KNOWLEDGE-BASED ECONOMY, AN APPROPRIATE RESPONSE TO ORGANIZATIONAL CHANGE PRESSURES, WITH A VIEW TO SUSTAINABLE DEVELOPMENT

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Abstract
The sustainable development of organizations within knowledge-based economy, in which knowledge represents the main priority, should focus on finding solutions for the intelligent management of the limited resources, especially through organizational change and its constant assessment as a long-term impact solution. The transition of organizations to the principles of knowledge-based economy involves a major change in organizational culture. The dynamism and complexity of the new type of society, which implies a higher and more diverse level of training, together with a continuous superior training of the workforce, increasing investment in research and development and, not least, a growing volume and a diversification of information, all these represent, chained together, an element of well-being for the future generations. The introductory section summarizes the concept of sustainability and places the development of companies and economies they aggregate, in a contemporary context of organizational change pressures, on the principles of the knowledge-based economy as the only resource, virtually inexhaustible in the long-term, and which leads to a sustainable development. There follows a methodological section, consisting in the instrumental description of the method of work and in reference to the database, thus providing the theoretical and practical foundation for the confrontation between the sustainable development index (SDI) in Romania and in the European Union (EU).

The results and discussion section of the paper includes a confrontation between the sustainable development of Romania and that of the European Union, drawing on the SDI for each case. This statistical tool was calculated starting from the values of several statistical indicators (available in EUROSTAT statistics), issued from four information subsystems (an economic one, a social one and an environment one as major subsystems of sustainable development, to which was added the institutional environment). The SDI confirms a considerable gap between Romania and the EU-27 average, and the organizational change on the principles of knowledge-based economy is emerging as the optimal solution and gradual recovery of these gaps.

Keywords: sustainable development, organizational change, knowledge-based economy, sustainability, sustainable development index (SDI), Board Sustainability Index support (BSI)

JEL Classification: D83, O11, Q01

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Introduction

To survive and further develop, companies must generate reliable strategies consistent with a new economic reality in which the resources and inputs of the industrial age represent only necessary but not sufficient requirements. Economic entities, multiplied in the real and virtual area (through the new e-entrepreneurship and the virtual companies that anticipate an unprecedented development of capitalism on the Internet) show clearly the importance of the new factors and of the investment in research and development, especially in a special type of development, a sustainable, triadic one with a simultaneous sense of development, an economic, social and environmental one (sustainable, fair, supportable, sustainable, etc.) – figure no. 1. Sustainability does not mean that things do not change. It is not a static but rather a dynamic, common evolution (Capra, 2002).

![Diagram of Sustainable Development](source: UCN, 2006)

The competitiveness of organizations is largely related to the acceptance of the concept of sharing knowledge. The success of organizations must be extended through strategies based on financial and physical resources oriented towards strategies related to intellectual capital administration, thus gaining a competitive advantage, in the sense of long-term sustainable development, by increasing the human capital through education. In the knowledge-based economy, material and human resources productivity enriches its meaning and the competitive advantage created through innovation; the superior training of workforce and the large scale use of knowledge minimize the role played so far by natural resources or geographical and historical features. The anticipation of a distinct and balanced type of real economic development has gathered around this new concept of sustainable development. Brundtland report first defined the concept of sustainable development as “the ability of human society to ensure present needs without compromising the ability of future generations to meet their own needs” (Brundtland, 1987). A classical meaning, a radical and antithetical one, is conferred in an antithetical and philosophical manner, on the
principle of negation, respectively that “unsustainable development is the development in which environmental impacts affect economic growth” (Hogendorn, 1996). The way to achieve the sustainable development of human communities must be established so that its life style, technology and commercial, economic and physical structures maintain nature and life, and not destroy them (Capra, 2002), and this aspect should be firstly considered by companies. Porter and Kramer in an article published in *Harvard Business Review* (Porter and Kramer, 2006) believe that the greatest service that a company can bring human society is to provide jobs, products and services and contribute to generation of social welfare. Whatever the approach to the reality surrounding us, the concept of sustainable development, fundamentally a notional one, conferred by sustainability, totally disagrees with the idea that environmental and social issues constitute acceptable negative effects of economic development. *The growth theory of the company*, given by Edith Penrose, in an attempt to explain how companies actually increase, claimed that any sustained increase in a company is related to the attempts of a group of human beings of that entity to “do something”, the increase not being restricted significantly by administrative approaches, and its speed depending decisively on the recruitment of well trained human resources, who are more efficient and dynamic, and the continuity of the recruitment process (Penrose, 1959). After more than fifty years, the theory lost its validity and to meet new economic evolutions, companies and organizations generally must make changes in terms of procedures, structures and, not least, skills, raising the employees’ skills. More educated workforce is the most important competitive advantage and must start from the managerial level to the first line of production or sales.

