

Study on Environmental Wellbeing and Its Main Socio-Economic Factors: Evidence from Romania

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Abstract

Sustainability especially targets the process of reconciliation and balance among specific tendencies occurring in its economic, human, and environmental dimensions. This study intends to reveal if salient differences between the levels of each dimension are present across a punctual national context, i.e. the Romanian one, in the 2006-2020 period. It also intends to investigate the effects of economic and social sectors on the main weak points of environmental wellbeing, if these are still significant and negative or, contrary, if sustainable path could be found in these links in the same circumstances of analysis. In this way, we centered our debate on environmental performance, found its main vulnerabilities for observing, on one hand, if Romania follows different environmental paths comparatively with the other two dimensions of wellbeing and, on the other hand, the nature of the effects of society's performance (with its economic and social parts) upon it. Particularly, our study aims to respond to a practical need of research in this country, being also possible to represent a support for the policies addressing sustainable development in the Romanian context. Based on descriptive and path analyses, our results showed that, in the case of environmental wellbeing, the most vulnerable indicators are shown to be the ones regarding renewable energy and energy savings. The main susceptibilities in Romania seemed to be in respect to the relationship between (1) energy savings and safe sanitation, healthy life, population growth, public debt, employment and (2) renewable energy and healthy life, population growth, public debt. Accordingly, the two most sensitive environmental indicators were shown to be affected by these human and economic components of wellbeing, recommendations being formulated in the directions of more careful strategical actions for their improvement in such a way of not highly contributing to the degradation of the environment.

Keywords

environmental performance, natural resources, climate & energy, human and economic wellbeing, Romania, path analysis.

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Introduction

Natural environment should represent a real concern across societies and needs to become a major priority at the individual, organizational, and, also, political levels. In response to this necessity, the academic debate did not take long to appear, integrating it in different domains and areas of applications. In the development theory, sustainability synthesizes the larger perspective in which, besides the human and economic concerns, environmental issues are considered and emphasized as essential for wellbeing and, accordingly, closely linked to the other major societal dimensions (Pohoacă *et al.*, 2020; Kowalski and Veit, 2019; Van de Kerk and Manuel, 2008; Collin and Collin, 2015; Springett and Redclift, 2015; Hediger, 1999; Goodland, 1995; Solow, 1993).

Therefore, as Ulman *et al.* (2021a) underlined, sustainability appears to represent the process of reconciliation and balance among different tendencies occurring in its three dimensions. This study intends to reveal if salient differences between the levels of each dimension are present across the Romanian society

in the period between 2006 and 2020. The differences of levels could be able to offer the perspective of the type of model put into practice at the national level, if there were different changes in this regard across the analyzed years or in regard to the priorities granted to a dimension or another or, more detailed, even to different components of these dimensions. In addition, it also intends to investigate the effects of economic and social sectors on the main weak points of environmental quality, if these are still significant and negative or, contrary, if sustainable path is identified. Consequently, our research is intended to analyze the manner in which the effort of improving human wellbeing, next to economic wellbeing, contributes to the status of environmental wellbeing in Romania. In this respect, it firstly tries to analyze the manner in which the model of sustainable development is put into practice in this national context. Secondly, based on our study's results, it opens new areas of research and policy initiatives that need to be fully comprehensive. Detailing, fully aware of the fact that nations differ in their capacity of attaining economic, social, and environmental performances (see, for example, Van de Kerk and Manuel, 2008; but also, Ulman *et al.*, 2021a, 2021b, 2020), the first major aim of this paper was to compare the national levels between 2006 and 2020 in Romania, for establishing: (1) actual national perspective in terms of differences between the performances of the three sustainability dimensions, identifying the major weaknesses in regard to environmental wellbeing and (2) evolution, from the perspective of time, of these three dimensions within this country, during the period between 2006 and 2020. In addition, we observed the effects of human and economic wellbeing upon environmental wellbeing in the case of main identified environmental vulnerabilities. In this way, we centered our debate on environmental wellbeing, found its main weaknesses for observing, on one hand, if Romania follows different environmental paths comparatively with the other two dimensions of wellbeing and, on the other hand, the nature of the effects of society's performance (with its economic and social parts) upon it. As far as we know, there are no other studies focusing on the effects of human and economic components of wellbeing on the main vulnerabilities of environmental wellbeing in Romania, analyzed through similar lenses.

