowledge and age.

The significant correlation between educational level and environmental knowledge verifies hypothesis # 4 a and supports the findings of Schahn & Giesinger (1993) and Keul and Biermayr (2005). As there is a correlation between education and knowledge, there must be the possibility to influence people's opinions in school. Environmental knowledge is mediated by school education. Thus, school is an important factor to develop and improve environmental knowledge.

Although educational level is an essential factor for higher environmental knowledge, surprisingly, membership of an environmental group does not correlate with environmental knowledge. Therefore, the knowledge about environment develops regardless of the affiliation to an environmental or conservation group. Thus, no support for hypothesis # 1 a, which was deducted from the findings by Haron et al. (2005), could be found.

Comparison between the "Knowledge score" of Austrians and the "Knowledge score" of people from Bowling Green, Ohio

As the "Knowledge score" in the current study has the same maximum points to reach, both studies can be compared. On average, the "Knowledge score" of Austrians lies at 4.1 points, with a range of 0 to 10. The Americans gave answers from 0 to 9 and reached a mean of 4.36 points.

When comparing the means of the environmental knowledge scores of Americans and Austrians, the Americans on average reach a 0.26 points higher score than the Austrians. However, this slight difference cannot be applied in general. The standard deviation of the Americans is 1.96 points. In general, there is no significant difference between the American and the Austrian population about environmental and energy knowledge. Regarding these findings, hypothesis # 6 b ("In self-description, the American population is less environmentally informed (knowledge) than the Austrian population.") cannot be proven true.

Personal Motivation (MT)

Personal Motivation is another variable of the Fietkau-Kessel model (1981). It should show how motivated people already are to behave in a pro-environmental way.

On the basis of giving away one point for each correct answer and summation of all of the six variables, a "Personal Motivation score" was built. This score has a mean of 2.58 (SD=1.46), dispersed from 0 to 6 total points (maximum points=6), and shows a lightly left-skewed distribution. There are 26 persons who only reached points between 0 and 1 on the "Personal Motivation score"-scale, which means that they show a very weak environmental motivation. Out of the 100 participants, 13 persons achieved 5 to 6 total points; thus they showed an excellent personal motivation regarding energy and environment. In between, with a moderate knowledge of 2 to 4 points, lie 61 people.

A Chi-Square test proved that gender is equally distributed in each category of the "Personal Motivation score." The results showed a $\chi^2(6)=4.592$, $p>.05$, which means that the amount of men and women is equal for each number of points reached in the "Personal Motivation score." Moreover, the "Personal Motivation score" does not demonstrate any correlation with age and education (Kendall's Tau). The number of people who are or who are not members of an environmental/protection group is not equally distributed between the "Personal Motivation score"-scale (Chi-square test: $\chi^2(6)=63.836$, $p=.000$). This means that there is a difference between members and non-members of an environmental/protection group regarding their "Personal Motivation."

Generally, Bowling Green citizens do not show a very high "Personal Motivation Score." Also, the "Personal Motivation score" is independent of gender, age, and education. The only factor, which has a significant influence on personal motivation is "Membership of an environmental/protection group." Members of an environmental group show higher personal motivation than non-members because they are involved in different aid projects and get more regular information about the actual situation of diverse topics.

Positive Feedback (FF)

Like the other scores, the "Positive Feedback score" is also built through giving away one point for each correct answer and summation of all of the three variables.

The "Positive Feedback score" has a mean of 2.21 (SD=1.17), dispersed from 0 to 3 total points (maximum points=3), and shows a right-skewed distribution. There are 17 persons who only reached zero out of the maximum points of three. This means that these people do not really respond to positive feedback. Out of the 100 participants, 19 persons achieved 1 or 2 total points; thus these individuals are moderately affected by positive feedback. However, most of the respondents (64 persons) achieved the maximum number of points.

A Chi-Square test proved that gender is equally distributed in each category of the "Personal Feedback score." The results showed a $\chi^2(3)=.170$, $p>.05$. Moreover, the "Personal Feedback score" does not demonstrate any age and educational correlation (Kendall's Tau). The number of people who are or who are not members of an environmental/protection group is also equally distributed between the "Personal Feedback score"-scale (Chi-square test: $\chi^2(3)=3.556$, $p>.05$). This means that there is no difference between members and non-members of an environmental/protection group regarding their "Personal Feedback."

Frey et al. (1990) suggested using feedback for an inducement to save energy and electricity. As shown in the actual research findings of the current study, people are responsive to positive feedback. It is essential to know that "Positive Feedback" is independent of variables, like age, gender, education, and membership of an environmental group. This confirms that most of the people are responsive to "Positive Feedback," which means that positive feedback is diverse and multifaceted applicable. Astonishingly, no difference between members and non-members could be found regarding feedback.

