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Tertiary education's role in research and innovation

Mihaela Muresan ^a, Emilia Gogu ^b^a*mihaela.muresan@yahoo.com, Bucharest, Romania*^b*arina_emilia@yahoo.com, Bucharest, Romania*

Abstract

The paper aims at emphasising the role of the universities in the global knowledge economy as poles of education, research and innovation. The tertiary education redefines its role and plays a major part in research and innovation, as promoters of the research and innovation culture and as contributors in finding solutions to tackle various actual challenges and to bridge the gap between the political decision area, the governance and the labour market. The desk research, based on the statistical data analyse revealed the direct contribution of the universities to the sustainable development and knowledge creation.

Keywords: tertiary education, research and innovation culture, innovation index, sustainable development indicators

1. Introduction

The paper focuses on demonstrating the role of the universities as drivers for education, research and innovation in the knowledge society. The development of the knowledge society is the direct consequence of the mix of economic, social and cultural processes, which involves the knowledge creation and its equitable distribution, open access and sharing. The general approach of the knowledge based economy „includes first and foremost the growth and increasing proliferation of the production of knowledge-intensive products and services, i.e. this is the determining factor” (Bager, 2009, p.5). Consequently, the main challenge of the knowledge economy is represented by the development of the global citizens' new competences, having the capacity to continuously learn and to generate knowledge. In this context, education in general and, especially, tertiary education and lifelong learning represent the main pillar of the knowledge society, besides technological development and research & innovation areas.

Moreover, the tertiary education is actively involved in research and innovation, becoming a significant actor for the sustainable development. In the actual context, the universities represent not only promoters of the research and innovation culture, but also active engines for the development of new solutions in the technological and socio-economic areas.

The analysis takes into consideration the European context and the specific Romanian tertiary education system position and role in the sustainable development perspective. The demonstration is based on a quantitative and qualitative analysis aiming at emphasising the active role of the universities for the human development and for a balanced socio-economic positive evolution, taking into consideration the environmental protection. Accelerating and ameliorating the knowledge and technology transfer from the academic area to the market could contribute to a better valorisation of the research results, increasing the cross-fertilisation of the ideas and their quick implementation in the socio-economic environment. Strengthening the link between the universities and the governance area represents another important contribution, facilitating the improvement of the decision making process, as a knowledge based process. Besides the benefits in quantitative terms, the contribution of the universities

is very important for the personal development, creating people's new competences in order to cope with technological changes and to have a pro-active attitude for continuous learning.

The main result of the research consists in a better repositioning of the universities in the socio-economic landscape.

2. Crisis challenges for the tertiary education

The large impact of the global crisis has a significant impact on the socio-economic processes, generating a significant economic loss and social difficulties, especially a substantial increase in unemployment. In this case, the achievement of the main goals of the 2020 European Strategy could be jeopardized. In order to tackle these threats, the EU should re-think the public spending on knowledge, i.e. the investments in research and innovation and also in tertiary education (Ritzen, J., Soete, L., 2011). According to the European priorities, the research and innovation, as well as the education, in general, and higher education in particular, represent the main pillars of the knowledge economy. In this perspective, a homogenous approach at the European and national level related to the research and education policies could contribute to strengthen the EU knowledge economy. An important achievement is represented by the development of the European Research Area (ERA), as an important pull of knowledge resources generated by the academic and research areas and shared among the stakeholders. The same approach is transferred in the education field, the European Higher Education Area (EHEA) being created as a wide academic framework. The promotion of the research and innovation as basis for the knowledge-based development requires appropriate competences and skills for the workforce. Consequently, tertiary education becomes indeed central to the creation of the intellectual capacity on which knowledge production and utilization depend and to the promotion of the lifelong-learning practices necessary for updating people's knowledge and skills (Salmi, 2002).

The EU Strategy 2020 reinforces the importance of the human capital as the key to sustainable growth. As stipulated in the Annual Growth Survey, „by 2020 85% of jobs will require high or medium level skills and the proportion of jobs for the low-qualified will reduce to 15%” (European Commission, 2011a). Moreover, by 2020, at least 40% of the EU's young adults (30-34 years) should have completed tertiary or equivalent education. In this context, the role of the universities has increased, being responsible for ensuring a wider access to education and providing adequate programmes for their students, in order to support the graduates to have the required competences according to the labor market needs.

