

# Knowledge Economy and its Effects in Romania

~ Prof. Ph. D. **Laura Cismaş** (Faculty of Economics and Business Administration, West University of Timisoara)

~ Assist. Prof. Ph. D. **Nicoleta Sîrghi** (Faculty of Economics and Business Administration, West University of Timisoara)

**Abstract:** Knowledge economy implies that the rationality of individuals is limited because they make and adapt their choices in an environment affected by risk and uncertainty. The first part of this paper proposes an analysis of the knowledge economy, based on its interdisciplinary nature. Thus, classical theories adapt to visions that pertain to the dynamics of human interactions, the restructuring of the social network theory, the general equilibrium theory and the game theory.

The research part of this paper identifies and explains the link between innovation and knowledge, as well as its effects on the Romanian economy's competitiveness and innovation. The conclusions illustrate that the consolidation of knowledge-based economy in Romania implies setting certain priorities, such as: investing in education, developing entrepreneurship, creating an innovative and efficient system made up of companies, research centers and universities, which enables new technologies to be absorbed, adapted and created for the society.

**Keywords:** knowledge economy, sustainable development, human capital, innovation, efficiency.

## 1. Introduction

Nowadays, knowledge economy is a challenge, as it is one of the forms of organization of human society. The rationality of individuals is limited because they make

and adapt their choices in an environment affected by risk and uncertainty. The collective behavior of economic agents is formed in a complex system of institutions, norms and conventions, laws, markets etc. that make up huge social networks.

Knowledge economy implies an interdisciplinary approach that adapts classical theories to visions related to the dynamics of human interactions, the restructuring of the social network theory, the general equilibrium theory and the game theory. Modern technology and engineering, as means of computerization and knowledge, definitely impact on the economy. Furthermore, new economy implies sustainable development, but it also brings about a new approach of the sustainable development itself.

Knowledge economy is based on the following main pillars: technological innovations and research & development costs; practice-based learning and knowledge propagation; accumulation of capital that generates positive technological externalities; improvement of the education & training, which generates work effectiveness, an absolute must for sustainable economic growth, conservation and reasonable use of non-regenerating resources, as well as a balance between resource consumption and regeneration.

The ideal solution seems to be to consider both nature and economy as part of a so-called "active circular flow" closed circuit. This means that, at the current state of knowledge, it is economically effective to use natural resources and to recycle waste material. Numerous efficient technologies for the use of raw materials are already available, but these must be applied and generalized, while others could be developed by intensifying research.

The current production, when viewed in the long run, seems to be higher than several years ago, but its contribution to improving the quality of life was markedly less significant than its growth, because the difference

represents costs and productions meant to reproduce natural conditions that the nature used to provide for free. Costs related to restoring the nature, as well as protecting and developing environmental assets should be taken into account to redefine the concept of economic efficiency.

Growth theories and, to a greater extent, the developed activities, approach natural environment as man's economic arena. This biunique relationship must be beneficial to the environment as well. Within it, human beings must meet environmental requirements to ensure their own perpetuity. Sustainable development imposes a wider view on the social equity by considering the man-environment relationship.

The authors propose an analysis of the knowledge economy, based on its interdisciplinary nature. The research part of this paper focuses on identifying and explaining the link between innovation and knowledge, as well as its effects on the Romanian economy's competitiveness and innovation. The aim of the final conclusions is to set certain priorities for the Romanian economy, such as investing in education, developing entrepreneurship, creating an innovative and efficient system of companies, research centers and universities, which enables new technologies to be absorbed, adapted and created for the society.

## 2. Literature Review

Each society had its own economy, which was considered new as compared to the economy of the previous society. The economic progress generated such ample changes that it was thought that a new economy was born, while in fact this only meant a

new stage acquired by the economic science. Thus, the progress was made from the classical economics to the neoclassical economics and later to the new classical economics. In this respect, the New Cambridge School was founded in the last decades, which laid the foundations of new economics, represented by such economists as J. Robinson, P. Sraffa, L. Pasinetti. They provided new explanations or formulated often categorical conclusions, which were overall considered to form the "new economics".

