



## EDUCATION, INNOVATION AND ECONOMIC DEVELOPMENT

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### **Abstract:**

*Innovation is a concept that is more and more often used as a solution for increased competitiveness and economic development, either at organizational level or at a national one, but how is it created and what are the factors involved in the cycle education-innovation-economic and social development? This article intends to clarify the above mentioned cycle and provide an insight on what innovation means and what are its components, especially from a macroeconomic point of view. The results show how important innovation and other components like education are for the national and global economic development.*

**Key words:** *innovation, higher education, competitiveness, economic development*

### **1. Introduction**

Nowadays, all countries are facing increasing global economic competition and much of the proposed solutions for decreasing the existing gaps between different countries is attributed to innovation and the innovation capacity of a certain country. Romania feels this pressure on an unprecedented scale. In order for the country to prosper and shorten the gaps compared to other countries, it needs to have a long term plan for the economic development and this plan, in order to be successful, needs to include an innovation component. This component requires a series of elements that are crucial for the national sustainability of innovation at all levels. One of these components is education and more specifically, higher education.

As an report of the University of Albany states (Schaffer and Wright, 2010), “as long ago as the Golden Age of Athens, when Socrates and Sophocles flourished in a city that rose to become the first great commercial power of the Mediterranean world, people knew there was a connection between higher learning and prosperity.”

The same research presents a series of results that show different approaches on economic development and its sources. It was concluded that almost all the twentieth century the United States' economic development efforts were centred on "incentives, financial packages, cost comparisons, labour policy, roads and water systems", and other aspects that on the long run do not "suffice to meet key challenges for the new economy". The report also mentions the shift in perspectives, since the twenty-first century paradigm shifted towards "putting knowledge first".

Although the above mentioned report refers to the USA situation, the same could be concluded about some European countries. Unfortunately, not all countries succeeded in making this shift, aspect that is clearly pointed out by the annual research conducted by the World Economic Forum, The Global Competitiveness Index (GCI).

The GCI evaluates over 140 countries on a number of factors that influence the business environment, grouped in three main development stages: *factor-driven*, *efficiency-driven* and *innovation driven* stage. The mentioned shift in perspective corresponds to the 2-3 Transition stage that, unfortunately, it is not achieved by all European countries, including Romania.

Table 1 shows the evolution of Romania through the development stages and points out the regression after the 2008 economic crisis and the involution afterwards.

**Table 1: Romania's evolution through the GCI development stages**

	FACTOR DRIVEN	TRANSITION 1-2	EFFICIENCY DRIVEN		TRANSITION 2-3		INNOVATION DRIVEN
			rank	score	rank	score	
GCI 2008–2009 (out of 134)	-	-	68	4.1	-	-	-
GCI 2009–2010 (out of 133)	-	-	-	-	64	4.1	-
GCI 2010–2011 (out of 139)	-	-	67	4.2	-	-	-
GCI 2011–2012 (out of 142)	-	-	77	4.1	-	-	-
GCI 2012–2013 (out of 144)	-	-	78	4.1	-	-	-
GCI 2013–2014 (out of 148)	-	-	76	4.1	-	-	-
GCI 2014–2015 (out of 144)	-	-	59	4.3	-	-	-

Source: own, with information from GCI

## **2. Modern perspectives on higher education and innovation**

It is clear that innovation is a 21<sup>st</sup> century key concept, but what does it actually mean? There can be provided many definition for innovation and innovation capacity, but mostly, when asked about this concept, people tend to think about new

technologies, new processes, new products, and new ideas that solve problems in their local economies.

For the USA, being innovating and “putting knowledge first” meant investing and channel efforts on connecting the higher education systems to their economic development strategies. As many studies have shown, national wealth, national competitiveness and national intellectual capital are interrelated concepts that are capable of creating great synergies for a country (Herciu and Ogorean, 2015).

Therefore, the relationship between education (the developer of intellectual capital), innovation and economic and social development should be acknowledged and accepted as a way of thinking by all countries that aspire to get through the transition and become an innovation driven country. This means that on one side, we need a global strategy that connects the above mentioned aspects and, on the other side, we need the translation of these strategies into each community. In this context, the higher education institutions, the universities, play a central role in helping with the revitalization of the community, firstly because they are a central pillar of the society.

Universities should develop strategies that enable the knowledge transfer to the future employees because, although the exact reasons for weak productivity growth aren't fully understood by economists, it is certain that a jump in innovation is likely to help increase it (WEF, 2016).

Also, there can't be forgotten that the higher education's most fundamental contribution to the economic development lies in its traditional role: creating an educated population (Schaffer and Wright, 2010). The question lies in how do they manage to encourage the creation of new ideas, new technologies, new products, new processes and all in all, innovation. In answering this question, we should consider the fact that innovation begins with research and research is often based on the use of technology. Also, the physical infrastructure needed to support research and technology development such as labs, equipment, classrooms, research parks, conference facilities and the policies needed to facilitate the commercialization of the research outcomes are the responsibility of a modern university. All these aspects are important when analysing the sources of innovation.

