

ASSESSMENT MODEL OF THE NATIONS' HUMAN CAPITAL - THE CASE OF THE EU COUNTRIES

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Abstract: *In the knowledge-based society and in the creative economy towards which all the EU countries aspire, being also driven by the regulations of the European Commission through Europe 2020 Strategy, the human capital of a nation acquires new values, representing a powerful comparative advantage for the countries investing in this direction. In this context, the purpose of this scientific approach is to propose a model for assessing the human capital of a nation, created in a new approach, by using representative variables. By using the model proposed benchmarking of the world countries can be made. In this paper we present a benchmark of the EU countries. To answer the approach of this paper, we have used the following research techniques: investigation of secondary data and content analysis of the key reports and studies of international organizations such as: World Bank – Human Development Reports, World Economic Forum, statistics and Eurostat and UNCTAD publications, Euro barometers and EU reports on human capital, etc. For the analysis of the data we applied statistical methods of analysis, from the simplest (descriptive statistics) to the implementation of complex analysis.*

Key words: *human capital, macroeconomic data, knowledge-based society, assessment models and methodologies*

JEL Code: *O11, O15*

Introduction

The issue of the importance of an organization's human capital as development engine of the nations has been the focus of world-class experts, Nobel Prize winners or practitioners in the field such as Friedman (Nobel Prize in 1976), Schultz (Nobel Prize in 1979), Mincer Becker (Nobel Prize in 1992), Stiglitz (Nobel Prize in 2001), Krugman (Nobel Prize in 2008) (Nobelprize.org, 2012). Currently, in the context of the knowledge-based society and of the creative economy, towards which all the EU countries aspire, and not only, being initially driven by the Lisbon Strategy rules, and more recently by those of Europe 2020, a nation's human capital acquires new values, representing a powerful comparative advantage for the countries investing in this direction. The positive correlation between the individuals' income and their education level has been demonstrated since the beginning of the concerns related to the human capital analysis by Becker (1964) and Mincer (1970:1 - 26) as well as between the labour occupancy degree and the duration of education. Schultz (1961:1-17) and Denison (1962:72-74) further explain that the education and health costs should be treated as investment to help increase productivity and economic growth. Other positive correlations, already demonstrated, are between the growth of the welfare and the investment in the human capital. More recently, Boll and Zurlinden (2012: 2297-2308) develop an index for the measurement of labour quality growth caused by unobservable characteristics. At microeconomic level, more and more numerous increasingly complex analyses are being developed on human capital (Jin, Hopkins & Wittmer, 2010:939 - 963; Wang, Jaw & Tsai, 2012:1129 – 1157; Hitt, Biernan, Shimizu & Kochhar, 2001:13-28).

1. Scientific research methodology

The model we propose in this paper meets the classical algorithm of scientific research. The main steps that we followed were the ones presented below (Adams et al., 2007:44).

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1.1. Indication of the problem; the aim of the research

Since we consider that the indicators, with quantitative value, lose sight of the people's perceptions, which are really the main subject investigated, we propose a more extended assessment indicator, by adding new sub-indicators, and appropriate to the European context of the knowledge-based society, in which the research – development activity plays a crucial role, without losing sight of the need for social inclusion of disadvantaged people. In their study, Altinok and Murseli (2007:237-244) argue the need for qualitative indicators of human capital at macroeconomic level. Therefore, we propose an indicator that includes both the quantitative dimension and the qualitative one of the investigated phenomenon.

1.2. Defining the model: selection of variables, accomplishment of assumptions

Given that the purpose of this paper is to propose a model for assessing the human capital at macroeconomic level we focused for our analysis on data and assessment indicators provided by the most important international bodies and organisations: Eurostat, World Bank and UNCTAD - for the quantitative indicators and World Economic Forum for the qualitative ones, the latter being obtained from surveys. Also, the index that we propose in this paper brings as new elements, compared to those already established, the fact that it takes into account the requirements of the knowledge-based society and the creative economy.

