

Elements of assessment of the eco-economy in the context of resource scarcity and consumer society

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Abstract: The paper highlights the necessary aspects regarding the awareness of the relationship between the economy and the environment in the conditions of increasing resource scarcity and increasing effects of climate change on the economy and well-being of the population. Thus, the respondents' responses regarding sustainable consumption, protecting budgets in the sense of responsible, rational and equitable consumption in relation to the factors of production attracted and used in consumption for the production of goods, an effect of solvent and sustainable demand, are appreciated.

Key words: ecoeconomy, bioeconomy, bioproducts, green economy, sustainability.

JEL Classification: I12, I25.

Introduction

Ecoeconomy is considered to be the step towards a new economic science that conceives the health of economic life and the values produced from the perspective of "the health of the whole living common" (Popescu, Burghilea, 2010), being strongly anchored in the principles of the green economy and the bioeconomy. **The bioeconomy** uses biological resources from the soil and sea (blue growth), as well as waste, as raw materials for the production of **bioproducts** (food, animal feed, industrial and energy production) (Smyth et al, 2011). It also includes the use of green processes for sustainable industrial sectors (biowaste is known to have considerable potential as an alternative to chemical fertilisers or for conversion to bioenergy and can contribute to the achievement of 2% of the European Union's renewable energy target) (Wesseler, 2011).

The green economy, as defined by the United Nations Environment Programme Report (released in February 2011), results in improved well-being and social equity, while significantly reducing environmental risks and the ecological deficit. The green economy implies the assumption of policies and investments that will receive economic growth from the intensive consumption of raw materials and energy. A green economy can be thought of as a low-emission economy, through the efficient and sustainable use of resources and ensuring social inclusion. In a green economy, income growth and employment should be driven by public and private investments that reduce carbon emissions and pollution, increase energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services.

At the same time, the green economy is a model of economic development based on sustainable development and knowledge of the ecological economy. Karl Burkart defines a green economy as based on six

main sectors (MNN 2013):

1. renewable energy (solar, wind, geothermal);
2. green constructs (LEED constructs -Leadership in Energy and Environmental Design);
3. alternative fuels (electric or hybrid vehicles, etc.);
4. water management (water treatment, rainwater collection systems, etc.);
5. waste management (recycling, etc.);
6. territorial management (including organic agriculture, habitat conservation, urban afforestation-parks, reforestation and land stabilization).

The Global Citizens Center led by Kevin Danaher defines the "green economy" as an integrated concept based on (Danaher, 2007):

1. **sustainability** - humanity depends on the earth's natural resources and therefore an economic system must be created that respects the integrity of ecosystems;
2. **social environment** - an economic system must be created that ensures that all people have access to a decent standard of living and full of opportunities for social and personal development;
3. **The green economy** is a global aggregate of individual communities meeting the needs of its citizens through responsible, local production and the exchange of goods and services.

Given the way in which the economy and the environment are approached, often as separate entities, operating according to different principles, corrections are required in the way they are substantiated and applied at the level of human and economic entities. In the opinion of many people, economic growth naturally occurs at the expense of the environment and the protection of natural resources imposes constraints on economic growth. This approach to the economy and the environment is not sustainable, and sustainability is perceived more as an environmental concept, not an economic one. In reality, a sustainable, sustainable vision, which does not overlap with the economic development model, is in contradiction with development trends, including the perpetuation of life and habitats. The economy of the future will require an economy that, rather than working against ecological principles, strengthens and builds on them. This type of economy is the eco-economy.

In essence, the ecoeconomy transfers the benefits of the bioeconomy to all components of economic life, giving the individual and his needs a predominant place and advancing renewable resources, innovative technologies, products of scientific research for the integrated development of society in relation to the natural environment and maintaining it at a level favorable to the perpetuation of life.

The ecoeconomy advocates for educating the population regarding the consumption of resources, efficient waste management in order to protect biodiversity, protecting the natural heritage and developing people's ecological awareness, along with increasing the commitment to protection and conservation actions.

Human society's dependence on ecosystem services makes biodiversity degradation a threat to the future of all people's well-being. Under these conditions, ecoeconomy proposes the development of a responsible attitude towards the natural environment, pro-ecological habits and practices in relation to the protection and conservation of the environment, awareness of the population about the problems caused by the irrational exploitation of resources and the negative effects produced on the environment, the most important of which are the high degree of pollution and climate change. The ecoeconomy essentially aims to apply the principles of

sustainability and sustainable development at the group level and to translate them to the community, in order to improve the perception of the indissoluble link between the natural environment and the rational use of natural resources. The ecoeconomy aims to change the perception of the content of the concept of economic growth, through major awareness, people understanding how vital it is for future generations, for us, today, to rationally consume natural resources with a significant impact on the result produced, with a knock-on effect on the economy. Sustainable economic growth is about sustainability, and sustainable development involves more than economic growth.

