RESEARCHES CONCERNING THE DURABLE DEVELOPMENT OF OLTENIA MINING BASIN

BOGDAN VLADU[1], MARIN SILVIU NAN [2], DANIEL COSMIN VITAN[3], CRISTIAN IONUT ARON[4],

Abstract: Beginning with 1997 and its inclusion within the Maastricht Treaty, Durable Development became a political objective of the European Union; further, in 2001, at Goteborg, the Council of Europe adopted the Strategy for the Durable Development of the European Union, which later, that is in 2002, at Barcelona, acquired an outward- facing dimension. These strategies of the European Union began to be implemented by Romania, which determined economic imbalances in a series of fields of economic activity, such as the mining field; this is shown by the economic and social indicators analysis and subsequently emphasized by SWOT analysis.

Key words: Mining industry, durable development, regional economy, sustainable development at national level, SWOT analysis on reserves in the Oltenia region.

1 GENERAL CONSIDERATIONS CONCERNING THE STRATEGY OF DURABLE DEVELOPMENT

The European Commission issued, on December 13th, 2005, after ample debates, a recommendation for checking the 2001 Goteborg Strategy; as a result of this, the Council of the European Union approved, on June 9th, 2006, a renewed Strategy of Durable Development, for an enlarged Europe; the document contains a homogeneous and systematic strategic perspective, which has as a goal the continual increase of life quality both for the present- say generations as well as for the future generations, through designing communities capable to use natural resources responsibly and efficiently with a view to maximize the possibilities of the social and ecologic

[1] *PhD student at the University of Petroşani, bogdan.vladu@yahoo.com*
[2] *Professor Ph.D. at the University of Petroşani, nan.marins@gmail.com*
[3] *Asistent Lectuer Ph.D at University of Petroşani, vitan.daniel.cosmin@gmail.com*
[4] *Ph.D student at University of Petroşani,*

innovation of the economy that result in both environment protection and social development.

Romania's national strategy concerning the Durable Development relies on the strategy of the European Union for Durable Development, including the completions settled at Lisbon; the strategy is desired to represent a biding element for conceiving and settling new public policies that are able to determine the change of attitude in Romanian society and the increased role of the decisional factors and citizens while planning, using or following the implementation of the strategies of Durable Development.

In order to carry out this approach, several objectives that should be accomplished have been set forth:

- Protection of the environment through taking actions capable of allowing the separation of economic growth from a possible negative impact on the environment;
- Respect for social cohesions and equity, through observing the basic rights and cultural diversity, eliminating discrimination and offering similar chances to all;
- Economic welfare through supporting competition, innovation and knowledge with a view to being able to guarantee high living standards as well as a larger number of well- paid jobs;
- Observing the international responsibilities of the European Union through promoting democratic institutions dedicated to liberty, security and peace, to the basic ideas of durable development throughout the world.

2. INDICATORS OF DURABLE DEVELOPMENT

In order to attain durable development two categories of indicators are employed:

- National indicators of durable development that rely on the main priorities which might be evaluated owing to the results proposed, while national results might be compared with international results and the objectives recommended by the Strategy for Durable Development of the European Union; such indicators are permanently updated;
- Progress indicators of the National Strategy of Romania's Durable Development, which should include all the policies it determines, even though such policies are not included within the Strategy of the European Union; as a consequence, all the policies that have been elaborated represent the goal of monitoring, making those who politically take decisions responsible and allowing public opinion to evaluate the quality of the actions carried out.

We shall further analyzes the main indicators that represent the foundation of durable development and that regard the economic, social, ecologic and institutional fields and might be the starting point of a process of taking good decisions.