1.3. Formalization of the model: finding the relationships involved; finding a functioning form

The dynamic analysis that we perform in this paper concerns the 27 EU member countries and considers the time horizon from 2007 to 2010, for which there are the necessary data for the international bodies and organizations. Although, for the quantitative data, the international and European organizations provide data on a longer period of time than the one considered in this paper, for the qualitative ones that we considered relevant and that we have used there is data in the reports on the World Economic Forum's global competitiveness, starting with 2007. As such, the index we propose is based on the following dimensions and it includes the indicators we shall describe below.

Living standards, Labour and Social inclusion index (LLSI) is a composite index that includes in its structure the following indicators *GDP/capita index (GDPI)* – for which the data collected from UNCTADstat were used as logarithms since large amounts were involved, *Cooperation in labor-employer relations index (CLEI)* and *Brain drain index (BDRI)* for which the qualitative data were collected from World Economic Forum, The Global Competitiveness Reports; *People with no risk of poverty or social exclusion index (PSEI)* using data collected from Eurostat.

Research and Development Index (RDVI) is also a composite index that includes the following indicators: *University-industry collaboration in R&D index (UICI)*, *Quality of Scientific Research Institutions Index (QSCI)* using data collected from the World Economic Forum and *Total R&D expenditure% of GDP index (RDEI)* for which the data were collected from Eurostat. The inclusion of this composite index in the aggregate index of the human capital answers a highly topical issue due to the fundamental role of research – development in creative economy and in the knowledge-based society.

Education and Healthy Life Index (EHLI) is the third composite index which we will analyse in our study and it includes: *Life expectancy index (Lexi)*; *Healthy life years index (HTLI)*; *Tertiary educational attainment index (TEAI)*; *School expectancy index*

(SCEI)) for which the data were collected from Eurostat and *Quality of educational system (QESI)* for which we used and processed data from the World Economic Forum.

1.4. Solving the problem: finding the right techniques, modifying the model or the approach, if necessary

To meet the scientific rigor, we further describe the methodology for calculating the composite indices, of the aggregate ones and of the global aggregate index of the human capital. The calculation methodology that we have used for the proposed index is based on well-known methodologies used by the major international organizations, such as the UNDP methodology used to calculate the Human Development Index, but also on other methodologies proposed in the literature and tested by empirical research such as the methodology proposed by Florida and Tinagli (2004) for building the European Creativity Index and further developed by adding new indicators (Bobirca et al., 2009: 117-144). **The calculation method of the annual composite indices: *Living standards, Labour and Social inclusion index (LLSI)*, *Research and Development index (RDVI)* and *Education and Healthy life index (EHLI)*** is the following: first, to calculate the annual composite indicators for each of the four years analysed, the values for the 12 component sub-indicators were arranged downward, attributing the score of 27 to the country with the maximum value (number of EU member countries). For each of the countries analyzed a distance indicator was calculated, as follows: the value corresponding to each country was multiplied by the maximum score and was reported to the value of the country with the maximum score. The cumulative values obtained are also arranged downward, attributing the score of 27 to the country which obtains the maximum value. The value of the composite indicator for each of the years under review is calculated as follows: the aggregate value obtained by every country by adding the scores of the sub-indicators (of the distance indicators), is multiplied by the maximum score, respectively of 27 and is divided to the aggregate value of the country that obtained the maximum score. The calculation methodology is applicable to each of the three composite indicators and for each of the four years analyzed. **To calculate the annual aggregate index of the human capital, the *European Annual Human Capital Index*** we have adopted the following procedure: the three composite annual indices were sorted in descending order of values, giving them ranks between 1 and 27. Rank 1 was assigned to the country with the maximum score, representing the best rank. Subsequently, the ranks were normalised by dividing them to the maximum number of countries, respectively 27. The values obtained were between 0.04 and 1; the country with the best position having, this time, the lowest value, namely of 0.04. Then we calculated the arithmetic mean of the values obtained by each country after the normalization of the ranks. The annual aggregate index of the human capital is obtained as the difference between 1, the maximum value, and the arithmetic mean calculated previously. **The global composite indices for the four years analysed were calculated as follows:** each of the annual composite indices is arranged in descending order of the values; ranks from 1-27 are assigned, the country with the highest score obtaining rank 1; the ranks obtained for each of the three annual composite indices is normalised by division by 27, obtaining values from 0.04, the country with the best rank and 1 the country with the lowest rank; for each of the three composite indices, during the entire period under review, in our case, 2007 – 2010, the arithmetic mean of the normalised values is calculated for each country; the three composite indices are determined by subtracting from the maximum value, respectively 1, the arithmetic mean of the normalised values obtained previously. **The global aggregate indicator (*Global European Human Capital Index*) is determined based on the global composite indicators, as follows:** the three global composite indices are sorted in descending order and are assigned ranks; the