The paper has four sections. After the Introduction, Section 2 comprises the review of the scientific literature, while Section 3 describes the data and the used methodology. The results are presented and discussed in Section 4. The paper ends with conclusions in Section 5.

1. Review of the scientific literature

Although the concept of sustainable development carries with it different epistemological and practical problems, it is considered to be also responsible for an obvious transformation of the environmental discourse (Springett and Redclift, 2015, pp. 6-7). Being a multidimensional phenomenon, simultaneously including economic, social, and environmental dimensions, the trade-offs between the objectives of each of them represents one of its main characteristics (Stoorvogel *et al.*, 2004; Hediger, 1999).

In the academic literature, diverse composite indices were created in order to measure the sustainability at different levels (i.e. national, regional, organizational, or individual). In the case of evaluating sustainability of a country, examples of such indices are as follows: the Environmental Performance Index EPI (Esty *et al.*, 2006), the Human Development Index HDI (UNDP, 2014), the Index of Sustainable Economic Welfare ISEW (Daly and Cobb, 1989), the Sustainable Society Index SSI (Kowalski and Veit, 2019; Van de Kerk and Manuel, 2008), the Ecological Footprint EF (Ewing *et al.*, 2010) etc. In this paper, basing on different reasons, we directed our attention to the Sustainable Society Index (SSI). It comprises a large set of indicators for each of the three dimensions of wellbeing (i.e. human wellbeing, economic wellbeing, and environmental wellbeing), all coming from a large number of reliable sources. Moreover, the SSI was described by the Joint Research Centre of the European Commission as an index: "well-structured and guarantying a control process to ensure transparency and the credibility of the results" (Gallego-Álvarez *et al.*, 2015).

Accordingly, while encapsulating a higher awareness on the approach of living with nature and with each other, imposing a quasi-new perspective regarding the need for a change in the way of living in terms of more simplicity and improved spiritual richness (Worster, 1993, p. 132), groups of components like natural resources (biodiversity, renewable water resources, consumption) or climate and energy (energy use, energy savings, greenhouse gases, renewable energy) became of major interest in the sustainability debate. A unitary perspective on what we now call environmental wellbeing is given by their integration (see Van de Kerk and Manuel, 2008, and also Kowalski and Veit, 2019). The definitions of the components of environmental wellbeing, to which SSI was based, are the following: (1) biodiversity - *The 10-year change of forest areas and the size of protected land areas as % of the total land area of a country*; (2) renewable water resources - *Annual water consumption as % of the total available renewable water resources, including internal and external (flowing in from neighbor countries) water resources*; (3) consumption -

Ecological footprint minus carbon footprint, once it is already included in this index by the emission of greenhouse gases; (4) energy use - Primary energy usage - Production + Imports - Exports ± Stock changes; (5) energy savings - Change in primary energy usage between 2012 and 2016, as %; (6) greenhouse gases - Amount of emitted CO₂ - other GHG emissions, like CH₄, N₂O, HFCs, PFCs and SF₆, not being included into it; (7) renewable energy - Share of energy produced by renewable sources, as % of the total energy (TPES, Total Primary Energy Supply).

Consequently, special emphasize is required to be laid on the responsibility of humans in regard to the necessity of an ample understanding of their role in relation to the environment (Costanza *et al.*, 2015, p. 56). As many studies revealed, different environmental components, inclusively the ones selected by us in the present study (i.e. the components of SSI), were linked to diverse social and economic issues in order to understand their implications towards environmental degradation. For example, Ulman *et al.* (2020; 2021) tried to observe the nature of influence among, on one hand, environmental and economic components and, on the other hand, environmental and social components of wellbeing in different contexts, i.e. the European Union and the Central and Eastern European Countries, while also considering the stages of development of the analyzed countries in order to understand the type of development put into practice across these groups of countries. The studies concluded on the fact that specific directions of actions may be the factors that significantly and negatively affect the wellbeing of environment and that these directions may be even particularized in terms of the stage of national development. Moreover, these papers agreed with the results of other studies that emphasized the impossibility of precisely detecting the consequences of different patterns of managing development, while underlining the idea that the economic and social dimension may influence in a negatively, costly and potentially irreversible way the wellbeing of our major commune good, i.e. the environment. These arguments constituted the basis of this present study that intends to observe the links between the components of the three dimensions of sustainability, having the environment into the center of the debate, into a more specific context, i.e. the Romanian one.

