

HUMAN CAPITAL AND COMPETITIVENESS IN UE¹

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Abstrat

The competitiveness is the engine of development and welfare's countries. The human capital has an important role in the construction of the competitive and sustainable economy. This paper is focus on human capital and tray to show how the human capital, as an important factor economic growth, can contribute to the competitiveness of the economy. Bontis (1999, cited by Bontis at all, 2000, p.89) "argues that human capital is important because it is a source of innovation and strategic renewal". G. Becker highlight on his work that: "many workers increased their productivity by learning new skills and perfecting old ones while on the job" (Becker, 1962, p11.) He consider that the training „has an important effect on the relation between earning and age" (Becker, 1962, p15.) and „could raise the new employee's productivity but would require additional expenditures by the firms" (Becker, 1962, p19), expenditure links with the training process. The relation between competitiveness and human capital is analyzing in relation with the innovation and R&D process (W. J. Baumol, 2002) or as factor of the increasing the competitiveness (factor al creșterii economice (Riley, 2012), or as factor of competitiveness increased (Russu, 2012, Kagochi and Jolly, 2010, Bontis at all, 2000). This paper is focus on relation between human capital and competitiveness based on the different technics trains to highlight the role of human capital in increasing the countries competitiveness".

Key Words: *human capital, human development, innovation, competitiveness*

JEL Classification: *E24, J24, F63, O15, O31*

1. Introduction

There is a large literature regarding the human capital and its contribution to the increased the competitiveness at national and regional level. Some papers highlight the human capital in relation to research and

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innovation processes¹ (Bontis 1999, Riley, 2012), or as factor of increases of competitiveness. Bontis (1999, cited by Bontis at all, 2000, p.89) “argues that human capital is important because it is a source of innovation and strategic renewal”. Huggins and Izushi (2007, p.3) consider that “knowledge is the ingredient that underlies the competitiveness of regions, nations, sectors or firms”.

G. Becker is one of the most important experts who try to evaluate the investment in human capital, showing that “many workers increased their productivity by learning new skills and perfecting old ones while on the job” (Becker, 1962, p11.) He consider that the training „has an important effect on the relation between earning and age” (Becker, 1962, p15.) and „could raise the new employee’s productivity but would require additional expenditures by the firms” (Becker, 1962, p19), expenditure links with the training process.

Bhatt, in accordance to Grant, Marsh and Ranft, Nonaka, Simonin opinions considered that the development of the human capabilities based on knowledge give a sustainable competitive advantage (Grant 1996; Marsh & Ranft, 1999; Nonaka, 1994; Simonin, 1999). According to the David Lamotte, The ILO’s Director considered that “today, human capital may be the most critical source of competitive advantage” (Lamotte, 2013, p.4).

Simion, Tobă and Barbu (2009, p.99) considered that the “the key-competences and the employee’s capacities that support the development of new products, the offer of performing services to the customers and the implementation of organizational strategies become relatively more influent.”

The present paper highlight the role of human capital as competitiveness factor trying to show its contribution to increase the national competitiveness based on econometric model. The paper is structured on three parts: first, trying a short literature review, second present the methodology and the third the results and conclusions.

2. Literature review

Giegiel and other (2007), analysing the international competitiveness in the context of human capital considered that the discrepancies between the education levels of the population could explain a great part of the productivity differences across OECD countries. „Competitiveness at the national level refers to a country’s ability to achieve sustained high rate growth in GDP per capita that means constantly rising standard of living, by generally focusing on productivity trends.” (Giegiel A, Anna Wildowicz,

¹ W. Baumol, in “The Free-Market Innovation Machine, considered innovation as a ‘prime competitive William J. Baumol: “The Free-Market Innovation. Machine: Analyzing the Growth Miracle of Capitalism”,. Princeton University Press, 2002

p.58). More than that, they consider the competitiveness as a dynamic concept, focus our day on the science and knowledge as one of the main source of competitive advantage, so the education, knowledge, intangible goods and technological infrastructure have had a more important role in achieving the competitive advantage at macroeconomic and microeconomic level.