The ecoeconomy responds to the need for the development of a modern education, which for the present could create that human wisdom, capable of engaging in active participation, capable of defining an ecological position, in order to rationally use natural resources, in consensus with sustainable development and protection of the natural environment.

Research methodology

EU Member States' efforts to reduce the level of greenhouse gas emissions are accelerated by the intensification of the implementation of clean technologies at the level of economic activities, advances in scientific research and biotechnologies in waste management, rational use of natural resources, production of economic goods by taking into account the principles of sustainability and sustainable approach to economic actions and processes. The EU is making progress in the sustainable approach to the economic act, both in relation to the strategies and regulations related to the economic system, and by stepping up funding efforts, from specific programmes adopted by the European Union institutions (Committee on the Environment, Public Health and Food Safety/European Parliament, Environment/Council of the European Union, Environment and Climate Action/European Commission, Section "Agriculture, Rural Development and Environmental Protection"/Economic and Social Committee, Committee on the Environment, Climate Change and Energy/Committee of the Regions, European Environment Agency).

At the level of the economic agent, the effort to implement non-polluting technologies is both of an investment and a logistical nature: it depends on the financial capacity, on the degree of absorption of the products made on the markets in order to ensure a profit rate, on the institutional capacity to appropriate and implement the legislative elements that would place the company in the area of sustainable economic growth.

In the article we propose for analysis a case study, in the form of a questionnaire, at the level of an energy company that sets itself the objective of reducing greenhouse gas emissions. The goal is to make the production process compatible with non-polluting, creative technologies. For this purpose, we have drawn up a questionnaire with 18 questions distributed to 232 employees. Each question is assigned pre-coded answers such as "Disagree total/Strongly disagree", "Disagree", "Undecided", "Agree", "Strongly agree" in order to identify the respondent's agreement or disagreement with the questions asked.

The 18 questions have the role of identifying at the level of the economic entity the degree of interest regarding the application of a set of rules that implement the principles of ecoeconomy. At the level of the economic entity, the questions were structured according to objectives, as follows:

- Objective 1: Sustainable use of natural resources (questions 1, 2, 3)
- Objective 2: Application of environmental standards in production (questions 4, 5, 6)
- Objective 3: Manifestation of competition and identification of its effects (questions 7, 8, 9)

- Objective 4: Pre-testing eco-economy principles (questions 10, 11, 12, 13, 14)
- Objective 5: Use carbon market-specific instruments (questions 15, 16, 17, 18).

Table 1. Presentation of research results

Questions	Total Disagree	Disagreement	Undecided	Agreement	Total agreement	
1	Protecting the environment is a must	16	9	29	56	122
2	The use of non-polluting materials contributes to the reduction of greenhouse gases	14	4	16	84	114
3	Environmental education and further vocational training increases proactive attitude towards the natural environment	16	2	16	98	100
4	The application of national and European rules in the field of environmental protection contributes to reducing the risk of pollution	15	1	12	68	136
5	Compliance with sustainable production standards increases product quality	10	12	30	71	109
6	Coercive measures of an administrative-legal nature have the role of diminishing polluting production practices	14	3	23	78	114
7	Competition encourages the reduction of production costs, with an effect on the decrease in the quality of the raw materials used	6	5	17	107	97
8	The market discourages ethical behavior in business	4	26	39	85	78
9	Consumerism as a societal effect encourages waste	29	24	41	75	63
10	The ecoeconomy protects the future of resources and implicitly of humanity	7	4	12	102	107
11	Quality of work protects nature and society	10	14	49	91	68
12	Creative work is sustainable	7	7	22	106	90
13	A sustainable approach to business has a positive effect on the environment	7	13	17	96	99

14	Ecoeconomy creates sustainable solutions for the future of humanity	8	8	22	94	100
15	Greenhouse gas emission certificates (EUAs) stimulate the non-polluting behaviour of the economic agent	7	9	27	97	92
16	Buying greenhouse gas emission allowances (EUAs) is an unsustainable transaction over time	5	11	13	110	95
17	The carbon market should be shrinking to protect the environment	5	11	4	104	108
18	It is an option for your own company to hold greenhouse gas emission certificates in its portfolio	87	56	41	39	9

Source: Own processing using parametric and non-parametric statistical methods

The 18 questions were constituted in 11 models, each having a number of predicates whose purpose is to identify whether the proposed analysis responds to the objectives of the research.

