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Estonia as a pilot for a sustainable society: utopia or opportunity?

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Abstract

Considerable research effort has been put into discussing the topic of measuring sustainable development. Ethical considerations of sustainability have to be considered before selecting sustainability indicators or indices. The aim of this paper is to examine whether Estonia can become a pilot for a sustainable society. The main objectives are to inquire: (1) What are the ethical preconditions of Estonia to implement sustainability? (2) What is the position of Estonia among the selected countries measured by genuine saving and ecological footprint simultaneously? (3) What is the key factor causing unsustainability in Estonia and what would be the key-solution? The results indicate that good preconditions for ethical considerations for sustainability exist in Estonia. Nevertheless, the current ecological and economic situation is unsustainable. While considering genuine saving, Estonia is behind the most sustainable country – Botswana – almost five times. The ecological footprint of Estonia exceeds the world average more than three times. Additionally, Estonia has a negative ecological deficit. The key factor in Estonian economic-ecological unsustainability is the extremely high CO_2 emission per capita. Estonia has good natural preconditions for implementation of an energy supply reform and to start applying renewable resources (biomass). The best solution would be using waste water treatment areas for biomass production. 300,000 ha of energy/treatment wetlands could supply 61 percent of Estonia's annual heat consumption and 55 percent of electricity production. This could change Estonia's present negative CO_2 balance to an equal positive one. As a result, genuine saving in Estonia would rise, the ecological footprint would decrease and the ecological deficit would be positive. This is Estonia's opportunity to become a pilot for a sustainable society.

1 Introduction

Sustainability as a modern keyword is over-exploited, and therefore devalued. On the other hand, the essence of sustainability has been understood: how to find a balance between a increasing number of citizens of the Planet Earth and the carrying capacity of the planet, both today and in the future. Malthus [1] was the first author who drew attention to this problem in the late eighteenth century. Only 200 years later general public started to recognise the problem. The term 'sustainable development' was incorporated into the political agenda after the UN Commission on Environment and Development published its report *Our Common Future* [2]. After the Rio Earth Summit in 1992 politicians and then entrepreneurs started to design strategies and principles for continuation of human development within the limited carrying capacity of the planet. Strategies state objectives, in order to measure their success and changes in development curves tools are needed [3, 4, 5, 6, 7]. Several hundred indicators, indices, measuring systems have been created by the UN, the scientific community and NGOs. In recent years World Bank and OECD, the European Union and Baltic Agenda 21 have created their own sets [8]. For instance, a few are presented here: AEANNP - Approximately Environmentally Adjusted Net National Product; PAM - Pearce-Atkinson Measure; NNP/K - Net Primary Production and Carrying Capacity; EF/ACC - Ecological Footprint and Appropriated Carrying Capacity; ISEW - Index of Sustainable Economic Welfare, Environmental Space and Rucksack, Genuine Saving, etc [9]. Some of them have been used for analysing the sustainability of single countries or regions. Researchers seldom ask on which basis the indicator system they apply was selected [10, 11]. The issue arises since the value system of a researcher and his/her ethics are seldom questioned. The answer to any one question depends on the definition of ethical concerns and their content [12, 13]. In the present paper my ethical concern is based on a balance between human beings and the nature, shortly it may be expressed by the term 'balance-centrism'. I address the present position of Estonia among other countries based on economic and ecological dimensions of sustainability. I also map ethical sustainability of Estonia using the results of sociological polls. First steps were the calculation of Estonian ecological footprint by Frey [14] and its environmental space by Merisaar & Lahtvee [15, 16] as well as by Randla *et al.* [17]. In order to compare economic and ecological dimensions of sustainability of selected countries, Genuine Saving (GS) as calculated by Hamilton [18] and Ecological Footprint and Ecological Deficit by WWF [19] are used. The other two dimensions of sustainability considered significant by the author, namely the social (cultural traditions, human development index, etc.) and institutional (legislation, policy, institutions, etc) are not analysed in this paper, which has previously been examined [20]. The paper focuses on arguments whether it is utopia or opportunity for Estonia to become a pilot for a sustainable society.

