REGIONAL KNOWLEDGE MANAGEMENT FOR THE SUSTAINABLE DEVELOPMENT

Professor PhD Mihaela Mureşan, „Dimitrie Cantemir" Christian University, e-mail: mihaela.muresan@yahoo.com

ABSTRACT: The article intends to present the achievements of a research Romanian project "Knowledge management architecture in environmental, social and economic areas, designed to support the sustainable regional development strategy". The main goal of the project is to improve the regional knowledge management, using a virtual framework for the design of the regional development strategy. The innovation introduced by this approach consists in the integration of the regional actors' views, in order to develop a realistic regional development strategy, on a democratic and scientific base. The challenge of this vision is to create a virtual environment for the regional knowledge management and consensus building related to the regional strategy development. The scientific base for the design of the regional development strategy is represented by an improved set of socio-economic indicators and benchmarking tools.

Keywords: regional sustainable development set of sustainable development indicators, embedded knowledge, e-democracy, e-Government

JEL Codes: R13, R15, P25

1. A new approach related to the sustainable regional strategy development

The research project aims at creating a regional knowledge management platform representing a virtual integrated framework for the acquisition of relevant information (regional, national, and international level) as a vital and necessary resource in the process of the design and implementation of the regional development strategy. It refers also to the procedures and tools of analysis, in order to develop a specific set of indicators and benchmarking analysis for the identification of major trends and needs in the sustainable regional development. The regional knowledge platform aims also at integrating both data and specific views and experience of relevant regional actors, for the best results in designing the regional strategy and supervising its implementation in the benefit of the regional development and competitiveness. This approach aims at strengthening the regional partnership and the interaction between citizens, public authorities, academic and business environment, in a democratic-centric view. The regional knowledge management platform integrates multiple dimensions of knowledge management, such as: techno-centric view, people view, organizational view, and process view. The technical view focuses on technologies, ideally those that enhance knowledge sharing, and people interaction. The people view focuses on bringing people together and helping them to exchange knowledge. The organizational view focuses on process re-engineering for the main actors involved in the design of the regional development strategy. The process view focuses on the management of the knowledge creation, processing and transmission. This approach intends to bring together valuable and updated data, procedures for data acquisition and updating, statistical tools, benchmarking standards and the people's best practices, experience and creativity, as a regional repository, which will be used for the knowledge creation and innovation processes. The development of the virtual platform ensures the possibility of a wider debate on a scientific and realistic base, offered by a set of detailed and relevant indicators and various analysis and scenarios, as embedded knowledge. The new web

technologies offer support for the efficient communication among main actors, reduces the cost and increase the participation rate of the citizens and experts in the democratic process of the design of the regional development strategy. It offers also the possibility of an iterative process for the refinement of the regional objectives and priorities. The interactive regional platform facilitates the management of the regional intelligence capital and best practices, in the benefit of the region. It creates also the premises for a better supervision of the implementation of the regional strategy, and support the process of finding the best solutions for fulfilling the established goals.

2. Sustainable regional development in the knowledge based society

The regional development as main pillar of the European cohesion policy represents a very important pole of creativity and innovation, contributing to the increase of the competitiveness, goal of the Lisbon strategy. The actual approach focuses on a global perspective in order to improve the local action ("think global – act local"). The sustainable regional development is articulated in the actual global frame, taking into account the international agreements, the European sustainable development policies and the national sustainable strategies, as illustrated in the figure 1.

