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Ecological Attitudes and Their Components about Organic and Conventionally Grown Food: The Case of the Gauja National Park

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Abstract: The 2nd year students of sociology in Faculty of Social Sciences in University of Latvia conducted a study "Attitudes of the residents of the Gauja National Park region towards organic and conventional agriculture" during the spring of 2020, under the supervision of lecturers Renārs Felcis and Jurijs Ņikišins, where ecological attitude index has been made on organic and conventional farming (including 4 statements regarding statements of state action). The aim of the article is to describe the index of ecological attitudes and to identify the latent themes of ecological attitudes about organic and conventional farming to reveal in more detailed hidden similarities of 10 statements about aspects of organic and conventional farming. A type of factor analysis (principal component analysis (further – PCA)) was performed in addition to the descriptive analysis to achieve the aim. In the final analysis, 3 components were proposed, the first of which reflects the ecological habits of purchase, the second – the ecological habits of growing and the third – the individual variables on the importance of the expiration of products. The applicability of the statement scale in future research is suggested for discussion and conclusions.

Keywords: ecological attitudes, organic and conventional food, education for sustainable lifestyle.

Introduction

The article is a continuation of the research "Attitudes of the residents of the Gauja National Park region towards organic and conventional agriculture" conducted by the 2nd year students of sociology in Faculty of Social Sciences in University of Latvia. Research was conducted by students Jānis Žaltkovskis, Lauma Rozentāle, Sandra Tajarova, Diāna Lavska and Monika Varakušina under the supervision of lecturers Renārs Felcis and Jurijs Ņikišins. Research reports will be available publicly.

Previous research demonstrates that the environment and care for the environment, biodiversity and natural resources are highly valued in the consciousness of Latvian society (Felcis, Felcis, 2019, 101). The study examines the attitude of the residents of the Gauja National Park (hereinafter GNP) region towards conventional and organic agriculture, because GNP is a natural value of Latvia, where it is important to preserve the existing biological value.

Capitalist-type production prevents the necessary elements of the soil from returning and regenerating into the soil. Natural conditions are disturbed and the soil is unable to regenerate. In modern agriculture, as in urban industry, productivity and mobility increase, but this is at the expense of waste disposal and labour and soil degradation (Marx, 1976; Foster, 1999; Moore, 2000). K. Marx, drawing attention to several destructive aspects of 19th century agriculture, noted that "(1) capitalism has created an 'irreparable rift' in the 'metabolic interaction' between human beings and the earth, the everlasting nature- imposed conditions of production; (2) this demanded the 'systematic restoration' of that necessary metabolic relation as 'a regulative law of social production'; (3) nevertheless the growth under capitalism of large – scale agriculture and long-distance trade intensifies and extends the metabolic rift" (Marx, 1976, 636-9; 1981, 948-50, 959; Foster, 2010, 108; Foster, York, Clark, 2010, 241). Linking theoretical perspectives with current studies and research done regarding ecological attitudes, there are research regarding ecological approaches on distance education (Katane, Kristovska, Katans, 2014; Iriste, Katane, 2020) that might reflect the importance of ecological knowledge in education for sustainable future. Ecological literacy is necessary for the sustainable future as well. Ecological literacy interpreted as the ability to use ecological understanding, thinking and habits for living in, enjoying, and/or studying the environment (Yıldırım, Hablemitoğlu, 2013).

In line with previous studies regarding consumption of organic or conventional food, study has been used with aim to reveal consumers' point of view of organic products and the factors which are effective in their selection process (Bahşi, Akça, 2019) as well as consumer attitude towards organic food products (Salleh et al., 2010) and knowledge of organic food (Meixner et al., 2014). Numerous studies that compare various

aspects of organic and conventionally produced foods have been written already 15 years ago. Previous studies indicated that consumers are not consistent in their interpretation of what is organic and while consumers typically understand broad issues about organic foods, many tend not to understand the complexities and niceties of organic farming practices and organic food quality attributes (Yiridoe, Bonti-Ankomah, Martin, 2005). Research has revealed that organic consumers share beliefs about positive health effects, environmentally friendly production and better taste of organic food. (Zagata, 2012).

