

The Sustainable Value Model: Comparative Analysis Romania and EU

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Abstract—For Romania, the fulfilment of the obligations undertaken as a member state of the European Union in accordance with the Treaty of Accession requires the effective implementation of sustainable development principles and practices, this being the only reasonable development option, which adequately draws in on the economic, social and environment resources. Achieving this objective is based on a profound analysis of the realities in the Romanian economy, which will reflect the existent situation and the action directions for the future. The paper presents an analysis of the Romanian economic performances compared to the EU economy, based on the sustainable value (SV) model. The analysis highlighted the considerable gap between Romania and the EU regarding the sustainable capitalization of resources, the provided information being useful to justify strategic development decisions at a micro and macro levels.

Keywords—Sustainable value, sustainable development, opportunity cost, economic performance.

I. INTRODUCTION

THE European model of economic growth implies implementing the sustainable development principles both at enterprises' level and at the level of the branches, of the activity sectors and of the national economy as a whole. The objectives of the National Sustainable Development Strategy Romania 2012-2020-2030 target the fundamental transformations in the productive mechanisms of all the economic sectors, as well as changes in the behaviour of various determining factors on which the quality of life and of the environment depends. Implementing the strategy ensures the adopting in a reasonable and realistic amount of time of the development model that generates high added value, directed towards the continual improvement of the quality of life and the relationships between people in harmony with the environment [1].

For the following period, the essence of the Sustainable Development policies for Romania has as main objective the diminishing of the imbalances existent in the field of using natural resources, increasing productivity and a better capitalization of the comparative advantages of the economy. Thus, Romania incorporates the European vision of economic growth and proves its intention to actively get involved in the priority directions of action established within the Sixth

Environment Action Plan [2], which identifies four priority fields to be considered: climatic changes, nature and biodiversity, environment and health, natural resources and waste.

At the same time, guideline prospects of the Romanian economy are fully in line with the objectives in the renewed Sustainable Development Strategy for an Extended Europe (2006), which focuses on several directions: increasing economic prosperity through the efficient management of resources, exploiting the knowledge, innovation and competitiveness potential, creating new jobs; improving social equity and cohesion by ensuring equal opportunities regarding fundamental human rights; ensuring environmental protection and the promotion of the sustainable development principles and practices by the EU [3].

The courses of action for the implementation of the sustainable development principles and practices must consider the unitary and complex feature of this development vision that implies the combination of three dimensions: economic, ecologic and social. The involved resources must be used on criteria of economic efficiency corresponding to the environmental requirements in order to raise the quality of life.

The sustainable development of the Romanian economy is an issue of rational coordination of the various objectives and actions of the sectoral programmes, as well as implementation of the production's restructuring elements and of the companies' management in order to achieve conversion towards a new philosophy of development, adopted by the European Union and widely shared globally—that of sustainable development.

II. ANALYSIS METHODS FOR THE SUSTAINABILITY OF THE ECONOMY

Being an economy based on resource consumption, Romania is at the stage when it's looking for proper solutions for its actual situation in order to put into practice the sustainable development principles and this is why it is realistically setting as a goal to reach the current stage of the sustainable growth from the developed countries of the European Union in a distant time horizon.

The current systems of *sustainable development indicators* quantify the multiple economic, social and environment aspects at the level of the objectives to be achieved, of the actions and of the effects of the taken measures. For example, the structure of the indicators set produced by Eurostat for the first monitoring report on the renewed EU Strategy associates

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a headline (Level 1) indicator to each strategic dimension, a set of indicators associated to its subordinate operational objectives (Level 2), and descriptive indicators for the domains of intervention of associated policies (Level 3).

The additive feature of the sustainable development indicators often express conflict situations and make it difficult to make decisions. Thus, some authors consider that the economic and social elements must be presented through indicators separate from ecological indicators, the latter allowing the assessment of the vital functions of the environment and have a stronger relationship with the sustainable development type. Therefore, the environment's quality is an expression of running in a sustainable manner economic activities and, at the same time, a guarantee of ensuring proper living conditions for future generations [4].

The analysis of the ecologic component of the sustainable development can be done with the help of a complex group of indicators systematized in accordance to various criteria.

In order to measure the economy's sustainability level, Romania elaborated national indicators for sustainable development, compatible with the ones established at the level of international statistics institutes: Statistical Office of the European Commission (Eurostat), United Nations Economic Commission for Europe (UNECE) and the Organization For Economic Co-operation and Development (OECD).

The sustainable development indicators for Romania (IDDR) were structured according to the architecture suggested by Eurostat and include series of data available in the national statistics system starting with the year 2000. Their role is to ensure the assessment of economic performances and of social and green responsibilities of the national economy growth.