Incentives to use Alternatives (VR)

The items about incentives to use alternatives are also developed regarding the Fietkau-Kessel model (1981) and include topics like toll-free phone lines, "green action day," and other incentives.

The “Incentives score” included three items. The subjects got one point for each positively judged answer. The “Incentives score” has a mean of 1.66 (SD=1.037) and is lightly right-skewed. The answers range from 0 to 3 points, with a maximum of 3 points. The majority of people reached a number of two total points at the “Incentives score.” Out of the 100 respondents, 26 reached the maximum number of three points, 28 individuals reached 1 point, and 16 people reached no point at all.

A Chi-Square test proved that gender is equally distributed in each category of the “Incentives score;” $\chi^2(3)=1.570$, $p>.05$. Furthermore, the score does not demonstrate any age or educational correlation (Kendall’s Tau). The number of people who are or who are not members of a protection group is not equally distributed between the “Incentives score”-scale; $\chi^2(3)=9.646$, $p=.022$. This means that members and non-members act differently when receiving incentives.

When looking at the “Incentives score,” no relationship with gender, age, and educational level could be found. However, there is a correlation with “Membership.” For further investigations it would be interesting to identify the role of incentives in being a member of an environmental group.

Availability of Alternatives (VA)

This factor should investigate whether individuals are more interested in green electricity when offered different alternatives.

An “Availability of Alternatives score” was built with a maximum of 3 points and a mean of 1.75 (SD=1.04). The distribution of total points among the respondents was as follows: 18 persons reached zero points, 16 persons reached 1 point, 39 persons reached 2 points, and the remaining 27 persons reached 3 points.

Further calculations proved that gender is equally distributed in each category of the “Availability of Alternatives score” ($\chi^2(3)=.564$, $p>.05$). Furthermore, the “Availability of Alternatives score” does not demonstrate any age or educational correlation (Kendall’s Tau). There is a significant difference between people who are and those who are not members of an environmental/protection group regarding their “Availability of Alternatives scores” (Chi-square test: $\chi^2(3)=19.141$, $p=.000$).

In summary, the score for “Availability of Alternatives” is rather high. Therefore, we can assume that it has a relatively positive effect on pro-environmental behavior. The score cannot be influenced by gender, age, or education. The only factor which has an influence on “Availability of Alternatives” is “Membership of an environmental group.” Probably, members of an environmental or protection group have more alternatives available. To this, however, more investigations must be made.

Self-reported Behavior (VS)

On the basis of giving away one point for each positively-judged answer and summation of these rather heterogeneous behavioral variables, a “Behavioral score” was built.

The “Behavioral score” has a mean of 2.97, dispersed from 1 to 6 total points (maximum points=6), and shows a lightly left-skewed distribution. There are 9 persons who only reached 1 point on the behavioral score scale, which means that they show a very weak environmental behavior. However, none of the 100 subjects had zero points. Nevertheless, 9 participants achieved 5 to 6 total points; thus they showed an excellent environmental behavior. In between, with a moderate behavior of 2 to 4 points, lie 82 people.

A Chi-Square test proved that gender is equally distributed in each category of the “Behavioral score” ($\chi^2(5)=5.35$, $p>.05$). This means that the amount of men and women is equal for each number of points reached in the “Behavioral score.” Moreover, the “Behavioral score” does not demonstrate any age or educational correlation (Kendall’s Tau). However, there is a correlation between membership of an environmental/protection group and the “Behavioral score” (Chi-square test: $\chi^2(5)=12.66$, $p<.05$).

The advantage of calculating a “Behavioral score” was to get a summary and an overview of the behavioral items. Results showed that most of the respondents have a moderate pro-environmental behavior. Moreover, the score allowed to make comparisons with gender, age, and education, which resulted in no relationship with the “Behavioral score.” Therefore, hypotheses # 2 b, # 3 b, and # 4 b cannot be proven true. These results argue against Schahn & Holzer (1990) who found a gender effect on “improved environmental attitudes and behaviors.” Thus, their assumption that

socialization plays an important role in developing environmental behavior cannot be supported with the results of this examination.

Conversely, a correlation could be found between the "Behavioral score" and membership of an environmental group. This confirms the assumption that members act more environmentally friendly than non-members regarding the use of electricity and energy (support of hypothesis # 1 b). I suggest offering free memberships in environmental groups. This would lead to higher integration of people in environmental and energy topics. Also, it would be an excellent idea to encourage the focus group "children" – e.g. information days in school – to join environmental groups.

Comparison between the "Behavioral score" of Austrians and the "Behavioral score" of people from Bowling Green, Ohio

When comparing the average "Behavioral score," the Austrians show a lower score (1.8 points) than the Americans (2.97 points). Furthermore, the Austrians reached points between 0 and 5 (Maximum= 6) and the Americans between 0 and 6.