The aims of this article are (1) to describe the index of ecological attitudes and (2) to identify the latent themes of ecological attitudes about organic and conventional farming to reveal more detailed hidden similarities of 10 statements about aspects of organic and conventional farming.

Methodology for ecological attitude research and index

To analyse the attitude of the GNP population towards organic and conventional agriculture, a group of student researchers, based on the theory of metabolic rift and risk society, analysed the attitude of the inhabitants of the Gauja National Park region towards organic and conventional agriculture and developed an ecological attitude index. The study used a mixed research design, where the quantitative survey was conducted electronically during the emergency of COVID-19 using the Internet panel of the market research company RAIT GROUP. Field work occurred from 8 to 14 May 2020. A total of 206 valid responses were received after data cleaning. Several methodological tasks or steps were formulated to reach the aim of this article. First descriptive analysis of various statements regarding organic and conventional farming. Second, to analyse the respondents' general attitude towards agriculture, an ecological attitude index was created. Third and most importantly, a type of factor analysis (principal component analysis or PCA in abbreviation) was performed in addition to the descriptive analysis to achieve the aim.

The questions used for the index were more about organic and conventional farming, but it was decided to call this index the ecological attitude index, because it also included answers from statements about the respondent's actions, opinions and knowledge in policy making. The index included all 14 statements, including 10 statements about organic and conventional farming in the four-point Likert scale from disagree completely to agree completely and 4 statements as proposals in the Likert scale from not supporting at all till supporting completely. Statements are as follows:

1. Organic farming is more environmentally friendly than conventional farming
2. Farmers can control weeds, pests and plant diseases without the use of synthetic fertilizers
3. Organic products are healthier than products grown in conventional agriculture
4. I avoid buying genetically modified food products
5. It is important to me that the food I bought is made in Latvia
6. When I buy food, I am concerned about the synthetic fertilizers used by farmers
7. Animal welfare conditions are important to me when I am buying products of animal origin
8. Synthetic fertilizers cause water pollution
9. Conventional agriculture reduces biodiversity (extinction of animal and plant species)
10. It doesn't usually matter to me that foods have a longer expiration term
11. The state should give more support to organic farms
12. A "polluter pays" principle should be introduced
13. The state should ban the use of synthetic fertilizers
14. The state should improve animal welfare conditions on farms.

The possible index value is from one to four. Respondents with a higher index value are more positive about organic farming, follow a greener lifestyle and are generally more supportive of ecological lifestyles and rules. Respondents with a lower index value – the opposite way.

The index was created for all respondents, however, respondents with more than 7 “hard to say” responses were not included in the analysis of the index. The value of the index is the sum of the values of all statements (excluding “hard to say” answers) divided by the number of valid statements (number of statements in which the respondent did not mark the answer option “hard to say”). A new variable (“dummy”) was also created, in which respondents with at least 7 valid statements were assigned a value of one and the others a value of zero. This variable was created to exclude respondents with less than 7 statements from the index analysis.

Ecological attitudes and their components

The components of ecological attitudes are understood as the hidden similarities in 10 statements (out of 14) about aspects of organic and conventional farming. To identify this, a type of factor analysis – principal component analysis (PCA) is used as a method to identify groups or clusters of variables. Its main applications are: (1) Reduction of many variables (10 variables) to a simpler explanation; (2) Measure the indirect (so-called latent) features in this case for 10 statements about organic and conventional farming; (3) The methods used do not differ much from the correlation analysis, in this case, in the correlations of all variables with all, the dimensions in which similar answers is formed are sought.

The analysis and interpretation of latent categories is the main empirical technique of this article to achieve the goal – to reveal hidden similar features, which would allow to create a more nuanced or different scale of statements in the future. Moreover, with this method, we can reduce the data of the variables that make up the ecological attitude index, without losing anything significant from the initial information as much as possible. Sufficient number of respondents, namely, 206 respondents have been reached (according to the theory 10 – 15 respondents for each variable) is enough to be able to apply principal component analysis. PCA in comparison with factor analysis does not require some theoretical ground. PCA is rather based on exploratory analysis.