2 Problems

Main objectives of this paper are to find out:

1) What are the ethical preconditions of Estonia to implement sustainability?
2) What is the position of the Estonia among selected countries?
3) What is the key factor causing Estonian unsustainability?

3 Methods

3.1 Ethical dimension of sustainability

Recent research has emphasized the importance of ethical concerns of sustainability [21]. However, the author has not been able to identify the universal methodology to measure and compare different cultures and states concerning sustainability. One of the reasons might be the fact that ethical concerns of sustainability can be 'understood' or 'translated' in various ways. It is common to understand ethical concern as equality between the generations of human beings. This is an anthropocentric view. Another way to describe the relations between human actors and nature is bio- or ecocentric. Ethical concern includes all living and non-living organisms and ecosystems [22, 23]. The Earth is seen as one living ecosystem as presented by the GAIA theory [24]. Between these two extreme theories of environmental ethics, several others with slight differences in the objects of ethical concern exist [25]. The result of any research on ethical sustainability or sustainability in general depends significantly on the choice of research methods, which on their turn depend directly on the ethics of the researcher. Moffat [9] illustrates the issue describing the answers given to the question 'Is Scotland sustainable?' reached with the help of five different methodologies. There is no one straightforward and simple answer: two methodologies gave a positive, two a negative answer, the final ended in a draw. Sustainable development is understood here as a development process, where the nature in a very broad sense has an equal right for existence to human beings. Consequently, broadening the traditional definition sustainable development is one that meets current needs and rights without jeopardising future generations' needs and rights including both human beings and nature. This is the third stage in the development of the sustainability concept [26]. A method for examining preconditions in Estonia for achieving ethical sustainability, where the results of sociological polls were used, which were conducted in Estonia in the last 10 to 15 years, was applied. Answers that indicated the relations between human beings and nature in Estonia or the environmental awareness of the Estonians were of particular interest. It is argued that the more people agree to the principle of balance between human beings and nature, the greater is the ethical precondition for sustainability in that particular country.

3.2 Economic dimension of sustainability

Genuine saving is used as sustainability indicator for measuring Estonian economic dimension of sustainability compared to other countries. Genuine

saving consists of investment in produced assets and human capital, less the value of depletion of natural resources and the value of accumulation of pollutants. Hamilton [18] gives the formula for calculating genuine saving (G) from real data. For produced asset depreciation δK, net resource rental rate n, and marginal social cost of pollution σ, (where e is pollution emissions and d is the quantity of natural dissipation of the pollution stock) and m is investment in human capital (current education expenditures) by

$$G = GNP - C - \delta K - n(R-g) - \sigma(e-d) + m$$

Here $GNP - C$ is traditional gross saving, which includes foreign savings, while $GNP - C - \delta K$ is traditional net saving. Net natural growth of living resources ($R-g$) is not added to genuine savings when it is positive, but net depletion (that is when $R>g$) is deducted. As a 'place-holder' for other pollutants, damages from carbon dioxide emissions are included in the genuine saving calculation, using a figure of $20 per ton of carbon. Genuine saving is thus a percentage from GDP and expresses sustainability in terms of 'investments to the future'. The bigger the genuine saving, the more economically sustainable the particular country is.