### **3. Contributions of higher education and innovation on national economic development**

For pointing out the contributions of higher education and innovation on national economic development we use the data collected in the annual studies conducted by the World Economic Forum. The three development stages are made up of 12 pillars that reinforce each other: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication, and not least, innovation.

For the purpose of identifying the “recipe” of an increased national innovation level, we analyse the main innovation facilitators for the first ten most innovative countries at the beginning of 2016: Switzerland, Finland, Israel, USA, Japan, Germany, Sweden, Netherlands, Singapore, Denmark, in a comparison with the scores of Romania (WEF, 2016).

**Table 2: The main innovation facilitators for the first ten most innovative countries and Romania**

<b>Country</b>	<b>Innovation rating</b>	<b>Higher education and training</b>	<b>Technological readiness</b>
<b>Switzerland</b>	5,8	6	6,3
<b>Finland</b>	5,7	6,1	6
<b>Israel</b>	5,6	5,1	5,7
<b>USA</b>	5,6	5,9	5,8
<b>Japan</b>	5,5	5,4	5,7
<b>Germany</b>	5,5	5,6	6
<b>Sweden</b>	5,5	5,7	6,2
<b>Netherlands</b>	5,4	6	6,1
<b>Singapore</b>	5,2	6,2	6,2
<b>Denmark</b>	5,1	5,8	6,1
<b>Romania</b>	<b>3,2</b>	<b>4,5</b>	<b>4,6</b>

*Source: own, with information from GCI 2015-2016*

The data above suggests that a higher innovation rating is influenced by high ratings (and implicitly a greater focus and investments) in the higher education and training indicator and in the technological readiness indicator.

Quality higher education and training is particularly crucial for economies that want to move up the value chain beyond simple production processes and products. Also, today, technology is increasingly essential for organizations to compete and prosper. The technological readiness pillar measures the agility with which an economy adopts existing technologies to enhance the productivity of its industries, with specific emphasis on its capacity to fully leverage information and communication technologies in daily activities and production processes for increased efficiency and enabling innovation for competitiveness (WEF, GCR 2009-2010).

For having a clear vision on the sub-components of the main innovation facilitators, we extracted the main data concerning the Romanian evolution regarding these indicators, as shown in table 3.

Tabel 3: The Romanian evolution on the main elements of the innovation cycle

WEF INDICATORS	2008-2009	2009-2010	2010-2011	2011-2012		2012-2013		2013-2014		2014-2015	
	RANK	RANK	RANK	SCORE	RANK	SCORE	RANK	SCORE	RANK	SCORE	RANK
Intellectual property protection	64	74	81	3	98	2.9	114	2.9	110	3.4	88
5th pillar: Higher education and training											
Tertiary education enrollment, gross %*	34	31	22	65.5	23	58.8	39	58.8	39	51.5	53
Quality of the educational system	71	77	84	3.3	90	3.1	108	3.3	99	3.8	61
Quality of management schools	84	85	98	3.8	92	3.5	112	3.7	104	4.2	74
Availability of research and training services	63	67	95	3.3	112	3.5	112	3.9	91	4.2	68
Extent of staff training	54	57	72	3.8	79	3.4	111	3.1	134	3.6	111
7th pillar: Labor market efficiency											
Reliance on professional management	74	57	63	3.9	84	3.5	124	3.3	131	3.3	126
Country capacity to retain talent						0		2.1	138	2.5	128
Country capacity to attract talent						0		2.2	132	2.6	115
Brain drain	102	102	116	2.2	131	2.1	136				
Women in (top force, ratio to men)	51	60	66	0.79	65	0.78	73	0.78	77	0.78	79
8th pillar: Technological readiness											
Availability of latest technologies	96		99	4.2	115	4.2	117	4.3	107	4.6	81
Firm-level technology absorption	94		108	4.1	117	4.1	116	4.3	104	4.4	81
FDI and technology transfer	62		70	4.5	83	4.3	97	4.4	89	4.8	43
12th pillar: Innovation											
Capacity for innovation	58	64	72	2.9	78	3.1	77	3.4	90	3.7	68
Quality of scientific research institutions	84	82	83	3.2	91	3.4	84	3.7	64	4	55
Company spending on R&D	74	74	103	2.9	87	2.9	87	2.8	104	3.1	65
University-industry collaboration in R&D	72	73	103	3	115	3.1	113	3.3	88	3.6	71
Govt procurement of advanced tech products	73	75	105	3.1	111	3.1	114	3.2	99	3.4	75
Availability of scientists and engineers	60	56	55	4.2	59	3.8	82	3.6	99	4	72
PCT patents, applications/million pop.*	55	57	62	0.8	62	1.9	56	2	55	2.2	56

Source: own, with information from GCI

The table consists in a series of indicators that together create the necessary synergy in order for innovation to thrive on a national level. As shown before, the innovation pillar itself is not enough for having a clear view of the situation because of the dependancies between the four selected pillars.