2. Research methodology

The analysis was centered on the relationships between aspects referring to the three dimensions of sustainable development in the case of Romania in the 2006-2020 period. Giving its historical background under the communist regime, Romania, as other countries from the Central and Eastern European region, had to face a significant challenge towards a more sustainable path of development. Once the communism crashed, the Ministries of Environment was founded and the environmental policy began to be an important component of the general state policy. However, in the process of transition from communism to democracy, Romania experienced a decade of economic and social instability and decline. In this context, the key to progress in all these respects was represented by the Romania's commitment to join the European Union (EU) in 2007. As a consequence of its admission in the EU, several policies were adopted at the national level for harmonization to the legislation with the European one. Thus, some of the indicators regarding the economic, social, and environmental aspects registered significant changes over time.

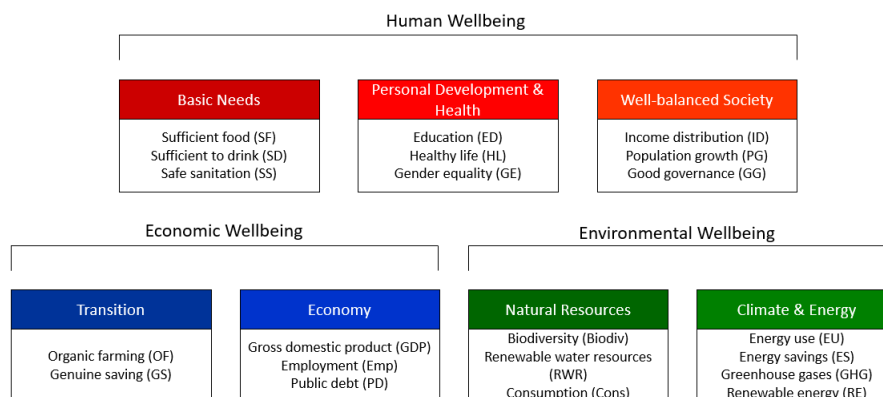


Figure no. 1. The SSI framework

Source: authors' representation, Van de Kerk and Manuel, 2008

In order to capture these variations, we used data for the indicators available on the official website of the Sustainable Society Index (SSI), which, until 2018 reported data every 2 years (2006, 2008, 2010, 2012, 2014, and 2016), and, currently, offers data in progress for the 2019 and 2020 years. In the SSI framework (Figure 1), for each of the three dimensions of sustainability, a series of indicators are included. Each of

these indicators vary from 1 to 10, where 1 refers to the lowest level of sustainability, while 10 to the highest one.

We structured our analysis into two parts. Firstly, giving the SSI framework, we determined the average scores for each of the categories of indicators in the case of Romania in the 2006-2020 period in order to identify the one which needs to be more improved. Secondly, taking into consideration the evolution and scores of the indicators included in the selected category, we further focused on the more problematic ones and we analyzed the relationships between them and the other indicators from the SSI framework using the path analysis. This type of analysis represents one of the statistical techniques which are used for examining the causal relationships between two or more variables. It is superior to classical regression analysis due to the fact that, beyond checking the mathematical correlations among variables, it focuses on the causal effects among those variables by depicting a mathematical model that is used to explain the correlations. The path analysis specifies the effects between the variables observed in the theoretical model on the basis of which the path diagram is made (Shumacker and Lomax, 2016). Taking into consideration the decomposition of the path coefficients, the causal effects can be classified in the following categories: direct effects (i.e. studying the relationship between two variables), indirect effects (i.e. analysing the relationship between two variables mediated through a third variable), total effects (i.e. including the sum of all the direct and indirect effects) and unanalyzed correlation and spurious effects (Olobatuyi, 2006). According to our purpose, we studied the sign and significance of the coefficients for each direct effect between the indicators. The path coefficients are derived from a Pearson product moment correlation coefficient and/or a standardized partial regression coefficient (Wolfler, 1977). For validating the results obtained in the path analysis, we used the following indicators: Goodness-of-fit, Adjusted GFI and Normed fit index (Shumacker and Lomax, 2016).