During the last decades, the concept of **new economics** has been widely used to refer to a new type of economic approach. Some economists believe that modern economies are rather *dynamic adaptive systems* than *closed equilibrium systems*, as it was long believed. Among these, we mention *Kenneth Arrow*, Nobel Price laureate and one of the first initiators of the modern neoclassical model and *Brian Arthur* of the Santa Fe Institute. *New economics* is also known as *the Santa Fe economics* because a great part of the economists preoccupied with this complexity are affiliated to the interdisciplinary research center of the Santa Fe institute. The complexity of the modern economic environment determined some authors to plead for a new economic approach based on a dynamic adaptive system. That is why the economists who study the new mode of economic thought are also referred to as complexity economists. According to these economists, economies are similar to biological systems in that they follow the same fundamental laws. These laws act differently in economics, and if we can improve our level of understanding, we will be able to comprehend the working mechanism of markets and companies to a greater extent.

New economics claims a rethinking of the production factors theory. Knowledge becomes the essential component of the contemporary economic and social development system. The spreading of innovation and the convergence of peak technologies will play a key role in boosting the importance of knowledge in the context of the globalization process. A knowledge-based organization can inspire entrepreneurship and drive top managers to transform the organization so that it becomes capable of absorbing, applying and developing value as a result of implementing new competitive technologies. Advanced knowledge and technology can significantly transform the economy of a nation.

### 3. Competitiveness and innovation in the Romanian economy

Despite the 6-8% annual growth rate, the lack of competitiveness of the Romanian economy provides reasons of concern. The main features of a competitive economy are high productivity and high efficiency in using available resources. At population level, this translates in higher incomes and a better quality of life, i.e. wellbeing.

Each year, the EU Directorate General for Enterprise and Industry publishes the European Competitiveness Report<sup>1</sup>, with concrete proposals regarding the macroeconomic effects of the EU policies (table 1).

A preoccupation for improving *macroeconomic competitiveness* may be noticed.

In Romania, several plans and structural programs exist; however, these cannot

<sup>1</sup>[http://ec.europa.eu/enterprise/enterprise\\_policy/competitiveness/1\\_eucompetrep/eu\\_compet\\_reports.htm](http://ec.europa.eu/enterprise/enterprise_policy/competitiveness/1_eucompetrep/eu_compet_reports.htm)

Table 1: Macroeconomic effects of EU-27 horizontal policies

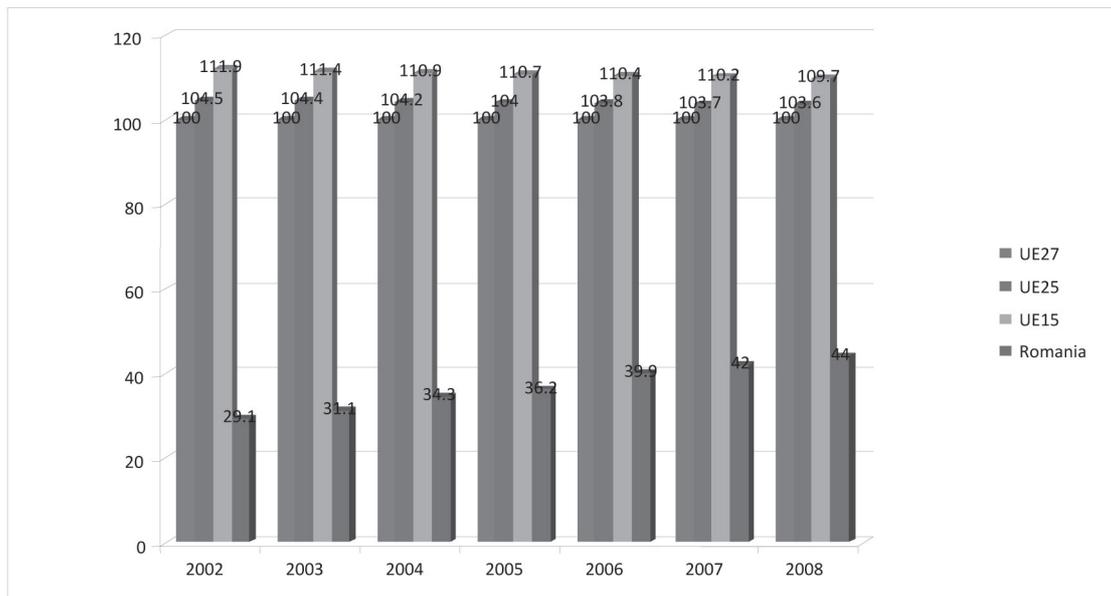
Index	Workforce qualification	Research & development	Administrative burden	Internal market	Energy efficiency	Total
Structural effects of the horizontal policy measures (%)						
GDP	0.5	3.0	1.5	1.7	0.9	7.7
Consumption	0.5	1.6	1.4	5.5	0.9	9.8
Export	0.5	4.8	1.4	40.6	1.8	49.0