ranks given to each country are normalised by division by 27; the arithmetic mean of the values obtained after the normalisation of the ranks is calculated; the global index of the human capital is calculated by subtracting from 1 (the maximum value) the previously obtained mean; finally, they are sorted in descending order, resulting the hierarchy of the global index of the human capital in the EU member countries.

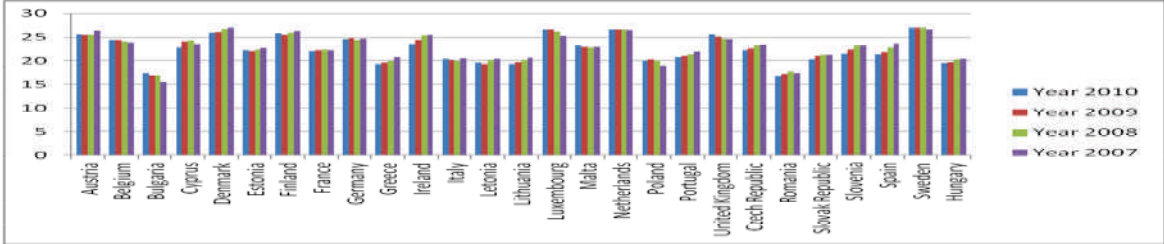
2. Interpretation of results and validation of the model

The methodology previously presented allows obtaining very detailed results on annual composite indices obtained by each country, of the annual aggregate indicators, of the three global composite indicators related to the entire period analyzed, as well as of the global aggregate index of the human capital. To present a summary and a conclusive image of the very abundant results, we will further expose and analyze the developments of the three composite annual indices, of the global composite indices obtained for the entire period analyzed, as well as of the global aggregate index of the human capital (*Global European Human Capital Index*).

2.1. Results of the annual composite indices

The annual composite indices allow, for each country considered, in our case the EU member countries, observing the dimension analysed, in dynamics.