Table 2 - Determination of statistical models

Model	Predicate	Questions
Model 1	3-responsibility, necessity, relevance	1
Model 2	3-responsibility, necessity, relevance	2, 3, 4
Model 3	5-responsibility, necessity, relevance, compatibility, quality	5
Model 4	5-responsibility, necessity, relevance, compatibility, quality	10, 14
Model 5	2-competition, efficiency	7, 8
Model 6	5-responsibility, necessity, relevance, compatibility, quality	11, 12
Model 7	1-Waste	9
Model 8	2- Relevance, opportunity	15, 16
Model 9	1-Legality	6
Model 10	4- responsibility, necessity, relevance, opportunity	17, 18
Model 11	5-responsibility, necessity, relevance, compatibility, quality	13

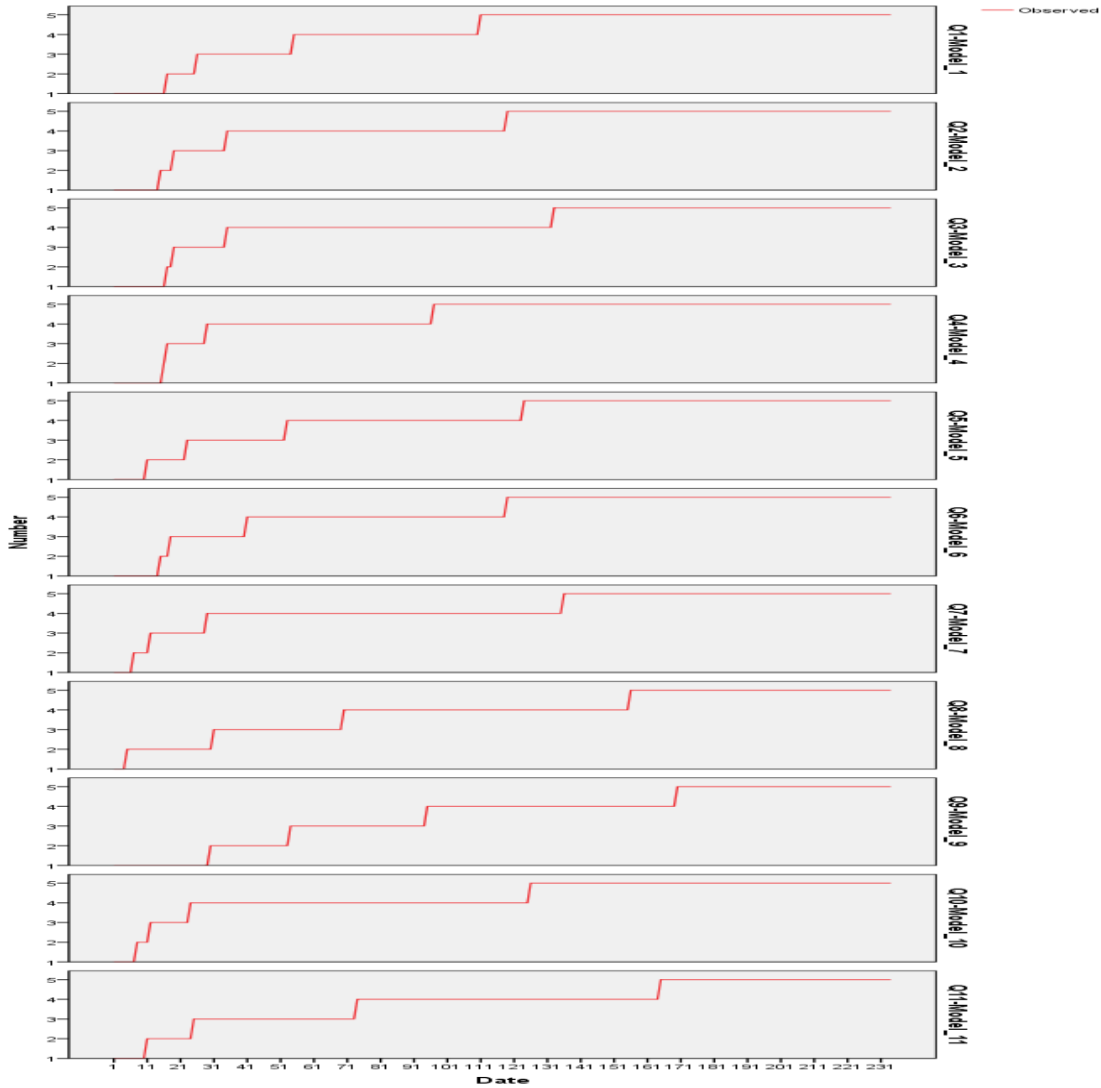
Model Summary

Model Statistics						
Model	Number of Predictors	Model Fit statistics	Ljung-Box Q(18)			Number of Outliers
		Stationary R-squared	Statistics	DF	Mr.	
Q1-Model_1	3	0.244	7.821	18	0.981	0
Q2-Model_2	3	0.110	8.894	18	0.962	0
Q3-Model_3	5	0.730	31.117	17	0.019	0
Q4-Model_4	5	0.359	10.598	18	0.911	0
Q5-Model_5	2	0.183	15.665	18	0.616	0
Q6-Model_6	5	0.359	24.015	18	0.155	0
Q7-Model_7	1	0.146	24.172	17	0.115	0
Q8-Model_8	2	0.067	7.483	18	0.985	0
Q9-Model_9	1	0.046	1.509	18	1.000	0
Q10-Model_10	4	0.448	45.448	17	0.000	0
Q11-Model_11	5	0.261	5.230	18	0.998	0

From the econometric analysis of the data presented in detail in Table 1 and centralized in Table 2, it is found that the data are not distributed independently; they show serial correlation (according to the Ljung–Box Q test). Each model has a certain number of 17 and 18 degrees of freedom (DF) respectively, which shows that the number of parameters of the model can vary freely when estimating a certain target (in relation to the identified predicates). The significance value of Ljung-Box (Sig) statistics less than 0.05 indicates that residual errors are not random. Thus, all models except Model 3 present a series of random residual errors, generated by endogenous factors (production activity) and exogenous factors (environmental, behavioral, psycho-affective, socio-political variables).