2.1 Indicators of the economic field. Regional economy

The basic occupation of the inhabitants of the area of Oltenia coal basin is mining and the activities closely connected with it, namely lignite energy (electrical and thermal) production, materials and spare parts for the mining industry. [1]

The decrease of the mining activity, which represents, as previously shown, the main occupation of the population in the area, has had a high enough negative impact on the population and upon the companies in the area. [2]

With a view to determine this indicator more accurately, a vast analysis of all the localities belonging to this mining basin should be carried out, which have to include data regarding:

- Unemployment rate; employment rate in accordance to the activity sectors (primary, secondary, tertiary); business opportunities and presentation of a series of companies that have as a field of activity consulting and support providing for opening new businesses; the manner of administering waste depending on its nature, origin and composition as well as analyzing waste dumps having resulted from the process of lignite extraction; analysis the communication and transportation networks, which connect both nearby localities and neighboring areas as well as those connecting to the national and European networks. [4]

2.2 Indicators of the social field

With a view to determine the indicators of the social field, a series of criteria that match certain indicators (displayed in Table 1) should be observed. As compared to the analyzed area, there are certain criteria and indicators whose analysis might give us a clear enough image of the area. A part of these criteria and indicators are representative for characterizing the durable development of the areas located in Oltenia mining basin:

1. The demography of the area, which offers data concerning the rhythm and the growth rate of the population, average and maximal lifespan, the structure of population in accordance to groups of age and sex, migration of population and all the other events that influence population, determining a certain effect on it.

2. The level of poverty of the population, which offers data concerning the living standard of the population, namely the number of employees, the number of unemployed individuals, the value of the incomes, access to education and to the health system, access to a series of essential facilities (running water, access paths, and health system).

3. Health equipment that shows the manner health assistance is provided through the existing hospitals and their equipping, the number of doctors and their specializations, emergency services, ambulance services, number of consulting rooms, number of pharmacies and specialized laboratories.

4. Providing drinkable water for the population is also an important factor today, mainly in the mining areas, such as Oltenia basin, where, due to the surface

quarries, groundwater is most often affected; as a result the population has no source of natural water and providing drinkable water is made through distribution networks.

Table 1. *Analyzed criteria and representative social indicators*

Analyzed criteria	Social indicator matching the analyzed criterion
0	**1**
Poverty of population	***Indicator 1***: Percent of the population that lives below poverty threshold
	Indicator 2: Gini coefficient of income inequality
	Indicator 3: Unemployment rate
Equality between sexes	***Indicator 4:*** Ratio between the average incomes of women and men
	Indicator 5: Percent of the population that cannot afford minimal caloric consumption
Nutritional condition	***Indicator 6***: Nutrition condition of children (Percent of children under 5 displaying weight and height matching their age and ranging between 80% and 120% of the values settled nation- wide)
Mortality	***Indicator 7***: Rate of mortality of children under 5
	Indicator 8: Life expectation at birth
Health equipment	***Indicator 9***: Percent of the population equipped with proper WC (inside their homes or nearby)
Drinkable water	***Indicator 10***: Percent of the population that have access to safe drinkable water (inside their homes or within an acceptable distance)
Sanitary system	***Indicator 11***: Percent of the population that have access to primary care facilities
	Indicator 12: Percent of children immunized against the infectious diseases of childhood
	Indicator 13: Rate of contraception prevalence
Level of education	***Indicator 4***: Percent of children who reach the 5th grade of primary education
	Indicator 15: Percent of working- age population (25- 64 years old) that graduated the 1st two years of high school, at least
Degree of literacy	***Indicator 16***: Degree of literacy of adult population
Living conditions	***Indicator 17***: Average habitable area per individual
Population changes	***Indicator 18***: Yearly average rate of population growth
	Indicator 19: Number of inhabitants that live in the central area of the town and in the peripheries (or under improper urban conditions, which correlate the quality and quantity indicators of drinkable water and health indicators)

5. The living conditions represent an essential part of life that are able to provide data concerning the living standards; living conditions include the average habitable area per individual, the average number of individuals that live in a room, the average number of individuals that live in a household / house and the number of individuals without a home.

2.3 Indicators of the ecologic field

These indicators include climate changes, quality of environment components and condition of wooden areas. During the last years a series of climate changes displaying a certain frequency and amplitude have occurred and included heat waves, floods, storms that sometimes turned into tornadoes, which are phenomena seldom seen in our country. These climate changes affected several areas of the country as the one of Oltenia basin, having also influenced population.

