Doctoral School of Management and Business Administration

THESIS SUMMARY

Zsófia Vetőné Mózner

Towards Sustainable Food Consumption?

The Ecological Footprint of Food Consumption in Hungary

Ph.D. dissertation

Supervisor:

Dr. Mária Csutora
associate professor

Budapest, 2013

Department of Environmental Economics and Technology

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I. Research background

Western lifestyles and patterns of consumption have been heavily criticised as being materialistic, permissive and based on the use of non-renewable resources; furthermore, their environmental impacts are considerable and significant (Wackernagel and Rees, 1996; Vitousek et al., 1997a). According to Stern (1997), consumption is not only a social or economic activity; it is a transaction between humans and the environment. The motivation behind acts of consumption may be economic and social, but its impacts are biophysical.

Food consumption is a special area of consumption: it is important for both the individual and the economy; it provides nutrients for individuals and its economic role is significant (Tansey and Worsley, 1995). As food consumption fulfils our daily biophysical needs, it cannot be dematerialised and substituted for using other products. According to Gerbens-Leenes et al. (2010), we are in a transitional phase of food consumption. This transition is relevant to developed and developing countries but in different ways. In developing countries the growing income per capita is generating growing demand for food, meat and protein. In developed countries with a stable level of protein intake, growth in consumption of carbohydrates and fats can be observed (and furthermore, high levels of food and calorie consumption per capita). Sustaining a European lifestyle creates a demand for land-based resources in other continents and agriculture is mainly based on the use of fossil resources (Palmer, 1998).

Food consumption is said to have one of the highest environmental impacts of all areas of consumption (Lorek and Spangenberg, 2001a; Tukker et al., 2006; Jackson and Papathanasopoulou, 2008; Druckman, 2010; Thøgersen, 2005; Tukker et al., 2011). The environmental impacts of food consumption primarily concern land use, as producing food requires the use of one of the most important natural resources; energy, and results in greenhouse gas emissions (Lorek and Spangenberg, 2001a).

In order to reduce the environmental impacts of food consumption the structure of food consumption within households should be altered (Carlsson-Kanyama, 1998; Schor, 2005a; Stehfest et al., 2009; Garnett, 2011; Schlösler et al., 2012).

Less research has so far been done on food consumption compared to other consumption areas, though its importance and environmental impacts are significant (Lorek and Spangenberg, 2001b; Csutora, 2012). In my research I present the importance of this consumption sector by quantifying its environmental burden.

The main topic of the dissertation is to quantify and analyse the ecological footprint of food consumption in Hungary. The responsibility of consumers and households has not always been a topic of research; it has grown into a determining issue and a continuously developing area of research. Using a consumption-based approach for research can provide useful answers to such questions which would not be revealed and solved by using a production-oriented research approach.

It is important to examine the following questions: which food categories are predominant in Hungarian food consumption; which food categories have large environmental impact and ecological footprint.

There has not yet been a representative survey undertaken in Hungary which was designed to measure the ecological footprint of food consumption patterns. In my research I analyse which socio-demographic variables influence food consumption, the consumption of which food category should be changed to moderate environmental impacts.

Previous academic studies did not differentiate by occupational activity and social segments in their examination of food consumption and its environmental impacts. In my research I carry out an analysis to examine the food consumption structure an ecological footprint using the variables of gender, age and type of occupation.

One of the aims of this research was to identify and categorise consumers into groups according to the structure of their food consumption. Knowing the characteristics of these groups would help to focus the communication activities of environmental policy which is designed to decrease the environmental impact of consumption.

Food consumption not only has environmental impacts but the quantity and structure of food consumption directly determines the health of individuals. Healthy and low-impact diets show many similarities with each other (Gussow and Clancy, 1986; Wallén et al., 2004; Duchin, 2005; Stehfest et al., 2009; Macdiarmid et al., 2011). One of the research questions of my dissertation was this: is it possible to move towards a healthier personal consumption structure while reducing environmental impact? Do these two goals (improving environment and health) supplement each other? What would be the environmental impacts of healthier diets? I carry out a scenario analysis in order to examine to what extent the ecological footprint of food consumption could be decreased, taking into account nutritional recommendations.

I give an overview of the ecological footprint of food consumption primarily in a descriptive way by analysing this topic from a number of perspectives.

II. Research methods

I carried out my analysis on sustainable food consumption with an environmental and health perspective. I identified, using the definition of Duchin (2004), during the empirical research, according to which a sustainable diet should have a low environmental impact and should contribute to preserving human health.