3.3 Ecological dimension of sustainability

In order to measure the ecological dimension of sustainability the Ecological Footprint method is used [19]. This measures a population's consumption of food, materials, and energy in terms of the area of biologically productive land or sea that is required to produce those resources and to absorb the CO_2 emitted from burning fossil fuels. The latter is the primary cause of climate change. The calculation of the footprint leaves out some pressures for which data are incomplete, such as water consumption and the release of toxic pollutants. The Ecological Footprint is expressed in 'area units'. One 'area unit' is equivalent to one hectare of biologically productive space with world average productivity. Land varies greatly in productivity; the most productive land is generally used to grow crops, while the least productive is used to graze animals. One area unit is equivalent to about 0.3 hectares of cropland of world average productivity. It is also equivalent to 0.6 hectares of average forest, or 2.7 hectares of average grazing land, or 16.3 hectares of sea (coastal zones) with average productivity. Thus a hectare of highly productive land represents more 'area units' than the same amount of less productive land. All land areas are scaled according to their capacity to produce biomass. Sea is measured in terms of its capacity to produce protein. The Ecological Footprint is aggregated from cropland, grazing land, forest, fishing ground, CO_2 and built-up land footprints. The CO_2 footprint of a country, for instance is calculated based on the national consumption of energy from fossil fuels plus the net import of 'embodied energy' in manufactured products. The total energy consumption is then converted into the area of average forest land required to absorb the resulting CO_2 emissions, using the present rate of carbon absorption by the world's forests. The country is ecologically sustainable when its footprint stays lower than 2.18 area units. Additional to the ecological footprint, the ecological deficit can be calculated. This is the difference between biological (absorption) capacity and Ecological

Footprint. The more positive the ecological deficit is, the more ecologically sustainable the particular country is.

4 Results and discussion

4.1 Ethical preconditions for sustainability in Estonia

According to the study by Lauristin *et al.* [27] in 1985 the first priority in environmental protection was sustaining the balance in nature for 73% of experts. 63% considered important to conserve the life on Earth and 55% declared that the uppermost goal is organising the relations between human beings and nature in a wiser manner. The attitudes of the citizens were measured at same time. Their first priority was health protection professed by 66% of the informants. The second and third objectives with equal 59% in importance were sustaining the balance of nature and conserving life. The difference between opinions of experts and citizens was not significant, the statistical similarity measured by *Spearman step correlation*, was 0.79. Ten years later the study by Kaasik *et al.* [28] indicated that 57% of the poll group found that the communication with nature is very important and that the citizens are primarily responsible for the environmental protection. Unfortunately, almost as many had the opposite opinion. Uljas *et al.* [29] conducted a sociological poll on the Estonian island of Hiiumaa in 1994. According to their results 65% of the islanders believed that there are mystical or higher forces in Nature. This opinion has not any correlation with their level of education. The sacred place was the forest, a grove of trees or single trees for 22%, as many of the islanders considered the church and chapel as theirs. According to the sociological poll by Moor [30] two persons out of three believe that the tree has a spirit and therefore they behave towards the trees like towards living beings. More than half of questioned during this poll believed that trees feel pain and one quarter of them were unsure. One quarter had asked for forgiveness from tree spirits when felling trees or cutting twigs. According to the poll conducted by Lang [31] in 1999, 60% associated the word 'nature' with the forest, 50% with water and 40% with life, flora and fauna. A trend to see nature as healthy and positive was strengthened by the fact that 99% of all informants did agree with the statement that 'In nature, I can rest and recover'. When asked about the relation between human beings and nature, the majority of informants answered that they are part of nature and all what happens in nature, will also influence the humankind. Citing: '... but the trend is clear: Informants see that they are a part of nature, that they need nature to be healthy and clean, because they take a lot of energy, strength and relaxation from nature. It also shows that Estonian nature in general is still relatively healthy, clean and that people tend to take this for granted. The beauty of nature is of much importance for the sample informants'. They realise that the beauty of nature is a prerequisite for environmentally friendly behaviour. 77% of all informants agreed with the following statement: 'If you do not appreciate the beauty of nature, you can not be environmentally friendly'. It may be concluded that ethical preconditions in Estonia for sustainability are relatively high.

4.2 Economic sustainability dimension of Estonia

According to Hamilton [18] Estonian genuine saving was 8.2% of GDP in 1997 (Figure 1). In order to compare Estonian position we selected 25 countries with the biggest and the smallest genuine savings. Among the selected countries Estonia is on 19th position, just after the USA and actually with equal genuine saving rate with the UK. Analysing the composition of genuine saving, high percentage of carbon dioxide damage (2.3%) can be deducted. It is remarkable that only 7 countries out of approximately 100 presented have this figure higher than Estonia: Mongolia 6.2%, Kazakhstan 5.5%, Azerbaijan 5.1%, Ukraine 3%, Bulgaria 2.7%, China and Uzbekistan 2.4%.