Owing to their specific character, mining extraction activities in day quarries determine a large range of effects upon the quality of environment components through the following specific actions:

- Damage of a series of areas required for carrying out extraction, dump and lignite storage activities as well as works for access paths and administrative buildings, which, after a certain period of time, can no longer be used for other purposes and which affect the population in the area;
- Damage of the lands due to landslides and dumps or of the lands close by the areas under exploitation;
- Pollution of waters, mainly of surface waters, either due to spills of used waters or of pollutant substances;
- Negative effects on atmosphere, flora and fauna due to the dust resulting from quarries or during transportation, which is emitted into the atmosphere;
- Noises and vibrations determined by the extraction machines and the transportation equipment and machines;
- Chemical pollution of the soil due to the improper storage of industrial waste (oils, fuels), which may subsequently influence land fertility.

2.4 Indicators of the institutional field

The implementation of the strategy of durable development has as a main goal the development and modernizing of the areas it refers to and, implicitly, of the whole country; in accordance, its implementation should be a priority for the population. These projects that have in view local development should match the needs of the people living there, should consider the material and human resources of the region and observe the policies and laws in force.

The strategies of durable development locally implemented should observe a series of objectives having a general character, such as:

- the transfer of responsibilities, competences and information from a national level to a local one, targeting the acknowledging of the most adequate projects that are suitable for a specific area;

- the operative progress of the development process through finding out real solutions to the specific issues of an area;

- transmitting the acquired competences, features and experience to local administration and designing a portfolio including the expected results;

- increasing the employment rate of the area, attracting investors, creating new jobs and promoting tourism in the area.

With a view to locally develop a series of regions, several requirements should be met, as follows:

- local, county, intra- regional , national and even international cooperation should exist through partnership agreements, mutual projects and programs having mutual interests;

- the infrastructure of communication means should be designed properly as the development of a series of areas depends on them to a large extent.

The indicators of durable development give data that concern the periodical changes that occur locally and show the degree of accomplishing the objectives settled by development strategies; these indicators may also be determined numerically. Owing to the index of human development (IDU), life expectancy may be determined (ISV), educational level (INE) and life standard (GDP/inhabitant - IPL) range between 0 and 1, so that it is calculated through the relation:

$$I_{DU}=\frac{I_{SV}+I_{NE}+I_{PL}}{3} \tag{1}$$

where:

$$I_{SV}=\frac{S_{med}-S_{\min}}{S_{\max}-S_{\min}} \tag{2}$$

where:
S_{min} – is minimal life expectancy, expressed in years;
S_{med} – is average life expectancy, expressed in years;
S_{max} – is maximal life expectancy, expressed in years.
and,

$$I_{NE}=\frac{2I_{GA}-I_{GCI}}{3} \tag{3}$$

where:
I_{GA} – is the index of literacy degree,

I_{GCI} – is the index of the degree of education coverage.

$$I_{GA}=\frac{G_{A_{med}}-G_{A_{\min}}}{G_{A_{\max}}-G_{A_{\min}}} \tag{4}$$

$$I_{GCI}=\frac{I_{GCI_{med}}-I_{GCI_{\min}}}{I_{GCI_{\max}}-I_{GCI_{\min}}} \tag{5}$$

where:
G_{Amin} – is the minimal literacy degree,
G_{Amed} – is the average literacy degree,
G_{Amax} – is the maximal literacy degree,
I_{GCImed} – is the average education coverage,
I_{GCImin} – is the minimal education coverage,
I_{GCImax} – is the maximal education coverage.

$$I_{PL}=\frac{\lg\left(\frac{PIB}{loc}\right)-\lg\left(\frac{PIB_{\min}}{loc}\right)}{\lg\left(\frac{PIB_{\max}}{loc}\right)-\lg\left(\frac{PIB_{\min}}{loc}\right)} \tag{6}$$

where:
I_{PL} – represents the living standard,
GDP/inhabitant – is the gross domestic product per inhabitant,
GDP_{min}/inhabitant – is the minimal gross domestic product per inhabitant,
GDP_{max}/inhabitant – is the maximal gross domestic product per inhabitant.