Source: European Competitiveness Report: The future of manufacturing in Europe – a survey of the literature and a modeling approach, 2008

replace the national competitiveness strategy in the long run. A public body that specializes in competitiveness issues should be established. This governmental think-tank based

on a public-private partnership should develop a database to assess and monitor competitiveness, as well as case studies and other comparative analyses.

Chart 1. Work productivity per employee



Source: EUROSTAT database

An extremely negative aspect of the Romanian economy is that its productivity is less than half of the average EU-27 level. According to Eurostat, Romania is the last but one among the EU states in terms of work

productivity per employee, before Bulgaria, despite the high average number of working hours.

Eurostat figures illustrate that work productivity per employee in 2008 in Romania

was 42% of the average of the 27 EU member states, while in Bulgaria it was 35.6% (chart 1). According to the same source, work productivity in Romania in 2002 was 29.1% of the

EU average and improved constantly between 2002 and 2008.

The situation of work productivity by sectors in Romania is shown in chart 2.

Chart 2. Work productivity by sectors of national economy

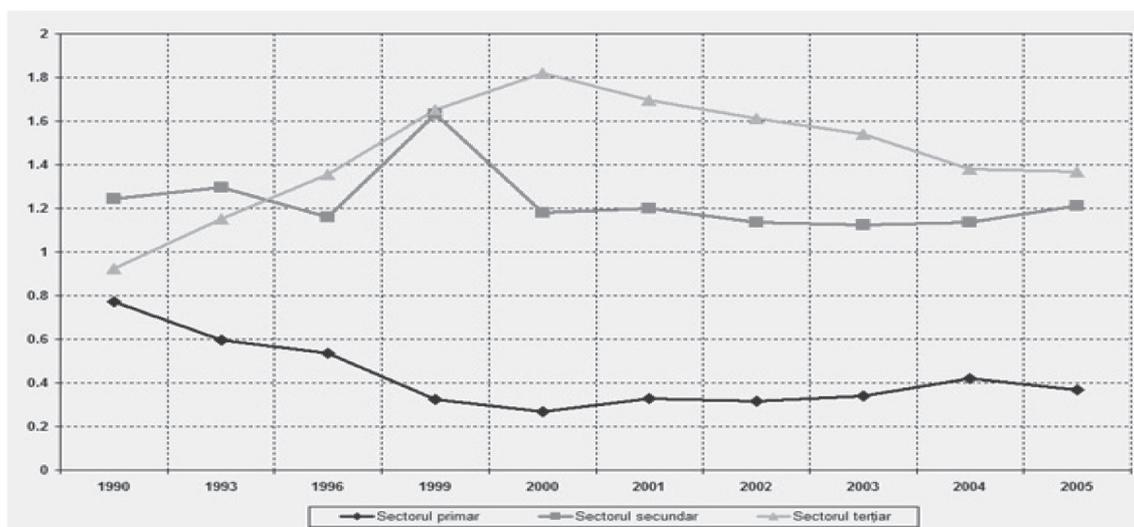


Chart 2 shows that the lowest productivity is in agriculture, with a level lower than in 1990. Industry has maintained a constant productivity level after 1989. In 1999, it registered a sudden growth, but then fell back to the levels of previous years. In 2005 it grew slightly, while the level of productivity in the other two economic sectors slightly regressed. Work productivity in the services sector was low at the beginning of the analyzed period, partly because services only began to develop after 1989. By the year 2000 services registered a solid growth, then a constant regression each year.