Many studies in the literature (Becker, 1964; Mincer, 1974; Becker and Lewis, 1973; Psacharopolus, 1994; Belamy, 1999 demonstrated the positive impact of human capital on productivity, poverty and health. Salahodjaev, Nazarov, (2013 p.64) considered that “It should be noted that the competitiveness index in human capital is an important tool in evaluation of the overall economic stability of the country and (N.a)..... having a better understanding on relative development of human capital in the developing countries enables policymakers to make timely policy interventions to address unmet needs of the general population.”

C. Russu (2012) highlight the differences between Romania and other UE countries regarding the human capital as main competitiveness factor and the argument used was the underfinance of the research and development (R&D) at the national and manufactured sectors. So, Romania invests around 0.4 per cent of GDP for R&D as compare to 3% establish by Lisbon Strategy.

Kagochi and Jolly (2010, p.58) considered that “productivity growth, reliability, delivery times, quality, after-sales service, financing arrangements, technological innovation, investment in physical and human capital, management style, and the institutional and structural environment play roles in competitiveness”. They improves the Almarwani (2003) methodology by including human capital and technological innovation, measured by research and development (R&D) as the factors of competitiveness in their study, and the conclusion was that in some cases, for same countries, the investment in R&D improve the export competitiveness for agriculture products.

Luthans and Youssef (2004) treat the human capital as an investment in competitive advantage considering that the explicit knowledge of human capital is not unique and interconnected but is cumulative like financial and structural traditional capital, but the tacit knowledge of human capital (which is intangible), like positive psychological capital and social capital is on long term, unique, cumulative, interconnected and renewable, so that the “that traditional resources may no longer qualify as ideal sources of sustainable competitive advantage”(p.145) but “the positive psychological capital management in particular can effectively channel people’s talents, strengths and psychological capacities toward achieving worthwhile

productive, ethical, sustainable outcomes and result in competitive advantage” (p.157).

Carlson (2001, p.1) considered that “Knowledge and an educated work force, along with an effective technological infrastructure, are among the most important competitiveness factors and most of the countries which are competitive are those that have developed an excellent education system and an educated labor force through additional training”

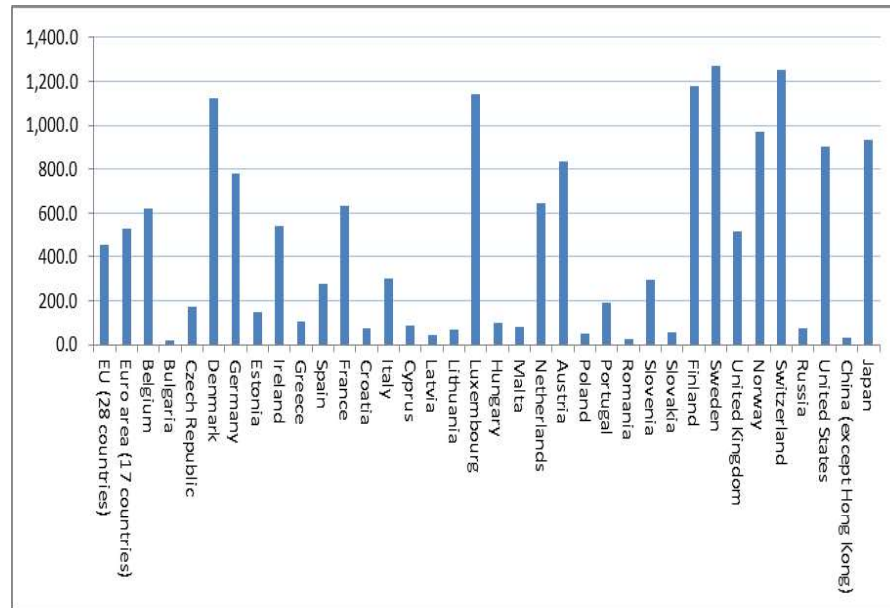
Saha, Pavelková & Sáha (2014, p.123) prove in their study that the performance, competitiveness and their productivity could be improve “through clustering and developing human capital, i.e. Human Resource”