As knowledge-based economy is the general solution to constant organizational change, in the spirit of sustainable development, so the implementation of knowledge-based economy can ensure sustainable development, thus synthesizing the optimal solution for the gradual recovery of gaps. The role played by knowledge in economic growth is not a novelty. In the present context, the sustained advantage of nations will result in knowledge, not in resources (Neef, Siesfeld and Cefola, 1998). The development of the modern society is dependent on scientific research and technological development, these acquiring, together with education, a central role in the process which ensures progress and welfare. It is generally accepted that there is a direct relationship between research and development firm expenses and the economic growth, since public spending on research and development is focused mainly on fundamental research that creates a positive externality for businesses.

In the context of the new knowledge-based economy, the relationship between research, development and innovation, on the one hand, and growth, on the other hand, is very important. The fundamental change brought about by the new economy refers to knowledge, reconsidered as the main raw material of organizations, their main factor of production and capital, a commodity and competitive advantage. Many companies are currently facing difficulties because, while their structure changes constantly under the pressure of organizational change, they are still run based on old attitudes and managerial decisions. The knowledge-based organization is associated with an equal knowledge management. Managers need to learn new skills to assist employees in achieving the changes required. Each level of management must be aware of the constant change and in order to achieve this goal they need to alter the manner of thinking and of ranking the values system. If, in general, knowledge can be acquired through learning, skills change is closely linked to the value and the culture of the organization. The economic development of organizations or principles of the knowledge-based economy brings a positive impact to
the environment and society as a whole, being able to ensure sustainability through: a) a more advanced workforce, b) a greater role assigned to innovation and inventions when establishing strategies, c) an increased role assigned to R&D in the modern organization, d) an increased contribution of ICT etc.

The more educated workforce is a prerequisite for the sustainable development of organizations, in which the investment in continuous training and the importance assigned to the speed of reaction and flexibility are the key elements for the increase of productivity and the promotion of innovation and inventions, which establishes new strategies and leads to a sustainable development of organizations. The development of tangible and intangible factors of competitiveness, of forms of innovation from the technological one to eco-innovation, and of inventions too, identifies solutions for the conservation of inventions with better energy efficiency and pollution reduction, for the access to clean technologies, reformulating the strategies of organizations. The share of research and development expenses in total added value created is directly proportional to the degree of development of the company and the economy as a whole, and the use of an increasing share of information and communication technology expresses the degree of modernization.

The ensuring of sustainable development of Romanian economy in response to the pressures of organizational change through an intensive process based on knowledge proposes in this article a periodical identification, an improved quantification, a systematic comparison and confrontation of the national level of sustainable development in parallel with that of the European Union, as objectively as possible from an instrumental point of view, valuing a tool which has been acknowledged (built Board Sustainability Index support - BSI) and its specific software, but also a set of indicators issued form authentic and validated databases - EUROSTAT.

1. Methodology, instrumental and database description

Previously to the description of the work method and of the databases, providing theoretical and practical basis for the determination of the appropriate index to quantify the sustainability of development in Romania and the European Union, a synthetical summary of the main tools of contemporary measuring of sustainable development would be required.

A first alternative is that of the index of sustainable economic welfare (IBEW) based on final consumption, which is a statistical indicator directly related to macro-conglomerates of national accounts. This index subjected to light modifications gave birth to the genuine progress index (GPI), starting from the idea to add or subtract value in order to insert positive and negative social effects, not measured by gross domestic product (GDP) or the final consumption indicator. Genuine progress index is valued especially in the evaluation of the decline of the quality threshold of human life. An evolution of the “scissors” type of the sustainable development indicators can regularly confirm the hypothesis of a threshold of quality of human life that is in decline at a certain level of economic growth (Max-Neef, 1995).

Non-monetary indicators constitute another alternative and bring together a category of indices aggregated as averages (unbalanced or slightly differentiated), of which the human development index (HDI), the environmental sustainability index (ESI), the sustainable development index (SDI) and the well-being index (WI) are the most popular statistical
tools used in the literature about measuring sustainable development (Prescott-Allen, 2001; Nováek and Mederly, 2002, Wackernagel et al. 2002).

HDI is the best known but it is less relevant for the topic of this article. Environmental sustainability index (ESI) can be considered as a tool to assess a potentiality since the indicator includes several indicators related to environmental quality and in an even more nuanced manner with reference to the environmental capacity of public or private agencies to deal with environmental issues. Sustainable development index (SDI) has the highest coverage of sustainable development dimensions, including political issues (human rights) and the welfare index (WI) is in fact a true barometer of sustainable development, which combines the welfare of the people with the ecosystems in a two-dimensional diagram.