This results argue against hypothesis # 6 a, where I assumed that Americans are less environmentally careful than Austrians. Thus, the stereotype that Americans act environmentally unfriendly cannot be confirmed. However, the sample of this study was composed of just a small part of people from America and cannot be generalized.

Although Austria is one of Europe's leading countries in using and advocating the use of green energy and offers different incentives (for example subsidies), no difference could be found in the current study. The stereotypes and (wrong) assumptions which postmark the Americans as the "environmental bad guys" may emerge from publications of different environmental comparison studies – such as the EWI or the ESI 2008.

Contrast Behavior (VG)

As I investigated people's habit of changing their electricity supplier, I wanted to have a contrast behavior to compare the likeliness of being stable versus

unstable. “Change of the mobile phone provider” was used as contrast behavior in this study.

The results show that more than half of the people who have a mobile phone (56%) have never changed their mobile phone provider so far. On the contrary, 31% have changed their provider once and 10% have changed several times.

Comparison: Change of cell phone provider and change of electricity provider

In the US, 5% of the subjects have changed their electricity provider so far. However, 41% have changed their cell phone provider in the past. The data of Keul and Biermayr (2005) shows that 42% of the 200 Austrian subjects have changed their electricity provider and 6.5% have changed their cell phone provider in the past.

Hypothesis # 5 can just be proven true for the population of Bowling Green, Ohio. In Bowling Green, people change their cell phone provider more often than their electricity provider. This result was less surprising because Bowling Green residents are not allowed to change the electricity provider. When looking at Austria, however, people do more often change the electricity supplier than the cell phone provider.

Correlations

In this section, the five factors of the Fietkau-Kessel-grid model are correlated separately with the “Environmental Behavior score.”

When correlating the “Knowledge score” and the “Behavioral score” no relationship could be found (Kendall’s tau, $p>.05$). When correlating the “Behavioral score” with the “Personal Motivation score”, a highly significant relationship could be found, $r=.204$, $p=.012$. Another correlation between the “Behavioral score” and the “Positive Feedback score” was calculated. However, no correlation could be found between these two factors. The correlation between “Behavioral score” and “Incentives score” did not show a significant result. When correlating the “Behavioral score” with the “Availability of Alternatives score,” no significant relationship could be found either.

To sum it up, the „Environmental knowledge score“ is not correlating with the „Behavioral score.“ However, there should be an indirect connection through “Personal Motivation”, as it is suggested in the Fietkau-Kessel grid model (1981). The necessity of “Environmental knowledge” was also explained by Schahn et al. (1993) who stated that environmental action will only be possible, if people know the opportunities which they can or could do. Without knowledge, no change can take place! The high significant relationship between the “Behavioral score” and the “Personal Motivation score” in the current study supports this assumption.

The other scores – Positive Feedback, Incentives, and Availability of Alternatives – do not show a significant correlation with the “Behavioral score.” This could be because of the low number of items for each score. Another explanation, which researchers, like Ellis & Gaskell (1978), Kohlenberg, Phillips & Proctor (1976), suggested is that one factor is not enough to influence the behavior; the combination of more factors can affect environmental behavior. As mentioned in the theoretical chapter above, Schahn et al. (1993) also recommended implementing all five variables of the Fietkau-Kessel-model in intervention programs.

Overview of the results of the demographical data

No gender or age effects could be found among all of the five factors of the Fietkau-Kessel model. Educational effects could be found among the factor “Environmental Knowledge.” The other factors do not show educational effects. “Personal Motivation,” “Availability of Alternatives,” and “Environmental Behavior” show differences regarding people who are members or who are not members of environmental groups.

Summary of the results of the hypotheses

The assumption in hypothesis # 1, that individuals who are members of a conservation or environmental group show higher environmental knowledge than non-members, cannot be supported through the results of the current study. However, it can be verified that there is a difference between members and non-members of an environmental/action group regarding their pro-environmental behavior (green product use, energy saving, green energy use etc.).

Both statements of hypothesis # 2 cannot be supported. This means that there is no difference between men and women concerning their environmental knowledge and pro-environmental behavior.

Also, hypothesis # 3, in which I assumed that in the US, older people show higher environmental knowledge and more pro-environmental behavior than younger people, cannot be supported through the found results.

In hypothesis # 4, I expected that in the US, individuals with a higher educational level show a) higher environmental knowledge and b) more pro-environmental behavior than individuals with a lower level in education. These assumptions cannot be supported either through the selected data.

The assumption, Austrian and American electricity users more often change their cell phone providers than their electricity suppliers, is appropriate just for the group of Americans. Surprisingly, Austrian people do more often change their electricity supplier than their cell phone provider.

Interesting results were also found for hypothesis # 6, in which I expected that the American population is a) less environmentally careful and b) less environmentally informed than the Austrian population. Here, both hypotheses cannot be supported.