Results and discussion

Empirical results for ecological attitudes and ecological attitudes index

The data obtained using the ecological attitude index will be presented below. At first, some theses on the attitudes towards organic and conventional farming will be formulated. Most of GNP population in sample agree with claims about water pollution from synthetic fertilizers, often agree that organic farming is more environmentally friendly than conventional farming, and believe that organic products are healthier than products grown in conventional farming. More than half (> 59 %) of the population living in the GNP area also agrees with other statements (Figure 1).

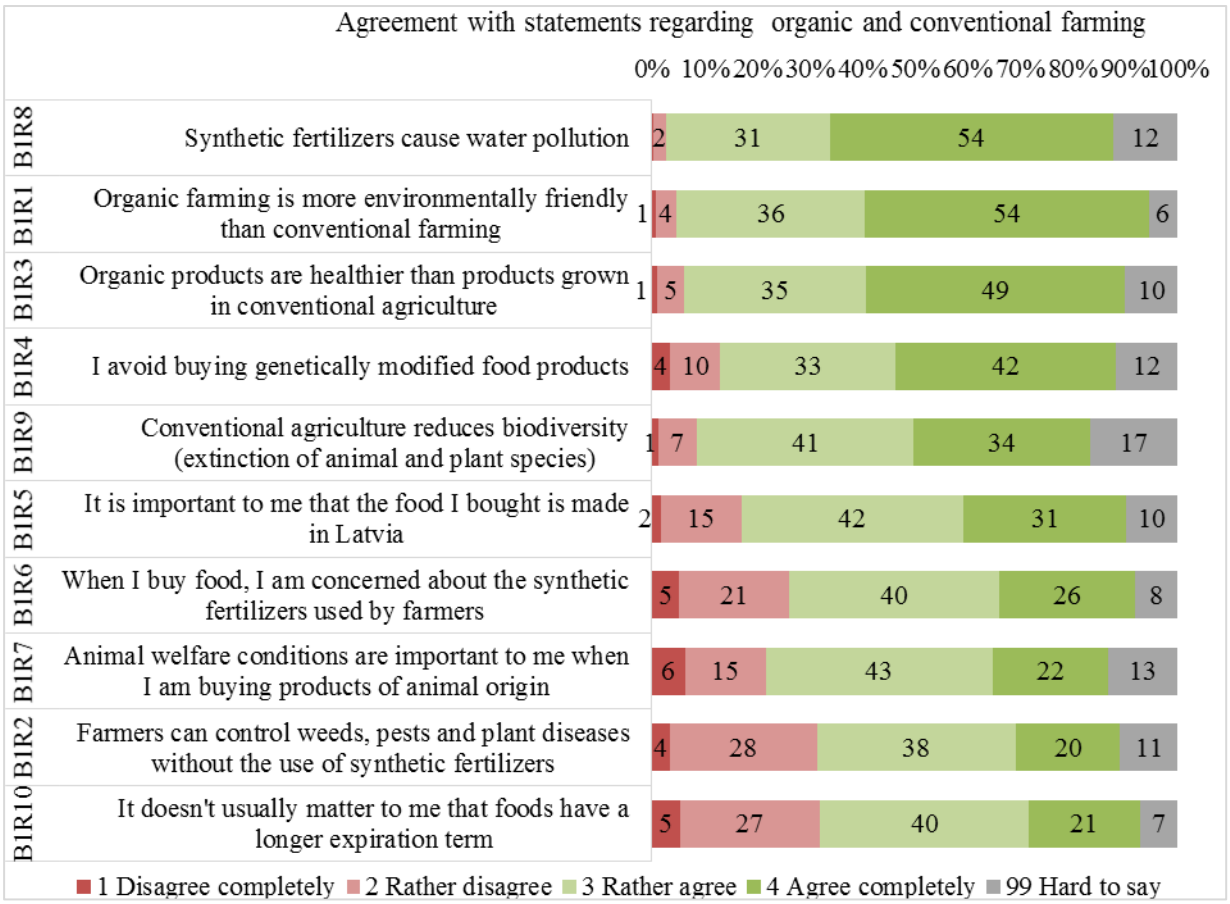

Figure 1. Agreement with statements regarding organic and conventional farming.