All these tools can be additive or improved by the “ecological footprint”, respectively by the assessment of the use of the natural resources while measuring the absorption of pollutants. This indicator bearing the name of ecological footprint benefits from the conceptual and intuitive simplicity of universal indicators and can be integrated into other constructions or communicated apart from them.

The method used in this article is the confrontation statistical method (facing the Romanian economy with the EU average - 27). Retrospectively, it appears that in their common effort the economic theory, statistics and informatics produce more and more instruments of measure of a complex type (from aggregate indices to complex cyclic graphs). Another example of application of these statistical tools of a growing complexity is present in the recent approaches in Romanian economic literature (Sâvoiu, 2011), which describes a similar process of comparative analysis based on complex instruments with specially developed graphic support, based on databases and on the Eurostat statistical tool, called the business cycle clock (Business Cycle Clock - BCC), which confronts the Romanian economy cycles with that of the European Union (EU-27), and the final finding by confrontation is that of significant time gaps, manifested by a greater stillness of the recession period in Romania. (Figure no. 2)
The solution of the confrontation of the evolution of Romanian economy with the EU-27 in the business cycle has used a total number of 13 economic indicators available from the point of view of method and value on Eurostat (2012).

In the European Union the process of quantifying the sustainability of development has the following synthetic structure, but the key indicators are relatively numerous (table no. 1).

### Table no. 1: The synthetic methodological content of the index of sustainable development

<table>
<thead>
<tr>
<th>No.</th>
<th>Topics covered through the sustainable development index (SDI)</th>
<th>Names of key indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Socio-economic development</td>
<td>Real GDP per capita</td>
</tr>
<tr>
<td>2</td>
<td>Consumption and sustainable productivity</td>
<td>Resource productivity</td>
</tr>
<tr>
<td>3</td>
<td>Social inclusion</td>
<td>Risk of poverty or social exclusion</td>
</tr>
<tr>
<td>4</td>
<td>Demographics</td>
<td>Employment rate of older employees</td>
</tr>
<tr>
<td>5</td>
<td>Public health</td>
<td>Life expectancy and healthy life years</td>
</tr>
<tr>
<td>6</td>
<td>Climate changes and energy</td>
<td>Greenhouse gas emissions Consumption of renewables</td>
</tr>
<tr>
<td>7</td>
<td>Sustainable transport</td>
<td>Energy consumption of transport relative to GDP</td>
</tr>
<tr>
<td>8</td>
<td>Natural resources</td>
<td>Abundance of common birds Conservation of fish stocks</td>
</tr>
<tr>
<td>9</td>
<td>Global partnership</td>
<td>Official development assistance</td>
</tr>
<tr>
<td>10</td>
<td>Good governance</td>
<td>[no key indicator]</td>
</tr>
</tbody>
</table>

Source: Eurostat, 2011

In this work we have ranked the levels of sustainable development of Romania and the European Union (EU-27), by calculating the Sustainability Board Index (SBI). The proposed model contains a set of indicators specific to the economic, social, environmental and institutional dimensions; the indicators used have their source in the Eurostat database and their corresponding values for 2010 (where there were no values for 2010, the value was estimated by the evolution of the recent years, the software that processes the indicators making up the index, is distributed by the Joint Research Centre of the European Commission and the International Institute for Sustainable Development.

The method of analysis is the method of confrontation between the index of sustainable development of Romania and the EU-27. To achieve a correct SBI the selected indicators were entered an Excel worksheet. (figure no. 3)
Figure no. 3: The Excel worksheet that contains the key indicators of SBI

Source: European Statistical Laboratory, 2012

The key indicators were grouped into domains. The colors displayed after entering the data and running the program represent the performance of the environment analyzed, from dark green (excellent) to red (critical). (figure no. 4)

<table>
<thead>
<tr>
<th>Score</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>+4</td>
<td>excellent</td>
</tr>
<tr>
<td>+3</td>
<td>very good</td>
</tr>
<tr>
<td>+2</td>
<td>good</td>
</tr>
<tr>
<td>+1</td>
<td>favorable</td>
</tr>
<tr>
<td>0</td>
<td>normal</td>
</tr>
<tr>
<td>-1</td>
<td>unfavorable</td>
</tr>
<tr>
<td>-2</td>
<td>very weak</td>
</tr>
<tr>
<td>-3</td>
<td>severely</td>
</tr>
<tr>
<td>-4</td>
<td>critical</td>
</tr>
</tbody>
</table>

Figure no. 4: The ordinal scaling specific to the SBI

Source: European Statistical Laboratory, 2012

Each dimension holds an equal share in the index. The interpretation and discussions on the topic of the results were made according to the information of the color ordinal scaling specific to the SBI index.