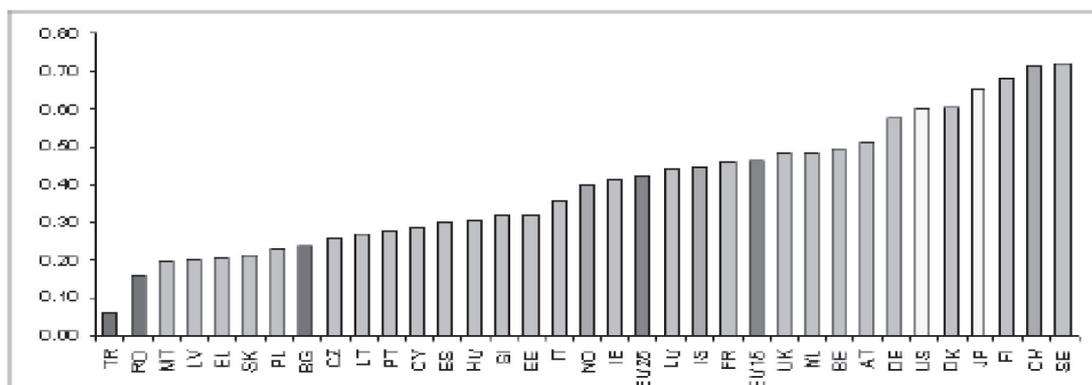
Romania is one of the growth leaders among the Catching-up countries, with an innovation performance well below the EU27 average but a rate of improvement that is one of the highest of all countries. Relative

strengths, compared to the country's average performance, are in Innovators and Economic effects and relative weaknesses are in Finance and support and Throughputs.

Over the past 5 years, Finance and support and Throughputs have been the main drivers of the improvement in innovation performance, in particular as a result from strong growth in Public R&D expenditures (18.0%), Private credit (17.4%), Broadband access by firms (24.3%), Community trade - marks (36.0%) and Community designs (44.3%).

In terms of productivity, despite the Romanians' numerous award-winning original ideas, the application of fundamental research at the production level is quite limited, either due to technological deficit or to prohibitive costs that annul process efficiency.

Chart 3. Innovation index values in 2008



Source: Annual Innovation Policy Trend and Appraisal Report, Romania, 2008, p. 82 at <http://trendchart.cordis.lu/>

The efficiency of the national innovation system, a key element of the innovation policy, represents the ability of companies to transform innovation inputs into innovation outputs and is calculated as a ratio between the composite innovation index consisting of input and the composite innovation index consisting of output. According to the European Innovation Scoreboard report, Romania is ranked the last but one among the European countries with respect to scientific research, with a performance higher than Turkey (chart 3).

Innovation and knowledge are determining factors for improving micro and macroeconomic competitiveness in the current regional economy, which increasingly lies on the production of non-material added value.

### 3. Conclusions

Each society had its own economy, which was new as compared to the economy of the foregoing society. The economic progress has generated such complex changes that it was thought that a new economy emerged, while in fact this only meant a new stage, a

new explanation provided by the economic science.

Romania's progress towards the new economy and the knowledge society requires that efforts be directed towards scientific research and technological development. These are the fields where a daring policy should be applied in order to reduce discrepancies. Romania must invest more in research and high technology to be part of developed countries. The current economic growth in Romania is based primarily on the low labor cost and reduced added value exports, as well as a low level of infrastructure and innovation mechanisms, which are at the beginning of their development state and do not have a significant contribution to economic growth. These issues cause workforce mobility in search of higher salaries and create unbalances on the labor market. In the long run, Romania has to invest in rebalancing the labor market, in education etc.

Romania's presence in the sphere of world technological development is insignificant. While a million European citizens succeed in registering over 100 patents each year, the same number of Romanian citizens only

exceeds 2 patents (Eurostat 2008). Romanian innovators have an extremely low capacity to transform an idea/product/method/technology in a patent and the latter in a business.

The imports of technology, the transfer of knowledge and the sale of new ideas from abroad are essential. Effective financial and fiscal stimuli are needed. Objectives should be clearly defined, more costs should be involved in innovation, and companies should elaborate evaluation criteria from the very phase of design.

The chances for Romania lie in boosting sustainable industrial development and proactively sustaining innovations and scientific research. The new European industrial

policy suggests initiatives for industrial development related to: competitiveness, energy and environment; intellectual property rights; better industry regulations; industrial research and innovation; market access for companies; qualification of specialists and changes in the management structure.

The consolidation of knowledge-based economy in Romania implies setting certain priorities, such as: investing in education, developing entrepreneurship, creating an innovative and efficient system made up of company partnerships, research centers and universities, which enables new technologies to be absorbed, adapted and created for the society.

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