In the literature review it was seen that socio-demographical variables influence the consumption of food in various ways in different countries and according to different social groups. During the research I analysed the impact on food consumption of the following variables mentioned in the academic literature: level of education, income status, gender, age and occupational activity. The latter three variables have a great impact on which items of food are consumed, which is why their analysis is important.

In my research I used the ecological footprint methodological approach and indicator to examine the environmental impacts of food consumption.

Developed by Wackernagel and Rees (1996), the ecological footprint is an indicator of environmental load and is a resource accounting tool that measures how much biologically productive land and sea is used by a given population or activity, and compares this to how much land and sea is available, using prevailing technology and resource management schemes. The ecological footprint is a biophysical indicator; this brings us closer to correctly analysing research questions connected to land and resource use (Borgström et al., 1999; Wackernagel et al., 1999a). These measurement units are global hectares with world-average productivity and the biocapacity of all biologically productive areas on the planet.

The core and significant novelty of the ecological footprint is that its methodology and meaning is consumption-centred; it shows the environmental impacts of consumption and it emphasises the responsibility of the consumer. It is an appropriate tool for drawing the attention of different social groups to their environmental load. The ecological footprint helps identify minimum conditions for sustainability; its utility is acknowledged despite its methodological shortcomings (Kitzes et al., 2009a).

I present my research hypotheses which reflect on the previous research questions and the results emerging from the relevant literature.

H1: Ecological footprints are significantly different according to level of education

H2: Ecological footprints are significantly different according to gender

H3: Ecological footprints are significantly different according to age groups

H4: The ecological footprint of more actively working people will be higher than that of people with lower intensity jobs

H5: The ecological footprint of higher income groups is offset by their healthier consumption structure

H6: Well-defined consumer groups can be defined based on the structure of their food consumption

H7: Environmental and health aspects are compatible with each other: modifying consumption structure can lead to both a healthier and a more sustainable way of consuming food

During this research I carried out a cross-sectional analysis where I used the database of a survey which was carried out within the Sustainable Consumption, Production, and Communication project at the Department of Environmental Economics and Technology. I personally took part in compiling the survey questions.

The survey was done within the monthly survey 'Omnibus' conducted by TÁRKI Zrt. in April 2010. Interviewers were used to help individuals complete the questionnaire. The sampling for the survey was nationally representative probability sampling in 80 settlements in Hungary. The sample was chosen to be representative for the following variables: habitat, gender, age and level of education.

Multistage sampling was carried out, whereby in the first stage the settlement was chosen, and in the second stage (within the settlement) a random walk method combined with the Leslie Kish-key method was used to select the household. The random walk method

provides for testing the probability of the sample. After choosing a household, a member of the household (who had been chosen through a probability estimation technique using the Leslie Kish-key) was asked to answer the survey. The Leslie Kish-key process can be used to choose the member of a household on a random basis. The key provides a clear and pre-fixed method for selecting respondents (Kish, 1949). The final size of the sample which I analysed was 975 persons.

The survey was comprised of closed questions. The survey comprised questions regarding the frequency of consumption of food items and the quantity of consumed food by primary food categories: vegetable-based dishes; fruits and vegetables; meat; tea and coffee; bread and bakery products; potatoes and rice; muesli; cold cuts; milk; dairy products; pasta; eggs, and vegetarian meals.

In the database the quantity consumed per meal and the frequency of consumption of each item from each food category were available for analysis (regarding the three main meals of the day). The consumption of each food item in kilograms per year was calculated for each respondent. The ecological footprint was calculated using the following formula:

ecological footprint (gha/year/person) = quantity consumed per year per person (kg/year/person) * ecological footprint intensity (gha/kg) (1)

The ecological footprint shows the environmental impact of the real, actually consumed food quantity for an individual.

Ecological footprint intensities were quantified based on the latest database from the Global Footprint Network for Hungary (published in 2011). The database of the Global Footprint Network (GFN, 2011) includes the ecological footprint of 160 primary agricultural products. This database is the best-acknowledged database used in scientific and academic research for quantifying the ecological footprint. It includes in a very detailed way the data which are needed to quantify the ecological footprint. As a result, I used this database in my research. I quantified the ecological footprint intensities of both locally produced and imported products and the average ecological footprint intensities for each food item were calculated as the weighted average of the footprints of the locally produced and imported products.

For testing H5 hypothesis I used the database of the Hungarian Central Statistical Office (KSH, 2012e), which includes food consumption data according to income deciles.