The index of human development (I_{DU}) ranges between 0 and 1; these values show the type of urban development as displayed in Table 2.

Table 2. *Type of development as compared to the index of human development*

No.	Type of development	Value of the Index of Human Development
0	1	2
1	high	0.8÷1
2	average	0.5÷0.79
3	low	0÷0.49

3. CONSIDERATIONS CONCERNING THE STRATEGIES OF DURABLE DEVELOPMENT AT NATIONAL AND REGIONAL LEVELS

In order that the principles of durable development are implemented at a regional level, a series of changes should occur both regarding the manner of conception and the manner of drawing up such policies at a regional level and, more important, at a national one. Besides, in order that the results obtained are positive, the changes that regard national strategy should be adapted to the local characteristics, which can be easily made for the specifics of our country.

Amsterdam Treaty makes sure that the demands concerning environment protection, coming from those states that are part of it, are going to be integrated within the policies and activities of the European Union.

The Treaty of the European Union, in order to implement the principle of integration, has designed a strategy that targets the acquiring of real effects in those fields that generate significant damages on the environment, which represents an issue not to be neglected and a challenge for the entire Europe.

The short- term policy of the European Commission recommends a step- by-step implementation that has in view the directives settles by the 2000 Agenda and Kyoto Protocol.

Meanwhile, agriculture development should be stimulated, while the cultivation of organic products should be supported; quality and not quantity should be stressed with the support of the markets, which might determine rural development.

Owing to the fact that price significantly influences individual behavior in business, it should be specified correctly to stimulate businesses; this might determine the foundation of new businesses in the field of services and the production of organic products, which would decrease the effects upon the environment, carry out certain economic and social demands and determine public incomes in the case of a series of important activities in less populated areas.

Public procurements of new and cleaner technologies represent a good manner of widening the use of new technologies, both in the public domain and in the private one, in the case they are rigorous and correct, and might have as a result the decrease of pollution.

SWOT analysis that regards the coal reserves, production and demand on the national and European markets

In accordance to the data provided by the National Agency of Mineral Resources, the condition of the coal reserves in 2018 is displayed in Table 3.

Pit coal deposits are mostly located in the basin of the Jiu Valley, which is in decline, while lignite reserves are mainly located in Oltenia mining basin, namely in Gorj, Mehedinți and Vâlcea counties; lignite gas an average calorific power of 1800 Kcal/Kg and a production of about 28 million tons/ year might be provided for about 30 years. [3]

Although a potential exists, during the last years, the request for coal dropped by about 10 million tons/ year, especially in the case of lignite; as a consequence, it has determined a surplus production as compared to pit coal, in the case of which the lack of investment has determined a shortcoming and the providing of pit coal from imports.

Table 3. *Condition of coal reserves in 2018*

Resource	**That might be exploited** (million tons)	**Estimated** (million tons)	**Total** (million tons)
0	1	2	3
Pit coal	590	1614	2204
Lignite	980	11606	12586
Total	**1570**	**13220**	**14790**

Most power stations in Romania rely on lignite as a raw material, which provides about 30% of the energy needs of the country as well as the thermal energy needs for the areas near this large mining basin.

When compared to other countries in Europe, Romania is in the 6th place regarding lignite production, with 22 million tons/ year, after countries like Germany (178 million tons), Poland (63 million tons), Greece (50 million tons), Czech Republic (38 million tons) or Bulgaria (32 million tons), but before smaller countries like Hungary (9 million tons), Slovenia (3 million tons) and Slovakia (2 million tons).