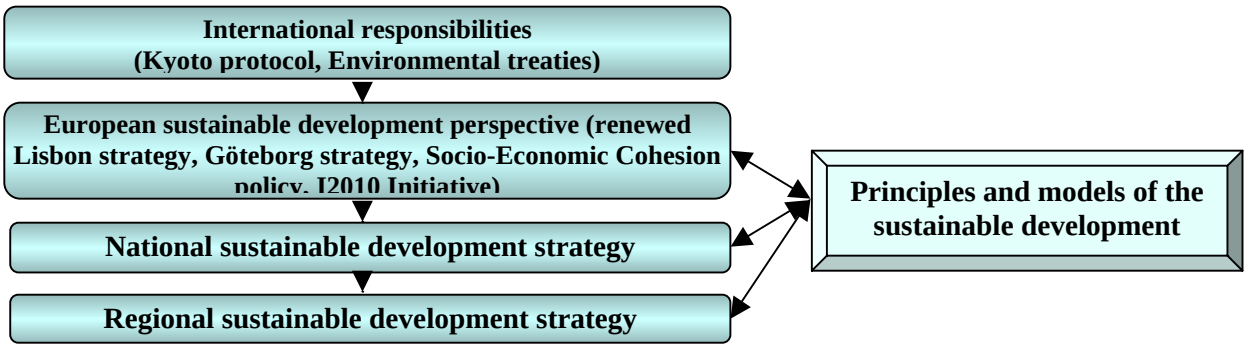

Fig. no. 1 – The context of the sustainable regional development

The actual European strategic frame integrates various policies which have the same goal: to create a space with better conditions for all the European citizens in a sustainable way. The renewed Lisbon strategy aims at integrating also the environmental perspective, as Göteborg strategy stipulated: "the urgent need to secure a better quality of life for present and future generations. This requires sustained economic growth which supports social progress and respects the environment, a social policy which underpin economic performance and a cost-effective environmental policy" ([16]). In order to measure the state of art concerning the actual Lisbon strategy requirements, the European Commission is monitoring the composite Lisbon indicator, which integrates six indicators relevant at the regional level ([15], page 87-88), as it will be presented in the table 1.

Other important articulation of the regional development strategy is with the economic and social European cohesion policy focusing on: convergence, competitiveness, employment and growth, and cooperation. The actual development has to take into account also the I2010 European Initiative which has as main goals: the development of a package of proactive policies to harness the potential of the digital economy to deliver growth, jobs and modern, on-line public services, as well as tools for good governance, being a key component of the EU's renewed Lisbon strategy for growth and jobs.

In this context, our country has as priority to meet the Lisbon strategy main goals, consisting in the transition to the knowledge based society, the development of the new social European model through the investment in human capital and the economic growth through a mix of macro/economic policies. , our country has to speed up the process to meet the targets set by the

Lisbon strategy, taking into account that the Lisbon indicators calculated for Romania, reflecting the 2004-2005 situation, scored only 0,32, and the Bucharest-Ilfov Region, the most developed Romanian region scored 0,39 ([15], page 191), values under the European average which scores 0,51 ([15], page 179).

In order to meet the main sustainability priorities, the development requirements are focusing on knowledge and the integration of good expertise and innovative approach in order to cope with the major actual challenges. In addition to the main concepts and principles related to the sustainability and strategic approaches, various set of indicators and models are used in order to design and monitor the sustainable development at the regional, national and global level.

3. Relevant sustainable development indicators

The actual challenges concerning the sustainable development determined the design of a wide range of models and set of indicators characterizing the sustainable development. There are two main trends in the actual approaches: the development of a set of indicators grouped on main themes and the development of composite indexes which integrates more indicators. A short list of the most used indicators for the sustainability measurement is provided by the table 1.

Table no.1

Relevant sustainable indicators

Type of indicators	**Name of indicators**	**Components**	**Implemen-tation**
Indicators for monitoring the European sustainable development	Sustainable Development Indicators (10 Themes, 3 levels)	Theme 1: Socio-Economic Development Theme 2: Sustainable Consumption and Production Theme 3: Social Inclusion Theme 4: Demographic Changes Theme 6: Climate Change and Energy Theme 7: Sustainable Transport Theme 8: Natural Resources Theme 9: Global Partnership Theme 10: Good Governance	EUROSTAT National Institute for Statistics (Theme 1–8)
Composite index for monitoring Lisbon strategy	Economic Lisbon Indicator	1. Gross Domestic Product (GDP) per capita 2. Employment rate age15-64 years 3. Employment rate age 55-64 years 4. Research and development expenditure as percentage from GDP 5. Long term unemployment (% of total unemployment) 6. Rate of young people (age 20-24 years) who have attended at least the upper secondary level of education	European Commission
Composite index for the	Regional Innovation Performance Index (RIPI)	1. Innovation engines 2. Knowledge creation 3. Innovation and entrepreneurship 4. Applications	European Commission

innovation		5. Intellectual Property	
Sustainable development indicators	Sustainable Society Index	Table 2	Geurt van de Kerk
Composite index for the human development	Human Development Index (HDI) Poverty Index (PI)	Life expectancy Education (literacy index and educational attainment) PIB per capita	United Nations Development Programme
Composite index for the environment	Environmental Performance Index (EPI) - 6 categories, 16 indicators	Environmental Health Biodiversity and Habitat Sustainable Energy Water Resources Air Quality Productive Resource Management	Columbia University and Yale University, USA.