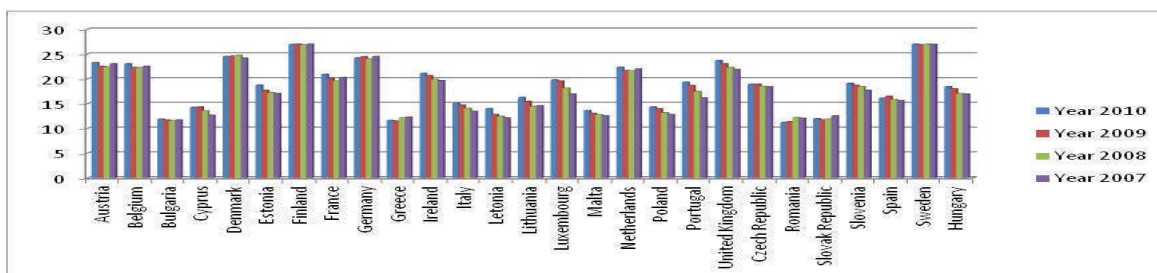
➤ Analyzing, for example, the annual composite index *Living standards Labour and social inclusion (LLSI)* (Graph. 1), we can draw the following conclusions: ■ The values of this annual composite index separate the countries in the following categories: leading in the ranking, with values exceeding the maximum of 25 points out of 27, are: Sweden, the Netherlands, Luxembourg, Denmark, Finland, Austria and, in 2009 and 2010 the United Kingdom. Between the 15 to 20 range are the countries that obtained the lowest values of the annual composite index: Romania and Bulgaria are placed in the entire period analysed, and, only for the last two years under review, namely in 2009 and 2010: Latvia, Hungary, Greece, Lithuania and, only in 2007, Poland which then moved to the next level. ■ The results of the study make evident a downward trend of the annual composite index, for many European countries such as Spain, the Czech Republic, Slovenia, Portugal, Slovakia, Greece, Lithuania, Hungary. Romania has registered an increase of this index in 2008 as compared to 2007 after which it declined. Denmark, although with a maximum of 27 points in 2007, also recorded a downward trend, reaching 25.92 in 2010. Other countries at higher levels in the ranking which have declined are Ireland and the UK. This situation that we find in most European countries can be partially explained due to the financial-economic crisis which occurred in the period analysed. ■ Increasing trends of the annual composite index can be seen in the United Kingdom and Belgium. Sweden has also recorded growth since 2007 reaching, starting next year, the first position in the ranking, three years in a row, respectively 2008, 2009 and 2010. A favourable situation can also be noticed in Bulgaria, the only country at the bottom of the ranking which records growth of this index in the period under review.



Source: data processed by the author

Graph 1: Evolution of the annual composite index Living standards, Labour and Social Inclusion

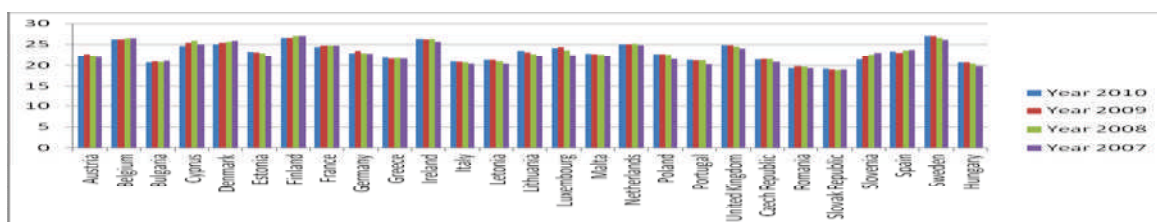
➤ The results of the study regarding the evolution of the annual composite index *Research and Development Index (RDVI)* (Graph 2) ■The results of the composite annual index *Research and Development Index (RDVI)* reflect a particularly favourable situation in the sense that most European countries record upward trends of this index in the period analysed. We can draw the conclusion that, although in times of crisis, most European countries realise the importance of the research – development activity and the investment in the human capital – the main factor involved in this activity, as the engine of the economic growth and recovery. ■The highest values of the composite annual index *Research and Development Index (RDVI)* are recorded by Sweden, Finland, Denmark, Germany.



Source: data processed by the author

Graph 2: Evolution of the annual composite index Research and Development

➤ For the annual composite index *Education and Healthy life index (EHLI)* (Graph 3), the results of the study allow noticing many more countries with an increasing trend. This upward trend is a favourable situation given the importance of the educational factor in the knowledge-based society. Thus, in the period under review increases in this annual composite index can be highlighted in the following countries: the United Kingdom, Luxembourg, Lithuania, Estonia, Malta, Poland, Portugal, Italy, Hungary, and Slovakia. The growth during 2007 - 2009, followed by a slight decrease in 2010, is recorded in Germany, Austria, the Czech Republic, Latvia, and Romania. ■Sweden, a country placed once again in the top of the ranking, recorded growth in the period 2007 – 2008, reaching maximum values, respectively 27 and maintaining itself on the same position during 2009 – 2010. ■The countries with the best values of this annual composite index, throughout the entire period under review, recording more than 25 points out of a maximum of 27, are: Sweden, Finland, Ireland, Belgium, Denmark and, except in 2007 when it recorded the value of 24.78 in all subsequent years, the Netherlands.