4.3 Ecological sustainability dimension of Estonia

According to the Living Planet Report [19] Estonian Ecological Footprint was 7.12 area units in 1996, the ecological deficit was –3.1. Estonia exceeded the world average level of Ecological Footprint around 3.26 times being among the 152 states at the 138th position. Comparison of Estonia in this matter with the 25 selected countries is presented on Figure 1. The main reason for such a low position of Estonia is the extensive CO_2 footprint (3.87) in area units per person. Only 12 countries have a bigger CO_2 footprint, from which 5 are situated in Europe. Ecological deficit (ED) indicator divides all of the compared countries into two groups: with positive (more sustainable) and with negative (less sustainable) ED. Unfortunately, Estonia belongs into the group with negative ED, which means that Estonia is much closer to the unsustainable countries than to the sustainable ones.

4.4 Opportunity for Estonia

Stating that sustainability starts with ethics, values, believes and attitudes, good opportunities for Estonia to become a sustainable society exist. When adding the present economic and ecological dimensions of sustainability in Estonia, the sustainable society is clearly a utopia. The results indicate that one major factor for both economic and ecological unsustainability is CO_2 emission per capita. This was 14.7 tons per capita in Estonia in 1996 [32], caused mainly by the Estonian energy sector based on oil shale. Estonia shared a 'second place' with Denmark after Luxembourg in the European Union at the bottom of the list. Is there any alternative? Can we turn our disadvantage to an advantage? The most promising solution seems to be utilising biomass (CO_2 balance=0) in Estonia. The first results presented by Mander *et al.* [33] indicate that the area of wetlands in Estonia left out of agricultural and forestry use and without any biodiversity value is roughly 594 000 ha. Utilising half of these lands for treating wastewater with ecological technologies, most of Estonian wastewater could be managed. 55% of electricity combined with 61% of Estonia's annual heat consumption could thus be provided. Preliminary calculations indicate that Estonia can improve its genuine saving and decrease its Ecological Footprint significantly after reforming its energy sector from using fossil fuels to applying renewable resources. Estonia has all needed physical preconditions for a so-called

environment reform; public understanding, political effort and private investment build the ground to implement the reform. The positions of other countries is analysed on the basis of genuine saving and Ecological Footprint/deficit (Figure 1). A surprising conclusion about the top four of the most sustainable countries worldwide can be made. The first four countries are Botswana, Indonesia, Gabon and Peru according to the three presented criteria (1) the biggest genuine saving as investment for the future; (2) Ecological Footprint less than 2.18 area units; (3) the biggest positive ecological deficit. This is opposite to the prevailing understanding of developed and developing countries in the world among them Estonia. It is often argued by the politicians and the media that Estonia can catch up with Finland within 10 years, but the level of the UK or the USA can never be achieved. The selected list presented on Figure 1 shows clearly 'the real price' of the development. According to the list, Estonia already is ahead of the UK and quite close to the USA. We are not so far behind Finland but very far from Botswana. Due to cultural similarities and differences, Botswana can never be Estonia's role model as a sustainable society. On the other hand, Costa Rica could be. The traditional 'developed countries' surely cannot be the role model for Estonia. Estonia could become a pilot for a sustainable society when finding sustainable economic and ecological solutions, choosing right examples and role models. Estonia has an opportunity bravely to ignore unsustainable development path what the most 'developed' countries are following at the moment.