At the same time, the indicators included in the IDDR data base can be used to assess and analyze the fulfilment level of the strategic objectives of sustainable development in Romania in comparison with the other member states and the integrated monitoring of the development quality in Europe. For full compatibility with the European system of the sustainable development indicators it's necessary, however, that the IDDR base continues to be completed, developed and improved.

To measure the effect of the actions undertaken nationally in order to comply with the objectives regarding sustainable development included in the European Union Strategy, an analysis based on a group of indicators centred on the economic and social aspects and on a group of indicators for environmental monitoring was conducted for Romania, for which there is information in the Eurostat data base and the conclusions of the study reveal the modest position held by Romania regarding sustainable development, compared to the average level of the indicators specific for the European Union as a whole. [5]

Yet, Romania has directed its actions towards important objectives set by the renewed Lisbon Strategy (2005) concerning boosting economic and jobs growth, but still presents an unfavourable situation regarding economic development quality, which puts its mark on the entire society. The green dimension of sustainable development reflects a

considerable gap between Romania and the EU in terms of energy and raw materials consumption.

The relatively high number of individual indicators of sustainable development creates vast array of information, which is difficult to follow in order to assess the national progress regarding sustainable economic growth.

To simplify the evaluating system of the sustainable development stage it's necessary to use aggregated indicators, such as *Sustainable Value (SV)* indicator. It achieves concrete measurement of sustainable performances on various levels of economic organization [6].

The *SV* analysis allows the value assessment of the contribution of various resources involved in the economic activity, expressed as a gain or a monetary loss. The reference point for assessing the performance is an opportunity cost represented by the economic, social and ecologic efficiency of an entity regarded as a benchmark, such as the level of the national economy or the economic sector (if the analysis refers to a company), a region, another country considered sustainable, the European Union, etc.

Defining resources as „something that is required to generate a return in an economic activity” [7], next to indicators that express economic, social and environment resources, we can introduce a series of indicators in the *SV* analysis that are connected to their effects, such as environmental pollution or work accidents, with the idea that they are unavoidable during the process of creating sustainable value.

The equation for the *SV* calculus for economic activities is following [8]:

$$SV = \frac{\sum_{i=1}^n R_i^E \cdot \left(\frac{VA^E}{R_i^E} - \frac{VA^B}{R_i^B} \right)}{n} \quad (1)$$

where:

- R_i^E and R_i^B represent the quantity of type i resource, used by the analyzed entity or the benchmark entity;
- VA^E - the added value by the analyzed entity;
- VA^B - the added value by the benchmark entity;
- n - the number of type of resources.

Studying the calculus formula allows to identify the influence factors of *SV*, elements on which if acted rationally, it becomes possible to increase the contribution of the analyzed branches to the economy's sustainable development. *SV*'s size is directly influenced by the quantity of each used resource (land, technical capital, energy, financial resources, input related work force, but output related atmospheric emissions also) and the quality aspects are introduced through the influence of the resources' profitability calculated on the basis of the newly created value. Sustainable value is reached when the analyzed entity runs its activity at profitability rates that are higher than the ones of the benchmark entity. Otherwise, a *SV* loss is recorded, with negative consequences for the sustainable development of the analyzed entity. If data regarding indicators of sustainable development is available

for a longer period of time, the determining model for Sustainable Value can be developed for new analysis directions. Given the situation in dynamic of the indicators that intervene in the SV calculus, the analysis may be completed with the determining relations of the factors' influence over the evolution of the sustainability of the economic activities as follows:

1. The influence of the resources used by the analyzed entity:

$$\Delta SV(R_i) = \frac{\sum_{i=1}^n R_{i,1}^E \cdot \left(\frac{VA_0^E}{R_{i,0}^E} - \frac{VA_0^B}{R_{i,0}^B} \right) - \sum_{i=1}^n R_{i,0}^E \cdot \left(\frac{VA_0^E}{R_{i,0}^E} - \frac{VA_0^B}{R_{i,0}^B} \right)}{n} \quad (2)$$

in which:

1.1. The influence of changing the used economic and social resources (Res) – input related:

$$\Delta SV(Res_i) = \frac{\sum_{i=1}^q Res_{i,1}^E \cdot \left(\frac{VA_0^E}{R_{i,0}^E} - \frac{VA_0^B}{R_{i,0}^B} \right) - \sum_{i=1}^q Res_{i,0}^E \cdot \left(\frac{VA_0^E}{R_{i,0}^E} - \frac{VA_0^B}{R_{i,0}^B} \right)}{n} \quad (3)$$