With the massive restructuring of the mining field, Oltenia Energy Complex has become the main producer of lignite in our country, providing lignite both for its own needs and for the other power plants in the country that rely on lignite (CET Brașov, CET Oradea, CET Bacău, CET Arad). [5]

During the last years, a decrease of coal production has occurred, both in Europe and in our country together with a decrease of the price of this product.

With a view to better understand the competitive advantages, the opportunities and the drawbacks and risks determined by the subsequent development and exploitation of lignite, a SWOT analysis is displayed in Table 4.

This analysis easily shows that exploiting coal and, implicitly, lignite is necessary in the future, even though it displays certain economic and environment drawbacks; nonetheless it is the resource on which human factor largely depends and still represents the basic activity in Gorj, Mehedinti and Valcea counties, as there is no other viable activity able to create jobs for the population of these counties; it also contributes to a large extent to the safety of the national energy system, a fact that should not be overlooked.

Table 4. *SWOT analysis of lignite exploiting in Oltenia basin*

ADVANTAGES	**OPPORTUNITIES**
0	**1**
-Lignite reserves under exploitation and for which an exploitation license has been issued represents about 980 million tons that can be exploited during 30 years, with possibilities for extending the period depending on the market needs. -Significant contribution to the energy security of the country especially under drought. -There is a proper infrastructure of the areas, of the opening works and of the transportation systems to the beneficiaries. -The mining exploitations are located on a relatively small area and within short distances to the main beneficiaries, such as CET Turceni, CET Rovinari; the other beneficiaries, CET Işalnița, CET Craiova, CET Arad etc., can be reached by railroad. -The lignite extracted matches the parameters of the combustion equipment belonging to the present- day power plants, which are the main beneficiaries. -The workers of the energy complex are experienced, qualified and have been long working in the field. -Lack of alternative jobs for the workers in the three counties involved in the activity.	- The development and continuation of the activity would have positive effects on the population in the area. - The production extracted could be regulated by the energy demand at a national level. - The present- day production capacities could be modernized so that they become similar to those in other more developed countries that have a higher productivity. - Catching and turning to good account the gases coming from the coal massif. - Considering coal as a strategic source with a view to providing the energy independence and safety of the country, while considering the climate evolution during the last years. - Creating new jobs for young individuals. - Important contribution to the safety of the national energy system.
DRAWBACKS	**RISKS**
- The quality of extracted lignite cannot be improved too much. - When compared to other states, productivity is obviously lower. - Production costs are quite high as compared to the price of the energy on the market. - No selective exploitation of lignite can be implemented due to the condition of the deposit. - Although of high capacity, the equipment employed cannot always be used at their full capacity. - Acquiring new, more modern technologies involves high costs that are hardly available.	- Due to the mono- industrial character of the area, there is a risk of increased unemployment, which is on the rise as no alternatives are at disposal. - Due to the imposed environment conditions, involving the buying of new equipment, production costs may grow. - Lignite production is closely connected to energy demand and, consequently, on the running of power plants. - The change of the national energy strategy which should consider coal as a secondary source for producing energy.

CONCLUSIONS

Despite this ample contribution, there is still a certain disharmony between the level of development and the manner of putting into practice these indicators; such facts show how difficult is to find out practical connections between the empirical studies and the regulations in the fields that interfere with each other within the notion of durable development: natural capital, economy and society, which make quite difficult the reaching of a set of indicators that are accepted with one voice.

The present- day mechanism of monitoring emphasize a series of indicators that are under evolution, are also representative for the goals proposed by the Strategy of the European Union, but are not yet good enough to perform a qualitative assessment of certain objectives such as the quality of governing.

The aim of implementing durable development is also to eliminate subsidies that still encourage the improper use of reserves and natural resources and the settling of a real cost of pollution effects, which might quicken the tendency towards acquiring, using and developing better techniques and equipment able to pollute less and determine significant results.

This analysis has as a goal the displaying of the main advantages the continuation of lignite exploitation might offer to Oltenia basin, the opportunities expected to be capitalized as well as the main drawbacks and even risks that might come out in the case this extraction activity is continued.

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