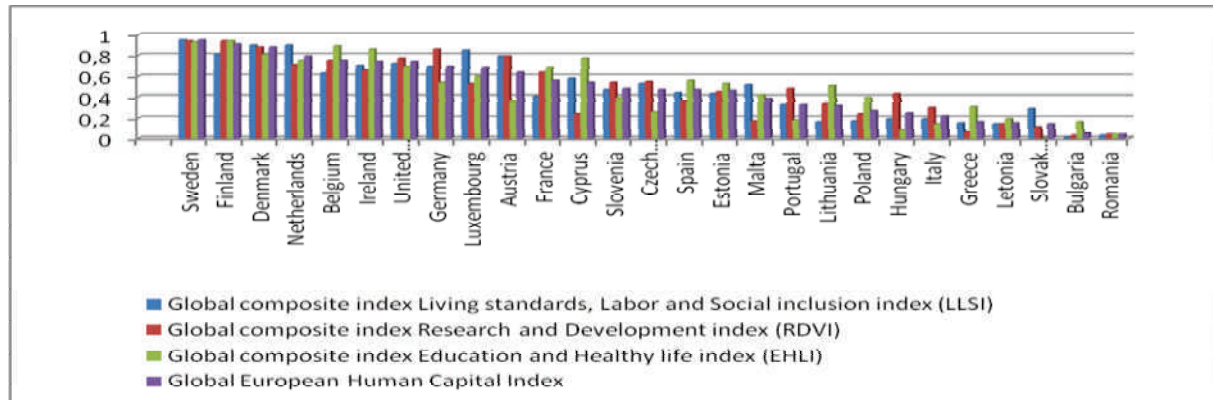
Source: data processed by the author

Graph 3: Evolution of the annual composite index Education and Healthy life

2.2. Results of the global composite indices and of the global aggregate index of the human capital (Global European Human Capital Index)

We further present the results obtained for the global composite indices for the entire period analysed, as well as the global aggregate index of the human capital (*Global European Human Capital Index*), which was calculated according to the methodology

previously presented, based on these indices. The results of the study, presented in Graph 4, illustrate in summary, for the entire period analysed the indicators proposed. Thus, the global values of the three composite indices *Living standards, Labour and Social inclusion index* (LLSI), *Research and Development index* (RDVI) and *Education and Healthy life index* (EHLI) can be noticed, as well as the final index which is precisely the purpose of this study: the global index of the human capital for the EU member countries (***Global European Human Capital Index***).



Source: data processed by the author

Graph 4: Global European Human Capital Index, 2007 – 2010

■As noted, the ***Global European Human Capital Index*** polarizes the two extremes, respectively countries with high values, the Northern countries, but also the first ones integrated in the EU, and at the other pole, the countries with the lowest values, which are countries that have joined the EU more recently.

■Another final result of the study is the following: the global composite indices allow, for each of the EU member countries to identify the main strategic directions in which one must intervene with priority to remedy the situations that affect the human capital.

Conclusions and future research directions

In conclusion, the index that we propose allows assessing the human capital of nations, in an approach that takes into account the requirements of the knowledge-based society and other current events, such as the brain drain, which affects negatively the human capital in the countries with lower living standards and where talented people cannot find development opportunities. Furthermore, the proposed index, through the indicators it integrates, meets the requirements of sustainable development of nations, of promoting certain socially responsible policies and the EU requirements specified in the Europe 2020 strategy. The benchmarking developed for the EU member countries confirms the hypothesis that the more economically developed countries are, but also integrated for a longer period of time, the higher is the concern for the human capital, as compared to the countries more recently integrated and faced with economic difficulties. The future research directions aim at analyzing the correlations between the ***Global European Human Capital Index*** and various other variables such as the fiscal policy with the budgetary and monetary one.

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