1.2. The influence of changing environmental resource indicators (Rec) - output related:

$$\Delta SV(Rec_i) = \frac{\sum_{i=1}^j Rec_{i,1}^E \cdot \left(\frac{VA_0^E}{R_{i,0}^E} - \frac{VA_0^B}{R_{i,0}^B} \right) - \sum_{i=1}^j Rec_{i,0}^E \cdot \left(\frac{VA_0^E}{R_{i,0}^E} - \frac{VA_0^B}{R_{i,0}^B} \right)}{n} \quad (4)$$

2. The influence of changing the resources' profitability:

$$\Delta SV \left(\frac{VA^E}{R_i^E} - \frac{VA^B}{R_i^B} \right) = \frac{\sum_{i=1}^n R_{i,1}^E \cdot \left(\frac{VA_1^E}{R_{i,1}^E} - \frac{VA_1^B}{R_{i,1}^B} \right) - \sum_{i=1}^n R_{i,0}^E \cdot \left(\frac{VA_0^E}{R_{i,0}^E} - \frac{VA_0^B}{R_{i,0}^B} \right)}{n} \quad (5)$$

in which:

2.1. The influence of changing the profitability of the resources used in the analysed entity:

$$\Delta SV \left(\frac{VA^E}{R_i^E} \right) = \frac{\sum_{i=1}^n R_{i,1}^E \cdot \left(\frac{VA_1^E}{R_{i,1}^E} - \frac{VA_0^B}{R_{i,0}^B} \right) - \sum_{i=1}^n R_{i,0}^E \cdot \left(\frac{VA_0^E}{R_{i,0}^E} - \frac{VA_0^B}{R_{i,0}^B} \right)}{n} \quad (6)$$

2.2. The influence of changing the resources' profitability in the benchmark entity:

$$\Delta SV \left(\frac{VA^B}{R_i^B} \right) = \frac{\sum_{i=1}^n R_{i,1}^E \cdot \left(\frac{VA_1^E}{R_{i,1}^E} - \frac{VA_1^B}{R_{i,1}^B} \right) - \sum_{i=1}^n R_{i,0}^E \cdot \left(\frac{VA_0^E}{R_{i,0}^E} - \frac{VA_0^B}{R_{i,0}^B} \right)}{n} \quad (7)$$

Developing the SV analysis model on influence factors highlights the extent to which the efficiency of the used resources exceeds the opportunity cost of the capital and

generates added value within the sustainable development system.

III. RESULTS AND DISCUSSIONS

To determine Sustainable Value for Romanian economy, the comparative analysis of the information regarding sustainable development existent in the Eurostat data base is used, establishing as benchmark for Romania the level of the same indicators from EU. The SV analysis is done in a comparative manner at the level of 2004 and 2007 for which we can find in the data base of the European Union statistic indicators for Romania, reported according to the EU methodology. At the same time, 2004 can be considered for Romanian economy a benchmark year, being the time when the pre-accession treaty was signed. The main elements that characterize sustainable development in Romania and the European Union during these two years are presented in table 1.

TABLE I
SUSTAINABLE DEVELOPMENT INDICATORS

Indicators	Romania 2004	Romania 2007	EU-27 2004	EU-27 2007
Economic-social indicators				
GDP at current market prices, millions of euro	610634	124729	10607864	12362879
Total population at 1 January, million	21,7	21,6	488,6	495,1
Final energy consumption, 1000 tonnes of oil equivalent	25498	24022	1173009	1157654
Agricultural area UAA (1 000 hectares) ¹	13906	13753	171879	172485
Domestic Material Consumption, 1000 tonnes	305096	33449	7716867	7734883
Gross fixed capital formation, millions of euro	13293	37671	2080104	2633049
Final consumption expenditure of households and non-profit institutions serving households, millions of euro	42156	83458	6176437	7078227
Environmental indicators				
Greenhouse gas emissions, million tonnes of CO2 eq	155,39	152,29	5153,26	5045,37
Emissions of acidifying substances, 1000 tonnes acid eq	34,3	45,78*	756,51	727,42*
Emissions of ozone precursors, 1000 tonnes ozone forming potential	1022	927*	28326	26655*
Emissions of particulate matter, 1000 tonnes	755	927*	19810	18978*

Source: Eurostat, Sustainable Development Indicators;

¹ Eurostat, Farm Structure Survey 2007

* year 2006

The calculus of the sustainable value for Romanian economy according to relation 1, based on the added value represented by the gross domestic product (GDP), is presented in table 2. We can see the loss of sustainable value for Romania, which in 2004 was 309 billion euro and in 2007 reached 357 billion euro. The biggest part of this deficit is due to the economic and social indicators. The conclusion of the analysis is: if Romania uses available resources with the efficiency recorded by EU-27 (the opportunity cost of resources), than its GDP will be three times higher.