Most often for respondents in the range from 1 (completely non-ecological attitude) to 4 (completely ecological attitude) the value of the index is 3 (modal value), which means that respondents have a rather ecological attitude. The midpoint or median indicates the most typical index value of 3.1. A standard deviation of 0.4 indicates that approximately 2/3 of the respondents gave an estimate in the range of 2.7 to 3.6. Measure of skewness (coefficient -0.290) indicates a negative asymmetry. Compared to the normal distribution, the empirical distribution curve is shifted to the right. A kurtosis coefficient of 0.065 indicates that the standard deviation around the arithmetic mean is 3.2 narrower than the normal distribution and the empirical distribution curve is steeper than in the normal distribution (Figure 2).

It can be concluded that the respondents' ecological attitude index is relatively similar (less dispersion than normal distribution) and that respondents are more ecological than non-ecological (arithmetic mean 3.2 and the empirical distribution curve is slightly shifted to the right) orientated in overall regarding various statements of organic and conventional farming, Figure 2 for details.

N	Valid	200
Mean		3.1761
Median		3.1440
Mode		3.00
Standard deviation		.44361
Skewness		-.290
Kurtosis		.065
Range		2.43
Lower value		1.57
Highest value		4.00

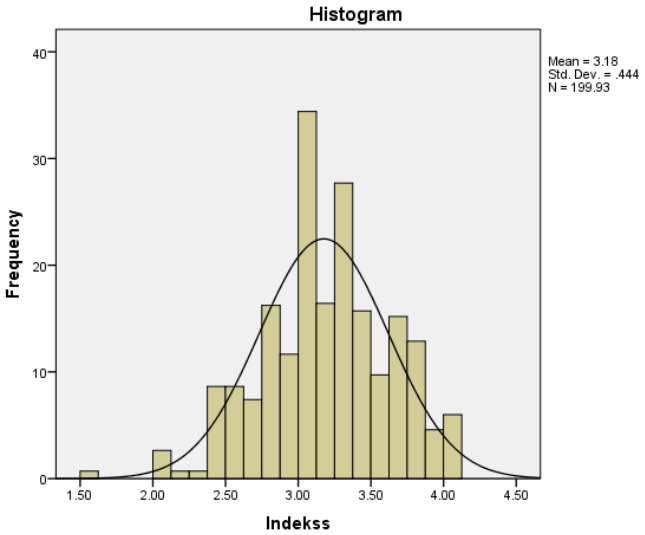

Figure 2. Descriptive statistics for ecological attitude index and histogram of value distribution of ecological attitude index.

Results of ecological attitudes components and Discussion

Principal component analysis was performed on 10 items out of 14 items by orthogonal rotation (varimax rotation method). Kaiser-Meyer-Olkin measure verified the sample's adequacy for the analysis as excellent (KMO = 0.79) and KMO values for individual items were > .5, which is above the acceptable limit of .5 (Field, 2009). Bartlett's test of sphericity x ^ 2 = 386.449, p <.001 indicated that the correlations between items were sufficiently large for the PCA. An initial analysis was run to obtain eigenvalues for each of the data components. Three components according to Kaiser's criteria were greater than 1 and combination explained 65 % of the variance.

Three components were offered in the final analysis. Table 1 shows the factor indicators after rotation.

For the sake of explanation PCA reveals and suggests that we can talk about ecological habits of purchase and the ecological habits of growing.