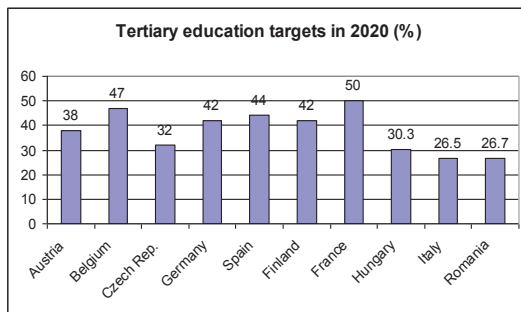


Figure 1. Tertiary education targets in 2020

The figures estimated by each country, without taking into consideration the countries which have not reported their targets for 2020 (UK and Holland), demonstrates that the target of 40% could not be achieved, the estimated total tertiary attainment rate will be of 37.3% by 2020, representing in absolute figures approximately 800 000 fewer tertiary graduates aged 30-34 years. A very interesting trend has been noticed during the last years (2000 – 2008) when the rate of the population with tertiary education level has increased in the European Union with 4.8%. The most important dynamic has been observed in Ireland (from 22% in 2000 to 34.4% in 2008). This dynamic is justified also by the migration of the high qualified work force to this country. A negative trend has been noticed in Lithuania where the population with tertiary education level diminished with 12% in the same period, as it is

illustrated in the figure 2. The explanation in this case could be the emigration, especially of the population with tertiary level attainment.

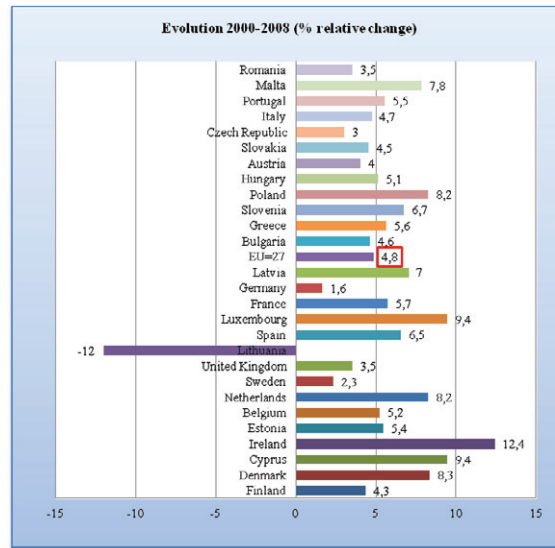


Figure 2. Rate of tertiary education attainment

The amplitude of the variation of the population with tertiary education attainment in 2008 was of 28,3 percentage points (the maximum was represented by Finland – 36.6% case and the minimum by Romania – 12.8%). Interesting results could be obtained by grouping the data related to the percentage of the population with tertiary education attainment. In this case 3 main categories could be distinguished as it is presented in the table 1.

Table 1. Analysis of tertiary education attainment

Groups related to the percentage of population – tertiary education attainment	No. of the countries
Under the medium level 10,0-20,0	9
Medium level 20,1-30,0	8
Over the medium level 30,1-40,0	10
Total	27

Despite the targets set by EU, the financial crisis creates real difficulties for the education systems, taking into consideration the public budgetary deficit and also the fact that the majority of the universities in the EU are public institutions. In this context, the public private partnership should be reinforced in order to sustain the higher education further development.

3. Higher education – main pillar of the knowledge economy

The role of the tertiary education is emphasized by the integration of the tertiary education indicators in various macro-indicators for smart growth, innovation and human development. The tertiary education indicator is a main component of various composite indexes, such as the European innovation scoreboard (***, European Innovation Scoreboard), measuring the innovative capacity of the EU member states according to 8 dimensions: the human resources, intellectual assets, firm investments, finance and support, linkages & entrepreneurship, innovators, research systems and economic effects.

Accordingly, there are four major groups of countries: the innovation leaders, the innovation followers, the moderate innovators and the modest innovators. Romania, as the calculated index for 2010 shows, is positioned in the last group with Bulgaria, Latvia and Lithuania (European Commission, 2011 b). Analysing the specific factors contributing to the innovative capacity, the modest innovators have a significant potential regarding the human

resources, but have not an adequate research system, lacking also access to specific networks and an entrepreneurship approach. Especially for the modest innovators, where the research and innovation areas are substantially lagging behind, the universities have to play a more active role in creating and participating in innovative clusters. In this case, the universities have, on one hand, to strengthen their relationships within the EHEA and to better cooperate across European research space, and on the other hand, to consolidate their research and innovation & knowledge transfer activities. In this perspective, the universities belong also to the ERA, stimulating the creative processes and the knowledge transfer to the market, as it is illustrated in the figure 3.