Source: Synthesis of [9]-[15]

The list of indicators is not an exhaustive presentation; it intends only to emphasize the most recent indicators developed for the assessment of the sustainable development. The European Union has developed a set of indicators for monitoring the sustainable development. The themes follow a general gradient from the economic, to the social, and then to the environmental and institutional dimensions. They are further divided into sub-themes to organize the set in a way that reflects the operational objectives and actions of the sustainable development strategy ([17]). The set of indicators for the sustainable development assessment is integrated also in our statistical system of indicators and are accessible on the portal of the National Institute for Statistics (theme 1 to 8). Some composite index developed and calculated in the European Union are: the Economic Lisbon strategy index and the Regional Innovation Performance Indicator, which follow the same algorithm. For integrating the specific indicators, they are transformed related to the European average of the indicators, followed by a deviation minimization. The composite index represents the adjusted average of the transformed indicators (scale 0 to 1).
A recent introduced set of indicators is the Sustainable Society Index, which is divided into 5 main domains with 22 indicators, as illustrated in the table 2.

Table no. 2

Sustainable Society Index

Domain	Indicator	Calculation
1. Personal development	**Healthy life**	life expectation at birth in number of healthy life years Formula: F(x)=(X-20)/60*10 Range of validity: $20 \leq x \leq 80$
	Sufficient food	number of undernourished people as percentage of the total population Formula: *F(x) = (100-X)/100*10* Range of validity: $0 \leq x \leq 100$
	Sufficient drinking water	number of people as percentage of the total population, with sustainable access to an improved water source Formula: *F(x) = X/100*10* Range of validity: $0 \leq x \leq 100$

	Safe sanitation	number of people with sustainable access to improved sanitation as percentage of the total population Formula: *F(x) = X/100*10* Range of validity: 0 ≤ x ≤ 100
	Education opportunities	combined gross enrolment ratio for primary, secondary and tertiary schools Formula: *F(x) = X/100*10* Range of validity: 0 ≤ x ≤ 100
	Gender equality	Gender Related Development Index Formula: *F(x) = X*10*
2. Clean environment	**Air quality**	air quality with respect to concentration of NO2 , SO2 , fine particulate matter and indoor air pollution from solid fuel use Formula: *F(x) = (X+1.8)/4*10* Range of validity: -1.8 ≤ x ≤ 2.2
	Surface water quality	Surface Water Quality based on dissolved oxygen concentration, electrical conductivity, phosphorus concentration and concentration of suspended solids Formula: *F(x) = (X+2)/4*10* Range of validity: -2 ≤ x ≤ 2
	Land quality	Degraded land as percentage of cultivated and modified land, the LQ-score Formula: *F(x) = X/100*10* Range of validity: 0 ≤ x ≤ 100
3. Well-balanced society	**Good governance**	the average of the values of the 6 Governance Indicators of the World Bank Formula: *F(x) = (X+15)/30*10* Range of validity: -15 ≤ x ≤ 15
	Unemployment	employment as percentage of total labor force Formula: *F(x) = exp(-0.1*X)*10 for 0 ≤ x < 60* Range of validity: F(x) = 0 for X > 60
	Population growth	average population growth in the period 2000 – 2005 Formula: *F(x) = (1-(X+1.5)/6.5)*10* Range of validity: -1.5 ≤ x ≤ 5
	Income distribution	ratio of income of the richest 10% to the poorest 10% of the people in a country Formula: *F(x) = exp(-0.1*(X-4.5))*10* Range of validity: 4.5 ≤ x ≤ 129
	Public debt	the level of public debt – and if this figure is lacking, the foreign debt – of a country as percentage of Gross Domestic Product Formula: *F(x) = exp(-0.009*X)*10* Range of validity: 0 ≤ x ≤ 793
4. Sustainable use of resources	**Waste recycling**	quantity of recycled solid waste as percentage of the total quantity of solid waste Formula: *F(x) = X/100*10* Range of validity: 0 ≤ x ≤ 100
	Use of renewable water resources	water consumption per year as percentage of the total available renewable water resources Formula: *F(x) = (100-X)/10 for 0 ≤ x ≤ 100* Range of validity: F(x) = 0 for X > 100
	Use of renewable energy	consumption of renewable energy as percentage of total energy consumption Formula: *F(x) = X/100*10* Range of validity: 0 ≤ x ≤ 100
5. Sustainable world	**Forest area**	change in forest area of a country as pro mille content of world forest area in the period 1990 – 2000 Formula: *F(x) = 0 for X < -0.7* *F(x) = (10*X+7)^2*(-20*X+19)/11^3*10 for -0.7 ≤ x ≤ 0.4* Range of validity: F(x) = 10 for X > 0.4
	Biodiversity	National Biodiversity Index Formula: *F(x) = X*10* Range of validity: 0 ≤ x ≤ 1
	Emission of greenhouse gases	CO2 emission per capita Formula: *F(x) = 10-X for 0 ≤ x ≤ 10* Range of validity: F(x)=0 for X > 10