III. Results

1. The ecological footprint of food consumption of Hungarian consumers

The aim of my research was to quantify the environmental impacts of food consumption of Hungarian consumers. I quantified the ecological footprint of Hungarian respondents which stems from direct food consumption using bottom-up methodology. The ecological footprint of food consumption for an average consumer is 0.51 global hectares. Looking at the size of the ecological footprint it can be stated that Hungarians consume less food than Western Europeans. The relatively small Hungarian ecological footprint (compared to the European size of ecological footprint) does not entitle Hungarians to increase their consumption of food in the future. Results highlight that the real level of consumption of food of Hungarians (defined using surveys and statistics) does not correspond with perceptions that Hungarians are significant consumers of meat.

In the structure of an average respondent's footprint, animal-based products are dominant (61%). The size of the ecological footprint is mostly influenced by consumption of meat, dairy products and bread.

It was interesting to examine the relative contribution of the food categories to the total quantity of food consumed and to the total ecological footprint. This comparison highlights the fact that analysing only the quantity of food consumed and the consumption structure does not show which food consumption categories have significant environmental impact. This knowledge can supplement analysis based on environmental indicators.

2. The impact of level of education on the ecological footprint of food consumption

After analyzing the ecological footprint of food consumption according to level of education it can be said that there is no significant difference. The structure of consumption is, however, different for differently educated groups of respondents. It is surprising, however, that in contrast to expectations there is no significant difference between the ecological footprints of meat, vegetables and fruit. People with a higher level of education do not consume less from those food categories which influence strongly the size of the ecological footprint. More highly educated people eat no less meat or vegetables and fruit. Altoghether there is no significant difference between the footprints.

3. The ecological footprint of food consumption according to gender, age and nature of occupation

In my research I revealed that there are significant differences in the structure and ecological footprints for food consumption according to gender. Men's ecological footprints are not only higher because of the greater quantities they consume, but because of the differing structure of food consumption (more food consumed with higher ecological footprint intensity).

As for age groups, results did not confirm that ecological footprints are significantly different. The structure of consumption is, however, different for the different age groups.

When I analysed the ecological footprint of food consumption according to gender, age and type of occupation, results of the analysis showed that there are no significant differences within the same age group and gender regarding occupational activity, which is a surprising result. The hypothesis that there are significant differences between the ecological footprints of people with different occupational activities was not confirmed. For some food products there is a significant difference between ecological footprints (e.g. muesli, cold cuts, eggs and vegetarian meals). For women there is a significant difference between the consumption levels and ecological footprints of the three occupational groups for cold cuts, eggs and pasta.

Leisure time activities do not explain this result sufficiently. I think that more analysis is needed to reveal the cause for the greater consumption of food by people with a lower level of physical activity. This analysis has highlighted the significance of differentiating between genders and age groups when the food consumption of people with different physical occupational activities is analysed otherwise misleading conclusions could be drawn. This is proven by the result that if no distinction is made between genders and age groups and we analyse food consumption and its ecological footprint in combination according to occupation, then significant differences are be revealed in the ecological footprint (though this can be tracked back to the varying proportion of the genders within the occupational groups). The ecological footprint for food consumption for those who are inactive from an occupational point of view (pensioners, women on maternity leave, students) is significantly different, a result which fits prior expectations.

4. The ecological footprint of food consumption according to income

Examining the income status, the ecological footprint results showed that people with higher income consume more food (the analysis was based on secondary data). The ecological footprint increases according to this by income decile; however, the structure of consumption changes: the largest difference is with consumption of fruit, dairy and vegetables. The least difference is with consumption of cereal and with consumption of potatoes; the ecological footprint for cereal and potato consumption is nearly equal for the lowest and highest income deciles.

People in the lowest income decile have 30% smaller ecological footprints than the average footprint, while people in the higher income decile have 22% larger ecological footprints than average. It is an interesting result of the research that in case of the upper two income deciles the ecological footprint for food consumption does not increase notably - these groups use their higher incomes to consume more fruit and vegetables and their consumption of meat and bread does not increase. Here, a higher income does not mean more consumption per se but greater consumption of healthier food products. This appears in respondents' ecological footprints as well.

5. Consumer groups according to the structure of food consumption

One important result of the dissertation is that I identified significantly different consumer groups regarding the structure of food consumption using cluster analysis. Cluster analysis was carried out to examine the consumption structure of the individuals (more precisely, on the energy intake of respondents for the food categories compared to their total energy intake). The clusters which result from the cluster analysis not only differ according to consumption structure but they are characterised by their distinct socio-demographic features and result from different lifestyles. The following clusters were created: meat and vegetable-based dish consumers, meat and milk consumers, average consumers, fruit, vegetable and dairy product consumers, bread and bakery product consumers, and consumers consuming no milk and dairy products. Those who consume more fruit, vegetables and dairy products do not have lower ecological footprints, regarding total food consumption. Those consumers whose consumption structure is dominated by meat consumption, which is of higher ecological footprint intensity, do not necessarily have higher ecological footprints. Consumers who do not directly consume milk or dairy products have lower ecological footprints.