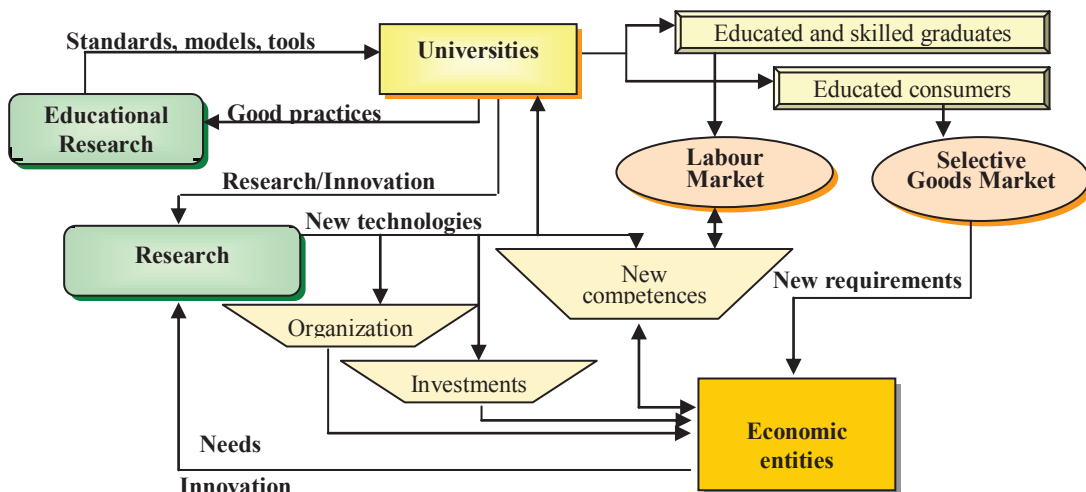


Figure 3. The relationship between academic and socio-economic environment

Simultaneously, the academic system represents a generator of ideas and good practices emerging from research processes, the doctoral research having a significant contribution (Davis, H., 2006). The findings and valuable research results stand for valuable assets for the innovative processes at regional, national and international level. Due to the increased importance of the higher education, the actual European strategy has as main goals the quality and the effectiveness of the educational systems, the enlarged access to education, the development of the open academic European space. A real challenge for the academic area is to strengthen the relationship with the market actors in order to minimize the gap between the education system and the labour market requirements, revealed as:

- ✓ “positive gap” - the students’ skills are more sophisticated and superior than the requirements of the employers;
- ✓ “negative gap” - the students' skills are under the requirements of the labour market.

Under these circumstances, the gap minimization involves not only the efforts from the academic system to cope with the requirements of the continuous changing world, but also a new design of the business process and a great permeability of the employers for new ideas, facts and techniques. This new perspective for the business environment involves the life-long learning for the management level, in order to design an adequate business and human resource strategy. From this point of view, it is necessary to have a closer link between employers and educational services providers, with a growing emphasis on the interest of the top management of the companies to have a well educated and skilled workforce.

The tertiary education has a direct influence on the economic growth and on the employment rate, main indicators of the EU sustainable development. The statistical data analysis reveals the tight correlation among these indicators, as it is illustrated in the table 2.

Table 2. Relation between higher education attainment rate, employment rate and GDP per capita in EU, 2010

Country	Population with tertiary education attainment (%)	Employment rate age 15-64, (%)	GDP per capita (Euro)
	X ₁	X ₂	Y
EU (27 countries)	33,6	64,1	24.400

Euro area (17 countries)	33,3	64,2	27.700
Belgium	44,4	62	32.600
Bulgaria	27,7	59,7	4.800
Czech Republic	20,4	65	14.200
Denmark	47,0	73,4	42.500
Germany	29,8	71,1	30.300
Estonia	40,0	61	10.700
Ireland	49,9	60	34.900
Greece	28,4	59,6	20.100
Spain	40,6	58,6	22.800
France	43,5	63,8	29.800
Italy	19,8	56,9	25.700
Cyprus	45,1	69,7	21.600
Latvia	32,3	59,3	8.000
Lithuania	43,8	57,8	8.400
Luxembourg	46,1	65,2	79.500
Hungary	25,7	55,4	9.700
Malta	18,6	56,1	14.800
Netherlands	41,4	74,7	35.400
Austria	23,5	71,7	34.100
Poland	35,3	59,3	9.300
Portugal	23,5	65,6	16.200
Romania	18,1	58,8	5.700
Slovenia	34,8	66,2	17.300
Slovakia	22,1	58,8	12.100
Finland	45,7	68,1	33.600
Sweden	45,8	72,7	37.000
United Kingdom	43,0	69,5	27.400

Source: <http://epp.eurostat.ec.europa.eu/portal/>

The analysis demonstrates the interdependence between the tertiary education indicator (qualitative variable), an effort indicator (human resources) and a result indicator (GDP per capita). These correlations are presented in the table 3.