CONCLUSION

Integration of results in the Fietkau-Kessel grid model

With the presented results, the Fietkau-Kessel grid model (1981) can be reconstructed into the following model (figure 3):

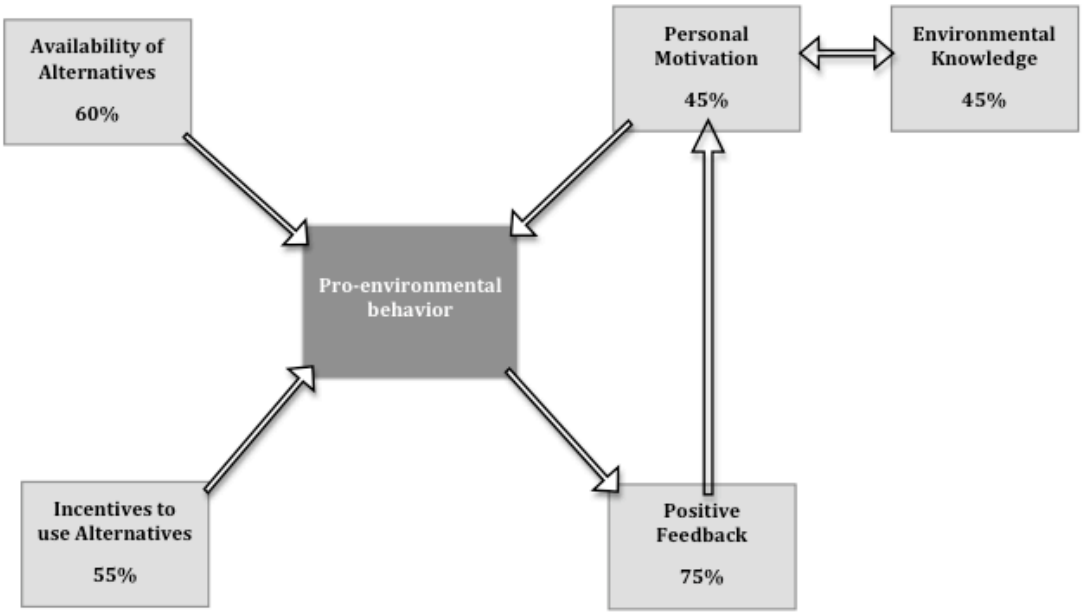

Figure 3. Integration of the results of the current study into the Fietkau-Kessel grid model (Percentages are rounded).

The percentages of Figure 3 were calculated by taking the means of each score ("Environmental Knowledge score," "Positive Motivation score," "Availability of Alternatives score," "Incentives score," and "Positive Feedback score") and setting them in relation to the maximum number of total points.

The demonstration in Figure 3 summarize the effectiveness of the individual factors. It describes that the factor "Availability of alternatives" affects 60% of the people to act in a pro-environmental way. For 55% of the subjects, "Incentives" have a positive influence on pro-environmental behavior. "Positive Feedback" works for 75% of the people to increase their pro-environmental behavior. For 45% of the individuals, "Positive Motivation" and "Environmental Knowledge" respectively affect pro-environmental behavior positively.

Those percentages (Figure 3), however, do not consider the combination of the factors. They just provide information about the correlations between each single factor and pro-environmental behavior. I assume that if each single factor provides a certain percentage to increase pro-environmental behavior, the combination of the factors will lead to an optimum.

Furthermore, with considering the results in Figure 3, the significance of the different factors can be identified. Therefore, we can set priority one for "Positive

Feedback," priority two for "Availability of Alternatives," priority three for "Incentives," and the last priority for "Personal Motivation" and "Environmental Knowledge." However, one problem by distributing priorities among the factors is that people just concentrate on priority number one and forget about the others. Therefore, I want to point out again that the factors are essential, but the optimum can only be reached by combining all factors and applying them together.

This problem can often be found in public relations and campaigns that concentrate mainly on one factor, like "knowledge," although other factors, like "Incentives" and "Availability of alternatives," are important as well. Also, Schahn et al. (1993) suggested to implement all five variables of the Fietkau-Kessel-model in intervention programs.

Purpose of the study and future prospects

The reason for extending the use of alternative energy and thus, decreasing the appliance of fossil energy resources in the last decades, has its origin in scarcity and subsequently in the increasing prices. The world population is forced to modify their energy using behavior and change to alternative resources, such as wind or solar energy.

The current study gives an overview of the status quo among a part of America's citizens (Bowling Green, Ohio). Although the population for this examination was not that large (100 subjects), it gives an interesting input to the previous studies and findings.

This study should be a start to motivate researchers to initiate more comparison studies. With comparison studies, further progresses could be made to find the advantages and disadvantages between countries and apply the advantages of one country in others.

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