TABLE II
EVOLUTION OF SUSTAINABLE VALUE OF ROMANIAN ECONOMY, 2004-2007

Indicators	Value contribution	Value contribution
	(millions euro) 2004	(millions euro) 2007
Economic-social indicators		
Total population at 1 January, millions	-410059	-414634
Final energy consumption, 1000 tonnes of oil eq.	-169522	-131808
Agricultural area UAA (1 000 hectares) ¹	-797173	-861019
Domestic Material Consumption, 1000 tonnes	-358331	-409847
Gross fixed capital formation, millions of euro	-6727,17	-52149
Final consumption expenditure of households and non-profit institutions serving households, millions of euro	-11338,2	-21040,3
Environmental indicators		
Greenhouse gas emissions, million tonnes of CO2 eq.	-258803	-248434
Emissions of acidifying substances, 1000 tonnes acide eq.	-419894	-653326
Emissions of ozone precursors, 1000 tonnes ozone forming potential	-321539	-305211
Emissions of particulate matter, 1000 tonnes	-343513	-479089
The economic-social component of SV	-175315	-189050
The ecologic component of SV	-134375	-168606
Total SV	-309690	-357656

Source: Calculated data

Implementing the analysis model for Romania's sustainable value based on the 2-7 relations allows determining the influence exercised by the change in time of the main elements on which the economy's efficiency depends upon from the perspective of sustainable development. The increased loss of sustainable value created in Romania with 47966 million euro in 2007 in comparison to 2004 is due to the quantitative and qualitative aspects recorded in the sustainable use of resources, and the quantified results of their action are presented within table 3.

TABLE III
FACTORS INFLUENCE ON SV'S CHANGING

Influence factors	Value millions euro
1. The volume of resources used in Romania, in which:	-24045
1.1. Economic-social resources	-3746
1.2. Environmental resource indicators	-20300
2. Resource profitability, in which:	-23291
2.1. The profitability of the resources used by the analyzed entity	45554
2.2. The profitability of the resources used by the benchmark entity	-69475
Total SV change in Romanian economy 2007-2004	-47996

Source : calculated data

The contradictory evolution of the used resources quantities in Romanian economy has determined an additional deficit of sustainable value towards the EU of 24045 million euro and environmental resource indicators of 20300 millions euro. Part of the economic-social resources involved in Romanian economy (Domestic Material Consumption, Gross fixed

capital formation, Final consumption expenditure of households and non-profit institutions serving households) have significantly increased in 2007 compared to 2004, which resulted in the increase of sustainable value deficit that couldn't be compensated by the slight drop of other used resources. A similar influence had the change of environmental resource indicators, which determined an additional SV deficit of 20300 million euro. A positive influence over SV in Romania was played by the change of the used resources' profitability owed especially to the GDP growth, which lead to an additional value of 45554. This effect was negated by the increase of the resources' profitability within the EU, which determined a SV deficit of 69475 million euro for Romania.

The sustainable development model allows the highlighting of other aspects too. Romania has a GDP/person of approximately 30% of the EU level. Energy intensity in 2007 was twice as higher in Romania than in the EU, and Domestic Material Consumption per unit GDP was four times higher. The agricultural area in Romania is used totally ineffective, GDP/UAA being eight times lower than in the EU. Although Romania recorded relatively lower air emissions compared to the EU, their efficiency in terms of contributing to achieving the GDP is low.

IV. CONCLUSIONS

The analysis method based on Sustainable Value provides a summary assessment of the situation in Romania compared to the performances of the European Union in terms of implementing the sustainable development requirements. The results of the analysis confirm the conclusions of similar studies according to which despite the progresses in recent years, Romania still has to catch up considerably compared to the other member states of the European Union, simultaneously with the mastery and implementation of the principles and practices of sustainable development in the context of globalisation [9],[10].

Although Romania has a high economic potential seen in the well-prepared work force, rich and diversified natural resources, technical capital in continuous upgrading, the economy is still based on a high consumption of raw materials and energy, a faulty management of the natural capital with consequences that may become irreversible [11].

The obtained information should be a basis to rationalize decisions both at macroeconomic level and at microeconomic level. The involved changes must target the more efficient use of the various forms of capital, simulating investments, introducing technological innovations, increasing work productivity and emphasizing measures to protect the environment.

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