The values recorded by the coefficient of determination (R-squared which shows the proportion of variation of the dependent variable explained by the regression model that varies in value from 0 to 1). Small values indicate that the model doesn't fit well with the data. Stationary R-squared establishes a measurement that compares the stationary part of the model with a simple average model. This measure is preferable compared to regular R-squared when there is a seasonal trend or pattern. Stationary R-squared can be negative with a range of negative infinity to 1. Negative values mean that the model in question is worse than the base model. Positive values mean that the model in question is better than the base model. In the present analysis, Model 3 meets the qualities of a model with a statistical significance: Stationary R-squared=0.73, Statistics=31.117, DF=17, Sig=0.019.

Figure 2- Dendrogram related to the econometric model developed



From the graphic presentation it can be seen that the outlined models meet the targeted objectives, the purpose being to get as close as possible to the standard model, namely the principles of ecoeconomy.

Model Fit											
Fit Statistic	Mean	HERSELF	Minimum	Maximum	Percentile						
					5	10	25	50	75	90	95
Stationary R-squared	0.268	0.200	0.046	0.730	0.046	0.050	0.110	0.244	0.359	0.673	0.730
R-squared	0.986	0.006	0.973	0.995	0.973	0.975	0.984	0.985	0.989	0.994	0.995
RMSE	0.111	0.018	0.071	0.127	0.071	0.074	0.107	0.115	0.124	0.127	0.127
MAPE	0.869	0.161	0.667	1.186	0.667	0.681	0.757	0.803	0.971	1.164	1.186
MaxAPE	33.659	11.973	18.721	50.000	18.721	18.916	24.041	30.986	50.000	50.000	50.000
THERE ARE	0.026	0.005	0.019	0.033	0.019	0.019	0.022	0.025	0.033	0.033	0.033

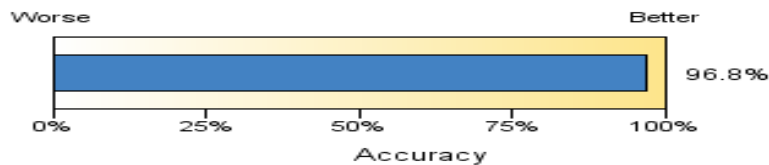
MaxAE	0.929	0.159	0.562	1.000	0.562	0.582	1.000	1.000	1.000	1.000	1.000
Normalized BIC	-4.263	0.260	-4.864	-4.092	-4.864	-4.826	-4.292	-4.151	-4.103	-4.094	-4.092

Automatic Linear Modeling

Model Summary

Target	Q1
Automatic Data Preparation	On
Model Selection Method	Forward Stepwise
Information Criterion	-712.541

The information criterion is used to compare to models. Models with smaller information criterion values fit better.