	Ecological footprint	the ecological footprint in hectares per capita Formula: $F(x) = 10-3*X/1.8$ for $0 \leq x \leq 6$ Range of validity: F(x) = 0 for X > 6
	International cooperation	participation in 14 international treaties and agreements with respect to human rights, nature and environment Formula: $F(x) = X*10$ Range of validity: $0 \leq x \leq 1$

Source: [13]

This comprehensive set of indicators is completed in our country with some other specific indicators, such as:

- Gross Domestic Product
- Poverty Rate
- Research and Development
- Transport
- Ecological Agriculture

One important and wide implemented index is the Human Development Index, which is a synthetic indicator integrating life expectancy, education index and GDP per capita index. This indicator, as well as the other composite indexes, reveal the performance of a region/country related to the indicator and offer the possibility of benchmarking, indicating the concordance or the gap in the sustainable development, related to other similar regions/countries. The HDI has a limited use because of its reduced number of specific indicators integrated.

A more accurate index is the Environmental Performance Index, which integrates the most important specific indicators related to the environment.

The analysis of the set of indicators presented revealed the diversity of the research and the great interest in the area. The majority of the indicators are oriented to reflect the state-of-art and have a limited use in the simulation or prediction. Other major observation consists in the fact that only few indicators are action oriented. The actual construction of the set of indicators is characterized by a lack of correlation between human, environmental, social and economic dimensions. Other major weakness is the lack of tools for the identification of the causes for the various effects measured, in order to provide a solution and an appropriate action.

Taking into account the strong and weak aspects of the set of indicators analyzed we developed a set of indicators structured on four dimensions (human-environmental-social-economic) and grouped in three categories (cause-effect-action). This represents an open heuristic model which can be refined and completed. The main frame of the indicators integrated in the model on the four axes and some examples of indicators are presented in the figure no. 2.

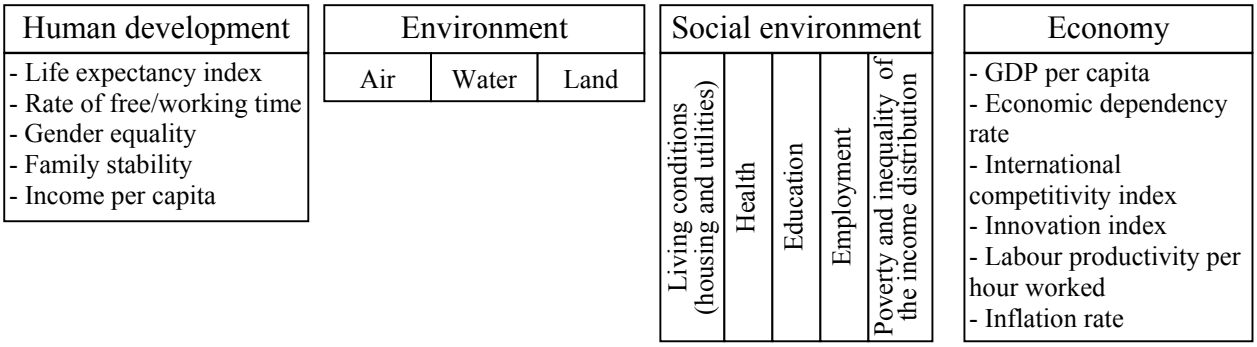

Fig. no. 2 – Main structure of the heuristic model

The status indicators are measuring the effects of the human activities upon the natural, social and economic environment. The action indicators represent investments/expenditures, policies, legislation, training measures etc. in order to correct the negative effects. The identification

of the causes generating negative effects is the result of a transversal analysis of the indicators concerning the sustainable production/results correlated with the rate of employability, the resource consumption (rate of renewable energy/materials) and the pollution generated by sector, as illustrated in the figure 3.