The set of items formed around the same component shows that the first component reflects the ecological habits of purchase, and it includes 5 items and they explain 29 % of all possible variances, while the second component - ecological habits of growing, it also includes 5 variables and they explain 24 % of all possible variances (the statement of weed control without synthetic fertilizers is ideologically included in both the first and second components, but it is difficult to explain), but third component - the importance of the expiration of products as one variable forms separate components and it explains 12 % of all possible variances, suggesting that this statement is probably redundant on this scale of 10 statements, because it has little to do with other statements.

Table 1

Summary of explanatory factor analysis or analysis of key components on organic and conventional farming issues (N=206)

Components	Rotated factor load		
	1. Ecological habits of purchase	**2. Ecological habits of growing**	**3. The importance of the expiration of products**
It is important to me that the food I bought is made in Latvia	0.831		
Animal welfare conditions are important to me when I am buying products of animal origin	0.803		
When I buy food, I am concerned about the synthetic fertilizers used by farmers	0.746		
I avoid buying genetically modified food products	0.703		
Farmers can control weeds, pests and plant diseases without the use of synthetic fertilizers	0.474	0.440	
Synthetic fertilizers cause water pollution		0.799	
Conventional agriculture reduces biodiversity (extinction of animal and plant species)		0.763	
Organic products are healthier than products grown in conventional agriculture		0.696	
Organic farming is more environmentally friendly than conventional farming		0.593	
It does not usually matter to me that foods have a longer expiration term			0.881
Eigenvalue	4.06	1.28	1.16
% of variance after rotation	28.9	24.3	11.7

Although this study reveals consumers' preferences and attitudes, for the discussion other studies demonstrate that there is also a gap between consumers' generally positive attitude toward organic food and their relatively low level of actual purchases (Pearson, Henryks, Jones, 2011) and recent year studies rather focus on determinants for organic food purchases (Janssen, 2018; Bryła, 2016; Van Doorn, Verhoef, 2015), or consumption in general (Bravo et al., 2013).

Conclusions

Most of GNP population in the sample agree with claims about water pollution from synthetic fertilizers, often agree that organic farming is more environmentally friendly than conventional farming, and believe that organic products are healthier than products grown in conventional farming. More than half (> 59 %) of the population living in the GNP area also agrees with other statements. The ecological attitude index among the inhabitants of the Gauja National Park territory shows that the inhabitants are more ecologically than non-ecologically oriented. It implies some remarks for ecological approach in education. Namely, we can talk about rather high ecological literacy within rural population, which can be maintained by ecological approach in education for multifaceted personality development.

The midpoint or median indicates that ecological attitude index overall value is 3,1. Most often for respondents in the range from 1 (completely non-ecological attitude) to 4 (completely ecological attitude) the value of the index is 3 (modal value), which means that respondents have a rather ecological attitude. Thus it can be concluded that the ecological attitude index is relatively evenly distributed (less dispersion than normal distribution) and that respondents are more ecological than non-ecological (arithmetic mean 3.2) oriented in overall regarding various statements of organic and conventional farming.

In this article a type of factor analysis (PCA) signifies that conceptually three components reflect various attitudes of organic and conventionally grown food. The first of which reflects the ecological habits of purchase, the second – the ecological habits of growing and the third - the individual variables on the importance of the expiration of products. The principal component analysis can help methodologically

as well for further research. Thus, methodological conclusions are important for further studies. Statements can be formulated around purchasing elements of organic food and/or around the dimension of growing organic food.

Thus, both methodologically and conceptually, we can separate the statements and, accordingly, the elucidation of attitudes about the ecological habits of purchase and the ecological habits of growing, and apply the tools in the research of the population of other regions of Latvia. Conceptually it is important to use ecological attitude scale about organic and conventionally grown food for educational reasons to measure readiness towards ecologically sound habits and attitudes for sustainable future of our current and further generations.

Finally, it can be said that the aims of this article have been reached. Principal component analysis helped to identify two important dimensions of ecological attitudes about organic and conventionally grown food. These dimensions are ecological habits of purchase and the ecological habits of growing.

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