3. Results and discussion

Within the SSI categories of indicators, according to the results presented in Figure 2, in average, the highest scores were identified in the aspects referring to Basic Needs (9.222) and Personal Development & Health (8.163), two of the human wellbeing components; while the ones regarding environmental wellbeing registered, in average, among the lowest scores in the case of Romania in the 2006-2020 period (6.667 for Natural Resources and 3.867 for Climate & Energy).



Figure no. 2. Levels of economic, human and environmental wellbeing in Romania in the 2006-2020 period

Source: SSI database, computed in Tableau Public 10.3

In the case of human and economic wellbeing indicators, in general, the dynamics were quite tough, with low variations from a year to another, exception being the Income Distribution (ID) and Genuine Savings (GS) which registered significant disequilibrium. In the Climate & Energy category, which is the most problematic one from the SSI framework, there can be observed significant differences among the evolutions and the levels of the indicators in the analyzed period. On one hand, Energy Use (EU), Greenhouse Gases (GHG) and Renewable Energy (RE) registered a slow tendency of increasing values with a peak in 2018, but with different levels, medium scores in the case of EU and GHG (varying between 6.4 and 7.3 and between 5.7 and 6.6) and low scores for RE (varying between 1.2 and 2.4). On the other hand, Energy savings (ES) registered the highest peak earlier, in 2014 (7.4) and the range of variation was more comprehensive (between 2.1 and 7.4).

Observing the 2020 year, referring to human wellbeing, from the available data, Good Governance (GG) and Gender Equality (GE) seem to have some problems, but not as stringent as the ones from the environmental dimension. However, in 2019, by far, the indicator related to Income Distribution (ID) stands out in a negative way. The major national worriment in terms of Economic Wellbeing (EcW) is in regard to Organic Farming (OF) and Genuine Savings (GS), followed by Employment (Emp). In the case of Environmental Wellbeing (EnvW), the most vulnerable indicators are shown to be Renewable Energy (RE) and Energy Savings (ES), while the Renewable Water Resources (RWR) is observed to register the maximum level of wellbeing.