Understanding this typology can help to reach consumers when there initiatives are undertaken to change the structure of food consumption.

6. Scenario analysis about the possibilities for decreasing ecological footprints

In my dissertation I analysed the possibility of decreasing the ecological footprint of Hungarian consumers through changing their diets. Using a scenario analysis approach I define fixed diets which are used to show up how environmental impact is modified when consumption patterns change. I based my analysis on the actual food consumption patterns of surveyed respondents and I presented alternatives which are achievable and realizable in the first scenario group. In the next group of scenarios I analysed the impact of changing diets reducing meat and egg consumption according to the recommendations of the Hungarian National Institute for Food and Nutrition Science (OÉTI).

I succeeded in revealing that by modifying the consumption structure towards healthier options environmental impact can be reduced. With the example of reducing step by step the consumption of meat and processed meat and eggs towards an optimal level I showed the impact of dietary changes on the ecological footprint. The results indicate that if a reduced consumption of meat is substituted for by the consumption of other food (i.e. calorie intake is maintained), the largest reduction in the ecological footprint can be made by consuming those food products which have lower ecological footprints per calorie.

Analysis revealed as well that in order to significantly decrease the ecological footprint of food consumption, radical changes are needed. However, it is necessary to highlight realizable changes to consumers, and even these changes can realistically reduce environmental impact. These results are in accordance with international findings; the reason for the smaller scale of results is that the quantity of food that Hungarians consume is lower than that of the average European (especially Western-European).

7. Recommendations

According to the theoretical and empirical results of the dissertation I agree with Wallén et al. (2004), according to them: a diet with low environmental impact which is not adequate from a nutritional perspective cannot be regarded as sustainable.

Measures for changing food consumption patterns should not separately treat environmental and health issues. The ecological footprint can be a great means for communicating about suitable levels and types of food consumption in the future. Closer cooperation of expert groups is needed in the future in order to develop alternatives which are adequate both from environmental and health perspectives. Changing the structure of food consumption is made more difficult by the lock-in effect which is why the support of the public policy is needed to change consumption patterns. Informing and motivating consumers

is needed to ensure that they have the knowledge that changing their food consumption can lead to not only favourable health effects but also to lessening of environmental impact.

Creating sustainable food consumption clubs would support a change in the structure of food consumption and help moderate environmental impact. Consumers need an unambiguous message about the healthiness and environmental impacts of food products. Furthermore, if food offerings in public catering were modified this could contribute significantly to changing consumption patterns.

These recommendations and conclusions are more applicable to developed countries as the subject of the analysis was the ecological footprint of food consumption in developed countries (where the level of food consumed is higher than the world average and so is the environmental impact). The level of food consumption is lower in Hungary than in Western Europe. Harmonizing treatment of environmental and health issues would have greater impact in countries with greater food consumption per capita.

8. Directions for future research

The aim of this research was not only to answer the specified research questions but to help pinpoint directions for further research. Of these I would like to specify the following:

With more detailed knowledge about types of food categories, further analysis would be possible. Having available data on the height and weight of respondents would allow the research findings to be expanded and could help in drawing deeper conclusions. Besides these data, knowing the total calorie intake of respondents would support quantification of the difference between actual and recommended consumption baskets and the precise ecological footprints of the individuals concerned. Based on these differences it could then be defined what kind of changes in the consumption of different food categories would be necessary to meet health recommendations. It is not enough that changes are made towards healthier food consumption structures but there is a need for the analysis of the quantities consumed as well (it may be possible that the consumption structure is adequate but overconsumption is a concern). Sustainable food consumption would be supported by knowing which foods consumers should consume to reduce their environmental impacts.

My research did not include an evaluation of the possible rebound effect arising from reducing the consumption of food and nor did it include consideration of the opportunities presented by alternative types of land use, therefore quantifying these effects could be useful as well.

It is necessary to take into account that the ecological footprint is only one indicator of sustainability and relates to resource consumption. The use of other indicators could supplement this instrument.

I think that fostering the international comparability of the results could be very useful and this would be supported though having a standardised, comparative database on a European level. This would allow research findings to be generalised more easily.

To sum up, the research highlighted the role of consumers in mitigating environmental impacts of food consumption. Research using a consumption-based approach can help us to reassess previous research findings which examined resource use and environmental impact from a production-based approach. The diversity of research that is based on a responsibility-for-consumption approach can help highlight those pressing environmental issues which need intervention and attention. My empirical results extend and improve the findings of previous research in the academic literature.

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