Education has to be understood as a long life learning process and analyzed in accordance, taking in account for example the ability to retain talent and to put it to use.

The inefficient use of talent, the lack of access to or poor quality of education, the slow adoption of new technologies are all factors that lead to low innovation rates.

Today's globalizing economy requires countries to nurture pools of well-educated workers who are able to perform complex tasks and adapt rapidly to their changing environment and the evolving needs of the economy. The extent of staff training is also taken into consideration because of the importance of vocational and continuous on-the-job training—which is neglected in many economies—for ensuring a constant upgrading of workers' skills.

The ICT access and usage are key enablers of countries' overall technological readiness. Whether the technology used has or has not been developed within national borders is irrelevant for its ability to enhance productivity. The central point is that the firms operating in the country need to have access to advanced products and blueprints and the ability to absorb and use them. Among the main sources of foreign technology, FDI often plays a key role, especially for countries at a lower stage of technological development. It is important to note that, in this context, the level of technology available to firms in a country needs to be distinguished from the country's ability to conduct blue-sky research and develop new technologies for innovation that expand the frontiers of knowledge (WEF, GCR 2011-2012).

All of the indicators that were taken into account are important and, if they are regarded as a priority in the national strategies, the results should be seen on many levels, but mostly, when it comes to competitiveness, in the level of innovation turnover form the total turnover of the national economic sectors, as shown in table 4 for the case of Romania.

**Tabel 4: Turnover from innovation as% of total turnover, economic sectors (Romania)**

	2002	2004	2006	2008	2010	2012
Total	9.4	16.6	18.5	14.9	14.3	3.7
Industry	11.2	20.0	21.9	20.0	21.4	5.4
Services	6.8	11.7	15.3	10.3	6.5	1.6

*Source: data from the National Institute of Statistics*

The evolution of the innovation turnover as a percentage of the total turnover in the case of the Romanian national economic sectors is consistent with the positive evolution registered on most indicators from table 3 before the 2008 global economic crisis and the problems encountered after the crisis.

#### **4. Conclusions**

Mankind has always known that new ideas can be shaped and deployed in ways that advance the individual and the society's prosperity, but now, more than ever, innovation has become a focus of intense analysis in public policy as it is widely understood the importance of coming up with truly new ideas in an advanced society, a knowledge based one.

The new economy is making the traditional academic mission ever more important, since we don't get innovation without research. The focus on innovation makes leaders and university representatives eager to change their strategies in order to find new ways to leverage their capacity for knowledge creation to yield tangible economic benefits.

The analysis of the innovation pillar does not provide enough information itself, without understanding the implication the other components such as *higher education and training, labour market efficiency and technological readiness* has on it.

#### **5. References**

- Herciu M., Ogorean C., Wealth, Competitiveness, and Intellectual Capital – Sources for Economic Development, *Procedia Economics and Finance* 27 (2015), 556 – 566
- Shaffer D.F., Wright D.J., (2010), A New Paradigm for Economic Development - How Higher Education Institutions Are Working to Revitalize Their Regional and State Economies, The Nelson A. Rockefeller Institute of Government, University of Albany, State University of New York
- World Economic Forum, (2009), The Global Competitiveness Report 2008–2009: Full Data Edition. Retrieved from [www.weforum.org](http://www.weforum.org)
- World Economic Forum, (2010), The Global Competitiveness Report 2009–2010: Full Data Edition. Retrieved from [www.weforum.org](http://www.weforum.org)
- World Economic Forum, (2011), The Global Competitiveness Report 2010–2011: Full Data Edition. Retrieved from [www.weforum.org](http://www.weforum.org)
- World Economic Forum, (2012), The Global Competitiveness Report 2011–2012: Full Data Edition. Retrieved from [www.weforum.org](http://www.weforum.org)
- World Economic Forum, (2013), The Global Competitiveness Report 2012–2013: Full Data Edition. Retrieved from [www.weforum.org](http://www.weforum.org)
- World Economic Forum, (2014), The Global Competitiveness Report 2013–2014: Full Data Edition. Retrieved from [www.weforum.org](http://www.weforum.org)
- World Economic Forum, (2015), The Global Competitiveness Report 2014–2015: Full Data Edition. Retrieved from [www.weforum.org](http://www.weforum.org)
- World Economic Forum, Innovators should be encouraged earlier. Much earlier, says a new report, retrieved from [https://www.weforum.org/agenda/2016/07/innovators-should-be-encouraged-earlier-much-earlier-says-a-new-report?utm\\_content=buffer3cf9d&utm\\_medium=social&utm\\_source=facebook.com&utm\\_campaign=buffer](https://www.weforum.org/agenda/2016/07/innovators-should-be-encouraged-earlier-much-earlier-says-a-new-report?utm_content=buffer3cf9d&utm_medium=social&utm_source=facebook.com&utm_campaign=buffer), 26.07.2016