Table 3. Correlation between tertiary education attainment rate, employment rate and GDP per capita in EU, 2010

Indicator	x_2/x_1	Y/x_1	Y/x_2
Correlation- R^2	$R^2 = 0,42$	$R^2 = 0,75$	$R^2 = 0,53$
Determination coefficient (%)	64,90	86,90	72,69

Source: Calculated data

Using the simple correlation by analyzing the data concerning the level of education (tertiary education rate), as independent variable, and the employment rate, as dependent factor, we obtained a correlation of 0,42 and a determination coefficient of 64,90%, which demonstrates the direct relation between these indicators. The statistical data analysis has been demonstrated a stronger correlation between GDP per capita and the tertiary attainment rate, meaning that higher competences and skills have an important contribution to increase the economic competitiveness and productivity.

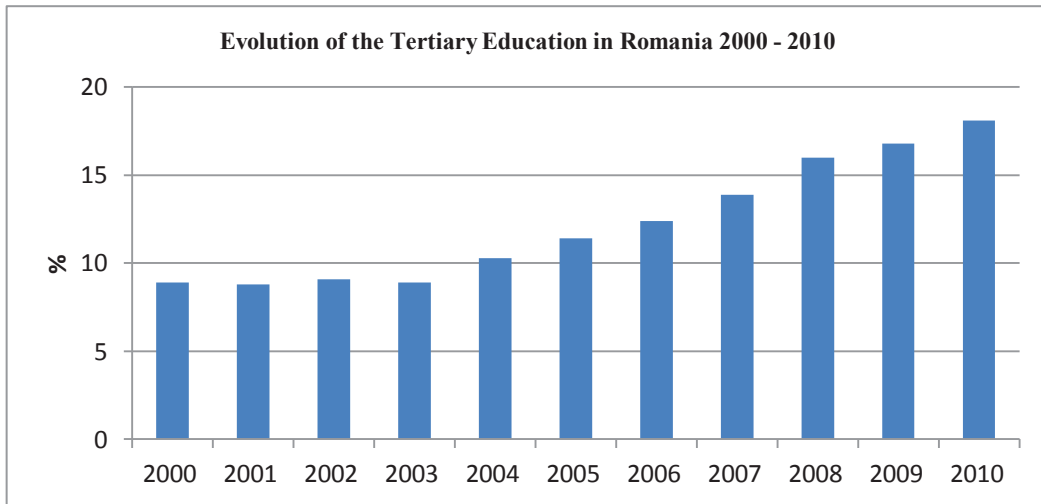
In general, the statistical data analysis demonstrates the positive relationship between educational attainment and employment rate, but in the last years, due to the financial crisis, this correlation is no more as strong as in the previous years.

This analysis reveals the demand of high competences and skills, and consequently an increased role of the tertiary education for delivering the adequate educational services.

4. Higher education in Romania

The Romanian is positioned under the European average, concerning the higher education attainment rate. Romania has also a modest position in the European Innovation Scoreboard. Even if comparing the Romanian performance with the other European states regarding the tertiary education attainment, the results are not

favourable, it should be stressed that the number of the tertiary education graduates has increased constantly, from 8,9 in 2000 to 18,1 in 2010, as it is illustrated in the figure 4.



Besides the positive trend in the evolution of the higher education attainment during the last decade, the Romanian higher education results are significant in the science and technologies areas. In respect with the number of graduates in science and technologies, Romania has a significant ascendent evolution, especially in the last 6 years. Beginning with 2008, the number of Romanian graduates in science and technologies was over the European average, Romania being on the second position, after France, within the European space (figure 5).