3. Some consideration regarding the national competitiveness and human capital

First we must discuss about how we can measure the national competitiveness taking into consideration the long debate regarding this concept. But, beyond the debate, we leave now in a world that is divided by technological dynamism which influences the development speed of the countries. So, “the ability to sustain incomes and growth depends, in a globalizing world, on each country’s ability to innovate or import and use technologies created elsewhere”. (Lall, 2001,p.1505). So, the national effort to sustain the innovation process at national level could make the differences.

If we compare the Romania R&D average efforts express on euro per habitant with the average efforts of other countries (see figure 1) we can see that Romania during the 2003-2012 period invest only 24 Euro per inhabitant, the lower level (Bulgaria invest 21 Euro per inhabitant) as compare to 456 Euro per inhabitant the average efforts of EU (28 countries), 526 Euro per inhabitant as average Euro area (17 countries) or 1270 Euro per inhabitant in Sweden, 1139 Euro per inhabitant in Luxembourg, 1121 Euro per inhabitant in Denmark or more than 900 Euro per inhabitant in USA and Japan.

Figure 1 Total R&D expenditure (GERD) by sectors of performance and type of R&D activity as average during 2003-2012 period expressed on Euro per inhabitant

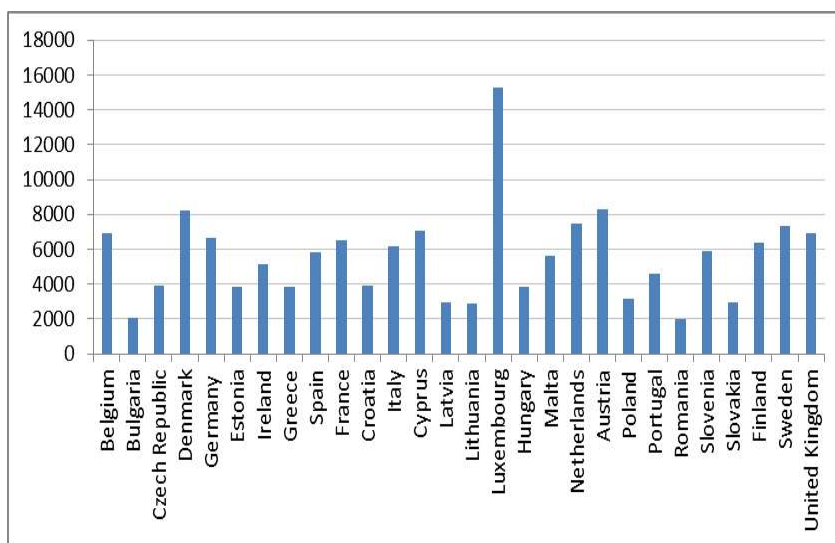


Source: table rd_e_gerdact, Eurostat

But, the innovation capacity depend the human resource ability to create new products and technologies, in other words, depend on the human capital defined as “the knowledge, skills, competence and other attributes embodied in individuals that are relevant to economic activity” (Hartog, 1999, p. 1).

Of course the education process is very important for human capital development. But the education expenditure differs very much between EU countries. During the period 2000-2011, the annual expenditure on public and private educational institutions per pupil/student in PPS, for all levels of education combined, based on full-time equivalents was between 1970, the lower level registered on Romania (average for 2005, 2009 and 2010) as compare to 15273 registered on Luxembourg, the higher level, or around 8259 registered on Austria and Denmark or 7348.6 on Sweden, as we see on data from figure 2.