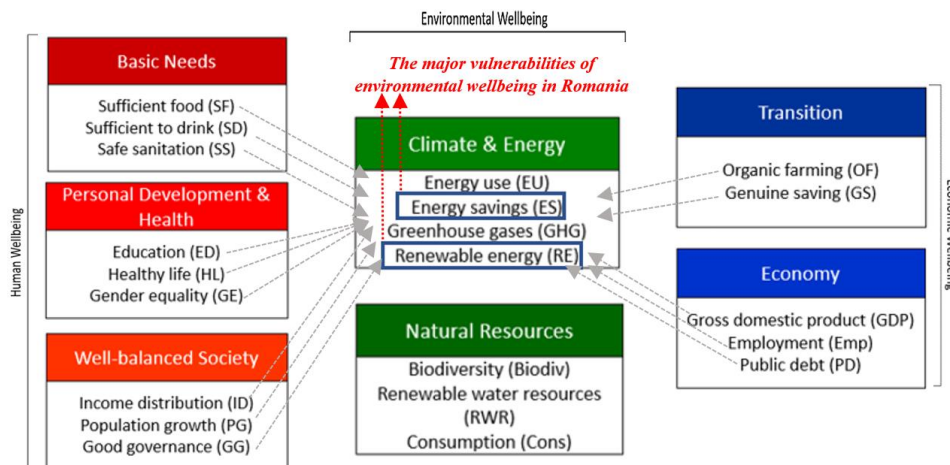


Figure no. 3. Analysis framework based on descriptive results

Source: authors' representation, SSI database

Taking into consideration these evolutions and also the main weaknesses in terms of environmental wellbeing, next, we analyzed in detail the direct effects of the human and economic indicators on the scores of ES and RE, as indicated into the framework of the analysis from Figure 3. In this way, energy savings and renewable energy, evaluated in terms of levels of wellbeing, are put face to face with the indicators of human and economic wellbeing and analyzed from the perspective of their effects on them. More clearly, as shown in previous studies (Ulman *et al.*, 2021a, 2021b; Ulman *et al.*, 2020), positive relationships could be able to reveal a sustainable path of development as human and economic components prove to be able of overcoming the most common way of influence, i.e. a negative one in relation to environment. Thus, only in these circumstances, the process of reconciliation and balancing the three dimensions of sustainability could be categorized as attaining its objective. Moreover, although it is understandable the impossibility of precisely detecting the consequences of different patterns of development in regard to human and economic dimensions on environmental wellbeing, the idea that the sign of influence could be changed in time and, also, that the empirical evidence for it could be found in different studies may encourage both the theoreticians and practitioners of sustainable development. Moving on, Figure 4 emphasizes the sign and signification of the coefficients indicating the relationships analyzed. Regarding ES, we can observe that among the human wellbeing indicators, some of them have a positive direct effect (SD, ED, GE, and ID), while others a negative one (SS, HL, and PG). The significant economic effects on ES are various: positive for GS and negative for Emp and PD. However, in the case of RE, most of the indicators have insignificant direct effects (GS, GDP, Emp, ED, SD, and SS), while others have the same types of effects as in the case of ES (i.e., positive for GE and ID and negative for PG and PD). In addition, GG and OF have a positive and significant effect in this case.

In this way, the main vulnerabilities in Romania seem to be in regard to the relationship between (1) energy savings and safe sanitation, healthy life, population growth, public debt, employment and (2) renewable

energy and healthy life, population growth, public debt. In detail, the number of people, as percentage of the total population with sustainable access to improved sanitation negatively influences the level of energy savings, meaning that, even if safe sanitation should improve or insignificantly influence environmental wellbeing, a high level of this indicator, as it was registered, affects the environment in Romania in regard to the savings of the energy.

The HL indicator maintains the same relation with ES as SS in the context in which the number of years that a newborn is expected to live minus the number of years spent in poor health influences in a negative way the energy savings from this country. This result is also overseen in the case of RE.

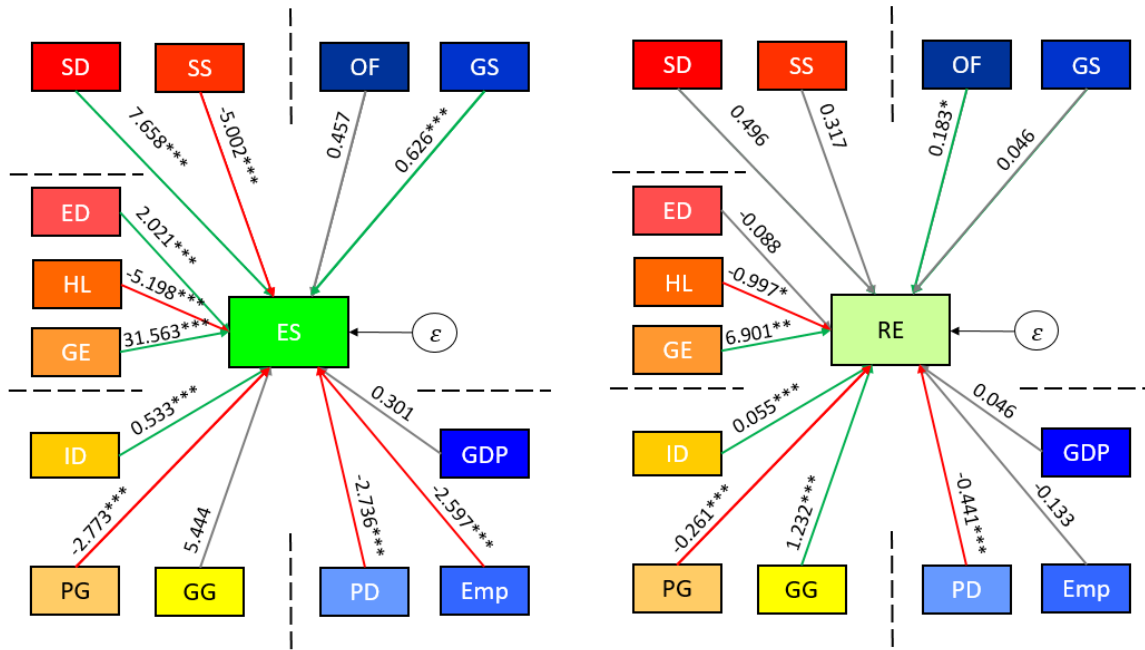


Figure no. 4. The effects of human and economic wellbeing components on main vulnerabilities of environmental dimension