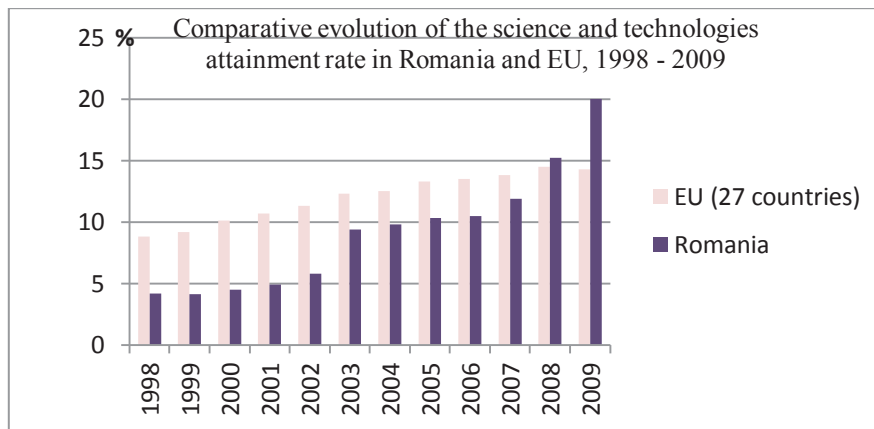


Figure 5. Science and technologies tertiary education attainment rate in Romania

Despite the relative good evolution related to the tertiary education attainment, the research and innovation policies have not been sufficiently focused on harnessing this important potential.

Moreover, the population is also supportive, being confident that education, research and innovation activities could be the engines of the economy revival. The survey organized within a research project framework, revealed that the population's perception is in line with the European policies related to the main priorities for finding efficient solutions for facing the crisis consequences. The survey has been carried out in 2010, in Bucharest-Ilfov region and encompassed 154 subjects with a balanced distribution related to age and professions. The subjects considered that education and training represent the main priority for enabling economic growth and for

ameliorating the effects of the financial crisis (Muresan, M., Gogu, E., Irimia, R., 2010). Moreover, on the second place has been identified the research and innovation area with an important potential for generating economic growth (figure 6).

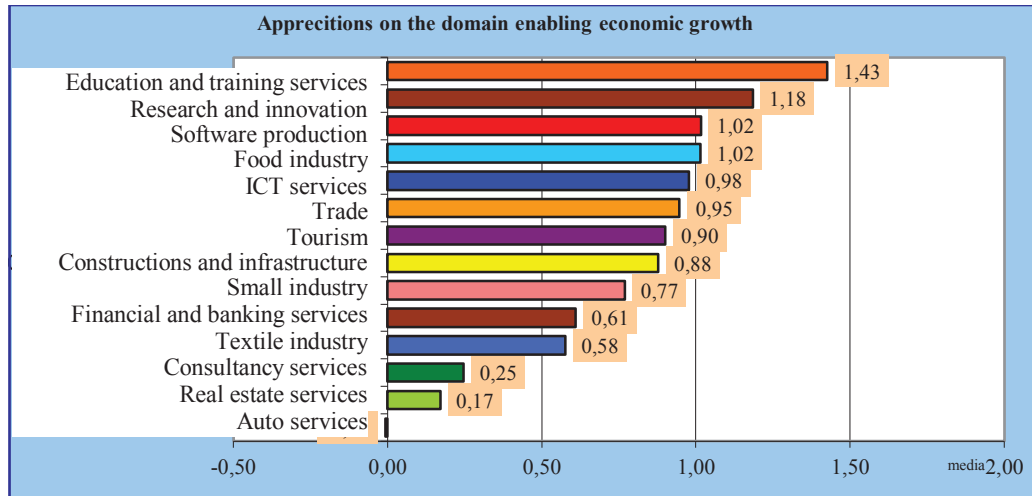


Figure 6. Population's perception related to the most important actual economic growth drivers

The Romanian case shows the favourable premises for developing the research and innovation system, taking into consideration the human and intellectual capital. Simultaneously, it is a lack of an appropriate valorisation of this potential which could redefine the evolution of the Romanian economy in the knowledge society. The population's awareness and support represent also an important asset for designing and implementing appropriate policies centered on research and innovation.

5. Conclusions

The tertiary education and the research and innovation activities represent the core of the knowledge economy. The actual financial crisis reinforce the need of finding innovative solutions for the sustainable development and for ameliorating the negative effects of the crisis. The vicious circle of the lack of public investments for education and research should be broken and new bridges between public and private areas should be built in order to support the intellectual capital development.

In order to accomplish its role and to overcome the effects of the financial crisis, the university system should become more flexible and adapted to the market requirements. In this respect, the modernisation of the higher education system represents a priority for the knowledge economy. The curricular changes should be targeted on the development of graduates' new competences, adequate for the global knowledge world.

The bivalent articulation of the university systems, on one side with the research and innovation area and, on the other side, with the business area could ensure the premises for an efficient education, more responsive to the real needs of the society. Moreover, the universities should be more involved in the public decision making system, harnessing its knowledge advantage in the public benefit.

The specific Romanian situation should be emphasised in order to a better valorisation of the human capital, especially the advantage in science and technologies knowledge, and competences. In this context, a deeper involvement of the universities in research and innovation activities could improve the academic area mission in Romania.

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