Figure 2 The average annual expenditure for 2000-2011 on public and private educational institutions per pupil/student in PPS, for all levels of education combined, based on full-time equivalents



Source: Author computing based on Eurostat data table [educ_fitotin]

The relation between human capital and competitiveness expressed as number of patent¹ was highlight by Pelinescu Elena and Elisei (2014) using a panel model for EU countries. They found a positive and statistically significant correlation between the actual number of patents and R&D effort at national level, between number of patents on one side and graduate per 1000 of population aged 20-29 with a 4 years lags, taking into consideration the necessity of experience for young researchers.

3.1.The model and results

In order to highlight the relation between competitiveness and human capital we apply a panel models dedicated to cross-country data analysis as Islam used on this study from 1995. The selected data indicators are as follows: the number of the patent (noted as Pat) used as dependent variable and proxy for competitiveness on the one side and as independent variable: the expenditure of R&D as percent of GDP(noted as RDExp), the participation rate in training (last 4 weeks) for first and second stage of

¹ Composed as the sum of domestic ownership of foreign inventions in patent applications to the EPO by priority year at the national level and foreign ownership of domestic inventions in patent applications to the EPO by priority year at the national level

tertiary education (levels 5 and 6) from 25-64 years noted RTERTTRAIN, and the GDP per capita at PPP (international \$, current 2011), noted GDP.

The sample data covers the period 2004-2011 and all the 28 European countries and the source of data is Eurostat database, and the descriptive statistics of the data are presented on the table 1.

Table 1 Descriptive statistics of the time

	DLOG (PAT?)	DLOG (RDEXP?)	DLOG (RTERTTRAIN?)	DLOG (GDP?)
Mean	-0.008828	0.031246	0.016555	0.047896
Median	0.014422	0.020836	-0.006858	0.045473
Maximum	1.945910	0.712950	0.916291	0.282358
Minimum	-1.427116	-0.298493	-0.554997	-0.195210
Std. Dev.	0.413333	0.087685	0.184935	0.070320
Skewness	0.245817	1.942237	1.517593	-0.204616
Kurtosis	7.068411	17.05555	8.254675	5.050413
Jarque-Bera	194.5267	2463.167	426.5443	50.63845
Probability	0.000000	0.000000	0.000000	0.000000
Sum	-2.454318	8.686445	4.602167	13.31509
Sum Sq. Dev.	47.32391	2.129766	9.473643	1.369719
Observations	278	278	278	278
Cross sections	28	28	28	28

Source: The processing of the author

All the data were stationary on logarithm of the first differences. Statistical analysis of the series shows big differences, standard deviations vary in reaching a low range. Also there is a asymmetry, Skewness values were mostly positive except for GDP, while Kurtosis indicator varies above 3 and the high level of the Jarque –Bera test indicate the non-normality of the distributions.

The chosen model is with cross fixed effects for countries and periods since both national and specific changes in different periods influenced the relationship between indicators. The independent variable was the number of patents (Pat) as expression of innovation pillar for national competitiveness. The model revealed the existence of negative coefficients in 2009 and 2011 that could show the impact of the financial crisis started in autumn 2007 and felt late in EU member states (Table 2).

Table 2 Pooled Least Squares model for 2004-2011 period

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.129522	0.046901	-2.761607	0.0064
DLOG(RDEXP?)	0.533655	0.237783	2.244293	0.0260
DLOG(RTERTTRAIN? (- 1))	-0.222623	0.109735	-2.028730	0.0440
DLOG(GDP?(-3))	0.989489	0.600819	1.646900	0.1013

Source: The processing of the author

The R-squared is 0.521648 and Adjusted R-squared is 0.422771. Statistically, the data model indicates a positive and significant correlation between patents and the explanatory variables.. Negative relationship between patents and the participation rate in training (last 4 weeks) for first and second stage of tertiary education (levels 5 and 6) is less than the theoretically expected and indicate the adverse effects; however, an explanation could be the specificity of innovation activity which depend more by tacit knowledge.