Conclusions

The econometric analysis of the presented data shows that the series does not vary significantly from the level of the predicted model, being expressed in the same units as the dependent series (the RMSE values obtained are Mean 0.11 and SE 0.018). At the same time, the econometric model is independent of the units used and, therefore, can be used to compare the series with different units (The MAPE values obtained are Mean 0.869). The results of the econometric analysis pertinently present model 3 that capitalizes on the assertion "Compliance with sustainable production standards increases the quality of products" and to which 5 predicates correspond: *responsibility, necessity, relevance, compatibility, quality*. Thus, the hypothesis according to which the principles of ecoeconomy contribute to a large extent to the increase of production if sustainable production methods are considered, with a positive impact on the environment and the individual alike. Also, model 3 validates assumed objectives, namely: O1 - sustainable use of natural resources, O2 - application of environmental standards in the field of production, O3 - manifestation of competition and identification of its effects, pre-testing of eco-economy principles and O4 - use of instruments specific to the carbon market. The application of this model opens up opportunities for economic entities to treat the principles of eco-economy as development priorities in consensus with the economy of the future, waste reduction and superior capitalization of scarce resources.

As a result of the development of cutting-edge technologies, the intensification of scientific research, the unprecedented influence of the media on the consumer's decision-making behavior, the relationship between resources and needs, between availability and needs, is experiencing strong distortions, which makes the assault on the production of economic goods in order to satisfy needs particularly strong. This assault has direct repercussions on the way of combining economic resources, own and attracted, respectively it requires convergent implications of the productive sector in order to size the supply at the level of demand.

The problem is, on the one hand, the efficient management of own and borrowed resources, in the

context of the continuous decreasing of conventional energy resource reserves and the adjustment of demand in relation to its purchasing power and, on the other hand, in the management of trade balance imbalances, respectively of the balance of payments at the level of countries, as a result of the discrepancy between exports and imports.

The advantage of globalization lies in the mobility of the factors of production in order to cover the demand for economic goods, in those economies where the endowment of factors of production is insufficient, a situation in which imports are made.

Modern economies are global economies whose relative market position is determined by competitiveness and efficiency ratios. We cannot exclude imports, but they are made when the relative cost of producing a unit on the domestic market is higher than the relative cost of the product on the foreign market, or when the need for factors of production cannot be covered from the domestic market.

What is inefficient and at the same time not equivalent is the increase in imports for those countries that have factors of production, but the level of production capacity does not partially cover the level of demand, both quantitatively and qualitatively. What would be the reasons?

Firstly, it is the lack of orientation of economic agents in relation to the size and structure of demand, towards its absorption capacity. The increase in production should be correlated with the growth rate of consumers' real incomes, but also with their presumed increase in relation to the lending limit of the banking and non-banking system. The financial-banking system can artificially sustain demand growth by adjusting revenues, which would boost domestic production capacity or the import of economic goods.

Secondly, the low dynamics of labor productivity, either as a result of the lack of an adequate production infrastructure, the non-correlation of the investment plan with the supply structure, or as a result of the inefficient combination of production factors, which have the effect of obtaining an uncompetitive production externally, thus not satisfying domestic and external demand.

There are also certain restrictions on the intensification of domestic production capacity, such as political factors (conflict of interest in favouring the import of certain economic goods or factors of production; excessive bureaucracy), social factors (the existence of a differentiated social structure that requires the social support of the disadvantaged classes, which requires an increase in the contribution of public expenditure, respectively the adjustment of the fiscal policy), the degree of involvement of civil society in changing people's mentality regarding the act of production and consumption, approaching the problem of the productive sphere as an opportunity and not as a priority in the act of consumption.

In this context, the ecoeconomy, through its actors, seeks solutions to optimize the relationship between needs and possibilities in consensus with the natural environment, taking into account quantitative restrictions of a monetary-financial nature, as well as the boomerang effect caused by excesses of any kind.

At the same time, in the context of the scarcity of conventional resources and an irrational use of resources which, in combination, have generated waste, impoverishment, it is necessary to create mechanisms through which the economy identifies with the laws of nature, which governs it, to use natural resources sustainably, to design strategies through which the use of free goods confers balance and limits in the production process generated especially by the natural degree, sustainable absorption of products into the environment. This natural way of approaching the economy is identified with the eco-economy.

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