5 Conclusions

I conclude that Estonia has relatively good ethical preconditions for sustainability. Over the half of the Estonians accept intrinsic value of the Nature. The present position of Estonia among the selected countries is closer to unsustainable societies compared on the basis of genuine saving and Ecological Footprint/Deficit. It is evident that the idea of becoming a pilot for a sustainable society for Estonia is clear utopia without radically changing its energy sector. The main reason and the key-factor for unsustainability of Estonia, is the extremely high carbon dioxide emission per capita caused by oil shale industry and energy production. On the other hand, Estonia has unique physical preconditions, having around half-a-million hectares of agriculturally non productive wetlands without any biodiversity value. These can be used for wastewater treatment as well as energy and material production. 300 000 ha of energy/treatment wetlands can cover about 61% of Estonia's annual heat consumption and 55% of electrical energy production. This will also change Estonia's present negative CO_2 balance to a similar positive balance. Genuine saving would rise, Ecological Footprint would decrease and ecological deficit would be positive. This is Estonia's opportunity to become a pilot for a sustainable society.

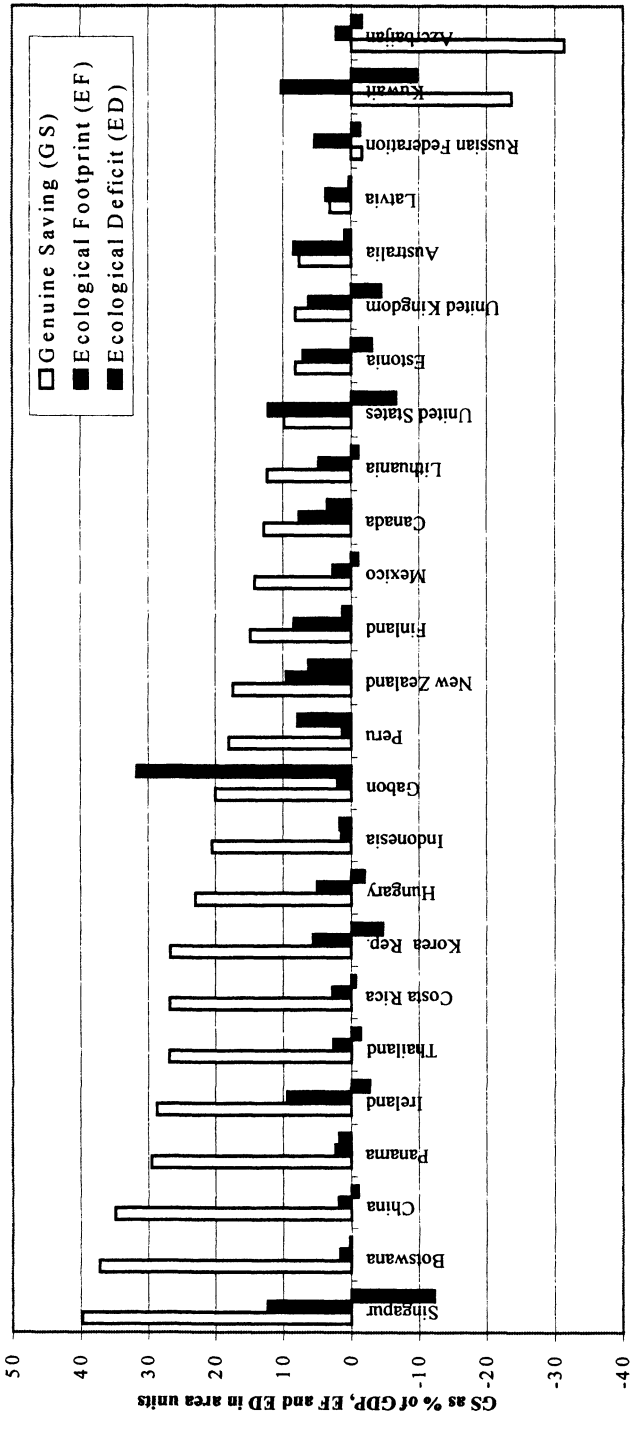

Figure 1: Comparison of 25 selected countries with biggest and lowest genuine saving (GS) rate as % of GDP. Additionally the ecological footprint (EF) and Ecological Deficit (ED) in area units are shown at the same time. Most sustainable is country with highest GS, EF<2,18 and with maximum positive ED.

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