2. Results and discussion

The Sustainability Board program allows a highlighting of the differences in the total number of sectors, for each sector and even for each indicator. An overview image discriminates Romania, which does not present the features of a common European sustainable development phenomenon, but the color ordinal scale is unfavourable to it.
A review of the four sectors, respectively assessing the four dimensions: environmental, economic, institutional and social allows a rapid confrontation accompanied by the identification of the specificity in development, of the differentiated sustainability, in an apparently simple, yet complex, graphical manner.

In figure no. 5 it can be observed the colour distribution that characterizes the performance of the four dimensions for Romania and the EU-27. It is easy to see that the sustainable development index, calculated on the data entered in the software of the Sustainability Board, for the EU-27 corresponds to the “good” level; for Romania it is “unfavourable”.

In figure no. 6 it is highlighted, using the indicators, the “Environment” dimension where you can see clearly the colour difference, EU-27 corresponds to “favourable”, and for Romania the grade corresponds to “unfavourable”.

Figure no. 5: The sustainability index created with sustainability board support for Romania and the EU-27

Figure no. 6: A comparative analysis between Romania and EU-27 for the “environmental” dimension
As far as the “economic” dimension is concerned, Romania holds the worst position, which is a critical one by comparison to the European average, which is excellent (figure no. 7). The values of the indicators in this environment do not manage to touch half of the value corresponding to the EU-27 average.

Figure no. 7: A comparative analysis between Romania and the EU for the economic dimension

In terms of the “institutional” dimension, Romania has a rating of “very weak” compared to the EU-27 which is one of “very good” (figure no. 8).

Figure no.8: A comparative analysis between Romania and the EU for the institutional dimension
The only situation in which Romania is ahead of the EU-27 is regarding the social dimension (figure no. 9). Thus, the EU-27 corresponds to the “unfavorable” level, while in Romania the ranking is “good”.

![Figure no. 9: A comparative analysis between Romania and the EU for the social dimension](image)

The situation analysis presented above shows that Romania continues to be behind the EU and has to recover significant gaps from the EU member states. Romania is not be compared with the Baltic States, with which it was compared during the interwar development period, with an emphasis on its dependence on the foreign commercial links with Germany and England (Savoiu and Dinu, 2012) or with Bulgaria, our country still having an economy based on the intensive use of resources. In order that this type of development damage does not become irreversible, our country must shift, in the shortest possible time, to a development model generating high added value, supported by knowledge and innovation, in a context of welfare and harmony with the environment.

Promoting clean technologies, the valuing and increasing use of renewable energy sources represent for Romania assuming commitments by ratifying the Kyoto Protocol at the Convention – of the United Nations on climate change. In this respect, Romania has adopted the strategy of valuing of renewable energy sources. Although in Romania there are several strategies related to sustainable economic growth, there are delays in their implementation or there is a partial implementation because of several reasons: a) limited financial resources; b) the presence within the entrepreneurship spirit of a development trend which is only profitable, not sustainable; c) excessive bureaucracy; d) increased taxation inappropriate to sustainability; e) changing legislation on social protection, etc..

**Conclusions**

The sustainable development index confirms a considerable gap between Romania and the EU-27 average, and the organizational change on the principles of the knowledge-based
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Economy is emerging as the optimal solution and gradual recovery of these gaps. So that Romanian organizations develop in a sustainable manner in the context of knowledge-based economy, there are several directions and immediate actions, starting from an increase of productivity through modernization and innovation in the existing companies, up to the ensuring of the conditions and financial resources for research and development, from the ensuring of the conditions necessary to the generalization of modern communication and transport with minimal resources, up to the increasing of the share of renewable energy sources and alternative technologies, etc..

Sustainable development is a fundamental obligation for all the countries in the world and at the European level, this is a distinct community policy. Savings and their micro(scopic) structure, and companies respectively, institutions and organizations bequeath to future generations resources and the environment, and human as well as the key resource that requires a new approach that is emerging increasingly as human ecology. In this context, the intensive development of the industrial age, cannot continue, the future must bring a different configuration and use of resources. Applying knowledge-based economy, with an emphasis on human capital development, research and development, innovation, infrastructure of knowledge, information and communication technology will bring many benefits to the social, economic, institutional and environmental levels. The success in achieving the purposes of the new economy will lead to a new development, a sustainable development, characterized by high creativity, continuous improvement, information emergence and competitive knowledge, all leading to a cleaner environment, social welfare and economic growth.

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References