Source: SSI database, computed in Tableau Public 10.3

Moving to the next links, PG also registers negative effects both on ES and RE. This may be explained by the fact that, from a certain threshold of population density, a growing number of people tends to be harmful for environment, putting pressure on both its resources and performance. This result is confirmed in other studies analyzing the same relation, but in a different context, i.e. in the first stage of development, the one in which there are included factor-driven economies (Ulman *et al.*, 2020b, p. 20). In the center of this discussion, the innovation seems to be the key response, more people being translated into higher possibilities of innovating the green actions and processes.

The pressure exerted by higher public debts seems to influence in the same negative way energy savings and renewable energy. As stated by Ulman *et al.* (2021b), this might be another reason for which the nations should escape from the high levels of debt trap. Once established, it is challenging (1) to prioritize environmental protection against economic gains and (2) to direct funds to improve the quality of environment. This finding confirms the ones from other studies revealing that, apparently, a high public debt may be a constraint on environmental preservation (Clootens, 2017; Fodha and Seegmuller, 2014).

Finally, our results emphasize a significant and negative relationship between the level of employment and energy savings. Thus, a higher level of employment seems to be harmful to the environment in this regard. The major concern established within the book of Lawn (2009) in terms of the potential conflict between the goals of ecological sustainability and full employment seems to be observed also in our study. Moreover, although it seems to have a more pronounced character within the developed societies, in Romania, the pressure on energy savings is on the same way.

Conclusions

The perspective of national development analyzed from the lens of sustainability is among the largest concerns of the actual socio-economic studies focusing on development. Accordingly, referring to the Romanian context, we consider that analyzing its state of fact with regard to economic, human, and

environmental wellbeing, as the three major dimensions of sustainability, is of great interest both for citizens and politicians, but also relevant within the academic literature focused on this country. This is pertinent especially in the context in which, to our knowledge, there are no other studies punctually analyzing Romania from this point of view and using similar approach and methodology. Besides the national state of fact, for observing if progress was registered and if this country was able to maintain an ascendant trend in the considered period, the evolution in time was also emphasized. In addition, centering on the environmental dimension and selecting the most critical components of it, the effects of economic and human components on these selected vulnerable environmental issues were investigated.

As observed across the study, the strong points of Romania seemed to be the ones referring to Basic Needs and Personal Development & Health, showing to have very high levels especially in terms of sufficiency of food and available drinkable water, capacity of having a healthy life and population growth. Moreover, these issues registered improvement in the analyzed period, managing to maintain their levels to the path of what supposes to be sustainability. Contrary, the weakest points of this country were shown to be the environmental components, with very low levels especially with regard to energy savings and renewable energy. Unfortunately, these small performances were maintained on the analyzed period, with progress only with regard to the first one, but with a dramatic return to the precedent low levels in the last two years. This was the main reason for opting to go further in our analysis only with these two environmental indicators that appeared to be the most problematic among all the seven ones from the same category. It is known that, in general, the society is constituted as a whole large system, with environmental, human, and economic issues connecting and influencing each other. Putting the environment in the center of our interest, while it was shown that it represents the most vulnerable dimension in Romania, we found that the indicators regarding healthy life, population growth and public debt seemed to be awkward in relation to both environmental issues, while safe sanitation and employment were added as affecting particularly energy savings. On the basis of the obtained results, we may assert that the solutions to be found should assure reducing the pressure of these socio-economic peculiarities upon the environment, while also contributing to improve the environmental concern among both citizens and public servants, who have to show more openness in supporting environmental protection initiatives focusing on these key issues. In this way, a future research endeavor may be the one that deepens these conclusions and investigates them into a more detailed approach, considering the local and regional levels for more preciseness with this regard.

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