Conclusions

This paper highlighted the importance of human capital in ensuring national competitiveness expressed as number of patents. The model revealed a positive relationship, statistically significant between the innovative capacity of nation as a main pillar of the competitiveness indices used by the international organizations (evidenced by the number of patents) and human capital express by the the expenditure of R&D as percent of GDP.

Unexpected is the negative relationship between the participation rate in training (last 4 weeks) for first and second stage of tertiary education (levels 5 and 6) and the number of patents. Moreover, the model showed negative influence both the economic crisis (negative coefficient for years 2009 and 2011) and differences deriving from specific countries.

In the future we will use in the model as alternative variables for human capital, weighted average of the population enrolled in primary education, secondary and tertiary to highlight how the results were influenced by choosing the proxy for human capital.

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Annex 1

The Pooled Least Squares Model

Dependent Variable: DLOG(PAT?)				
Method: Pooled Least Squares				
Sample (adjusted): 2004 2011				
Included observations: 8 after adjustments				
Cross-sections included: 28				
Total pool (unbalanced) observations: 217				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.129522	0.046901	-2.761607	0.0064
DLOG(RDEXP?)	0.533655	0.237783	2.244293	0.0260
DLOG(RTERTTRAI N?(-1))	-0.222623	0.109735	-2.028730	0.0440
DLOG(GDP?(-3))	0.989489	0.600819	1.646900	0.1013
Fixed Effects (Cross)				
BELGIA--C	0.021498			
BULGARIA--C	0.027753			
CEHIA--C	0.033511			
DANEMARCA--C	0.076300			
GERMANIA--C	0.047294			
ESTONIA--C	-0.058819			
IRLANDA--C	0.000863			
GRECIA--C	0.056526			
SPANIA--C	0.046037			

FRANTA--C	0.028670			
CROATIA--C	-0.131109			
ITALIA--C	0.067491			
CIPRU--C	0.006852			
LETONIA--C	-0.191548			
LITUANIA--C	-0.312764			
LUXEMBURG--C	0.053988			
UNGARIA--C	0.000544			
MALTA--C	0.105940			
OLANDA--C	-0.066470			
AUSTRIA--C	0.026252			
POLONIA--C	0.097003			
PORTUGALIA--C	0.008651			
ROMANIA--C	0.048222			
SLOVENIA--C	0.032160			
SLOVACIA--C	-0.041695			
FINLANDA--C	-0.018527			
SUEDIA--C	0.064679			
ANGLIA--C	0.008994			
Fixed Effects (Period)				
2004--C	0.124267			
2005--C	0.258541			
2006--C	0.076864			
2007--C	0.113747			
2008--C	0.003109			
2009--C	-0.002128			
2010--C	0.078179			
2011--C	-0.652579			
Effects Specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.521648	Mean dependent var	-	0.047764
Adjusted R-squared	0.422771	S.D. dependent var		0.386188
S.E. of regression	0.293409	Akaike info criterion		0.543218
Sum squared resid	15.40987	Schwarz criterion		1.135090
Log likelihood	-20.93917	Hannan-Quinn criter.		0.782310
F-statistic	5.275711	Durbin-Watson stat		2.846052
Prob(F-statistic)	0.000000			

Annex 2

The tests for fixed effects

Redundant Fixed Effects Tests				
Pool: DATECONFERINTACHINA				
Test cross-section and period fixed effects				
Effects Test	Statistic	d.f.	Prob.	
Cross-section F	0.623695	(27,179)	0.9262	
Cross-section Chi-square	19.510698	27	0.8506	
Period F	22.896780	(7,179)	0.0000	
Period Chi-square	138.756836	7	0.0000	
Cross-Section/Period F	5.398046	(34,179)	0.0000	
Cross-Section/Period Chi-square	153.143688	34	0.0000	