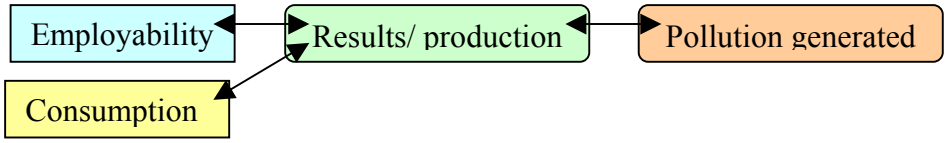

Fig. no. 3 – The transversal integrated analysis

The proposed model will be used as basis for various scenario building, in order to offer possible development paths for the entities supporting the decision makers at the regional level. This information will be delivered to the public in a transparent way, creating the premises of a better understanding of the regional development context.

4. Generic architecture of the knowledge management platform

The heuristic model will represent one of the tools of the knowledge management platform, which will provide, through the use of various statistical data, information related to possible sustainable regional development trends. The data for the model will be provided by a data warehouse containing regional statistical data and benchmarking information related to European standards or other regions' indicators and data. This approach intends to offer valuable information for the decision makers and also for the citizens and regional entities, in order to increase their participation to the process of the sustainable regional strategy development. This is an efficient way to involve citizens and organizations in the regional development, as a knowledge based process. The knowledge platform will contribute also to the acquisition of data, models, experience, and various views from experts and research institutions, creating greater opportunities for the sustainable development. This innovative approach at the regional level increases the possibility to identify valuable initiatives and supports the regional consensus building for the regional development.

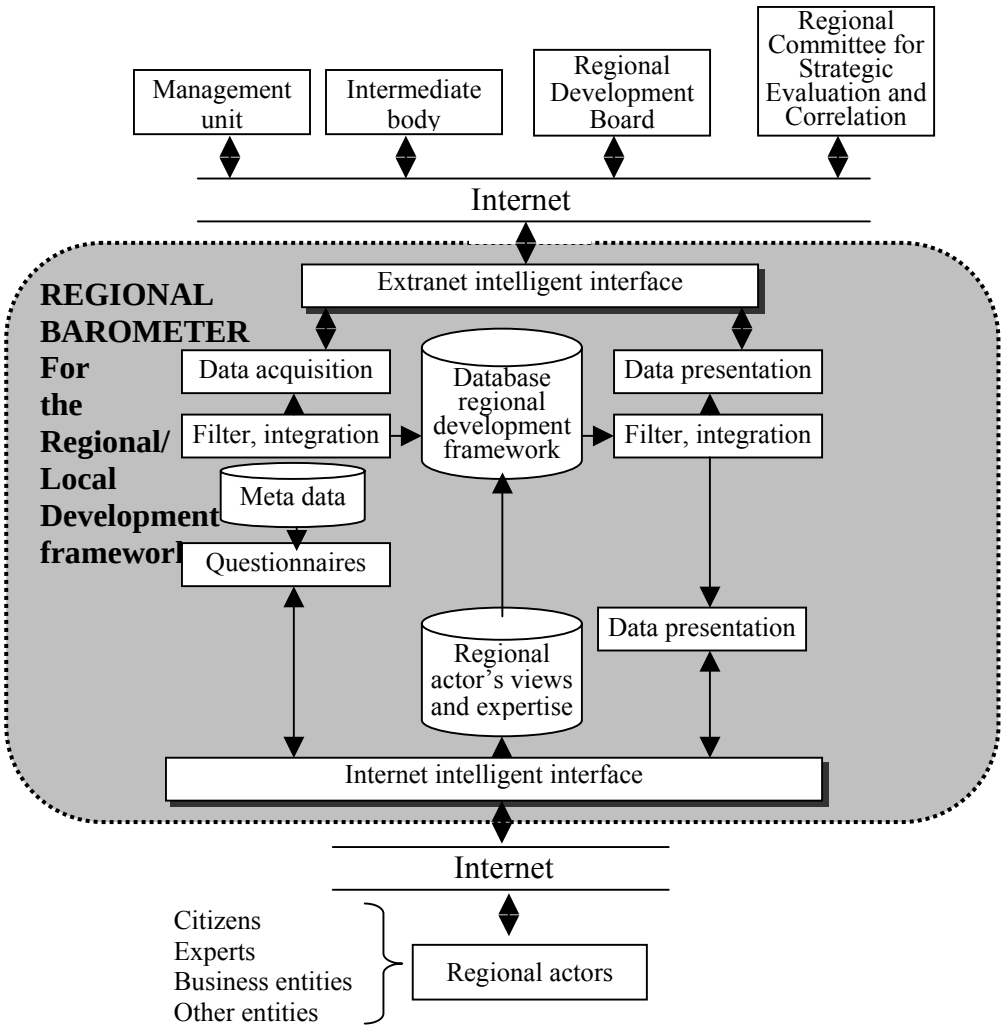

Fig. no. 4 – Architecture for the regional/local knowledge

One of the major goals of the virtual platform is the efficient interaction of the regional/local entities with the management and intermediate units for the design of the regional development strategy. The increase of the interactivity between the local authorities and the regional actors will stimulate the pro-active behavior in the benefit of the regional/local development. The use of various questionnaires, focus group debates, and e-voting techniques will contribute to a better measurement of the regional actors' views and satisfaction, related to the regional development strategy design and implementation, as illustrated in the figure no. 4.

The project will develop also interactive tools in order to gather information from the regional partners and to develop an iterative process for the refinement of the regional development priorities. The innovation of the virtual platform consists in supporting through specific virtual services the development of the regional strategy and its implementation, through a wide process of consensus building and ensures the necessary synergy at the local level.

This democratic-centric approach is a qualitative change at the regional/local administration level. The feedback obtained represents important information for the regional decisions makers (Regional Development Board and Regional Committee for Strategic Evaluation and Correlation), in order to improve the process of the design and implementation of the sustainable regional strategy.

References

1. ***Regional Operational Plan (ROP) 2007-2013, http://www.mdlpl.ro/documente/POR/POR_august_07.pdf, date: 18.01.2008
2. *** Implementation Framework ROP 2007-2013, http://www.mdlpl.ro/documente/POR/Cadru_POR_septembrie_07.pdf, date: 25.01.2008
3. ***National Development Plan 2007-2013, http: //www.mfinante.ro/, date: 25.01.2008
4. ***National Sustainable Strategy – Horizons 2010-2020-2030, http://mmdd.ro/, date: 18.09.2008
5. European Commission, (2006): Communication from the Commission to the Council and the European Parliament on Thematic Strategy on the Urban Environment, COM (2005) 718 final, SEC (2006) 16, Brussels
6. „Ion Mincu" Architecture University, (2006): Romania 2025, Spatial development concept, Bucureşti
7. LEIPZIG CHARTER on Sustainable European Cities, Leipzig
8. European Commission, (2007): Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the Mid-term review of the Sixth Community Environment Action Programme, , COM(2007) 225 final, Brussels
9. Eurostat, Indicators for monitoring the EU Sustainable Development Strategy, http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1998,66119021,1998_66292168&_dad=portal&_schema=PORTAL, date: 16.06.2008
10. UNDP, The Human Development Index (HDI), http://hdr.undp.org/en/media/hdr_20072008_tech_note_1.pdf, date: 16.06.2008
11. *** Environmental performance index, http://epi.yale.edu/Home,
12. http://sedac.ciesin.columbia.edu/es/epi/, date: 15.08.2008
13. *** Sustainable Development Indicators, http://www.ymparisto.fi/default.asp?node=15131 &lan =en, Finland, date: 15.10.2008
14. Van der Kerk, Geurt (2008): A comprehensive Index for a sustainable society, Ecological Economics, Volume 66/2-3, pp 228-242
15. *** Sustainable society index, http://www.romaniadurabila.net/, date: 29.09.2008
16. European Commission, (2007): Growing Regions – Growing Europe. Fourth Report on Economic and Social Cohesion, Brussels
17. ***Göteborg strategy, http://www.climnet.org/news/June%202001.html#sds, date: 15.10.2008
18. ***,Eurostat, Sustainable Development Indicators, http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1998,66119021,1998_66292168&_dad=portal&_schema=PORTAL, date: 15.09.2008