

INTELLECTUAL CAPITAL – INTANGIBLE ASSETS MATERIALIZED IN THE MAIN ENGINE OF THE NATIONS' ECONOMIC RECOVERY

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Abstract: *The research developed in this paper is mainly aimed at the achievement of certain analyses on some key variables of intellectual capital in companies from EU countries and thus, implicitly, from Romania, as well as through the Pearson correlation matrix, intensity analysis of the relationships between the respective variables of the three dimensions related to the intellectual capital, namely the human capital, the structural and relational capital and the GDP/capita. The main research techniques used for the research were: investigation of secondary data and content analysis of the major reports of international organisations on intellectual capital, as well as statistical methods of analysis and interpretation of data, respectively descriptive statistics and correlations. The main results of the research consist in identifying the main directions that envisage the area of intellectual capital in which companies must act to diminish the negative effects of the economic crisis.*

Keywords: *intellectual capital, human capital, relational capital, structural capital, correlation matrix.*

JEL classification: O11, O32, J24

Introduction

The measurement of the intellectual capital and of the knowledge management is not reflected in most cases in the companies' monetary and financial – accounting records, the reporting being rather voluntary than mandatory. As such, there is a huge difference between the reporting methods used by companies and in the typology of the indicators reported.

In the case of intangible assets, intellectual capital measurement, although being in the attention of numerous scientific studies, is quite controversial. Thus, any assessment methodology may be, in some regards, questioned. However, practitioners and international organisations are constantly seeking new ways of improvement. After a review of the various assessment methods and models, we consider that the most important are: the Intangible Assets Monitor (Sveby, 1997), Balanced Scorecard (Kaplan and Norton, 1996), addressing the intellectual capital of Edvinsson and Malone, respectively the business navigator of Scandia (Edvinsson and Malone, 1997), IC - Index (Roos et al., 1997).

As such, this paper aims to carry out analyses on certain key variables of intellectual capital within the companies from the European Union member countries, so that we know the main directions in which the Romanian companies must intervene to take action to reduce the gaps on the scale of values integrated in the intellectual capital.

1. The current state of research in the field of intellectual capital

The results of London & Siva's study (2011, pp. 846-855) shows that the most important characteristics of successful international companies regarding intellectual capital are: specialisation of skills and capabilities of both companies and employees and the niche expertise, as well intercultural capacity. Another important result of the study refers to the ability of companies to be reflexive, developed on three dimensions: awareness, responsiveness and adaptation to change. By analysing the effects of the three dimensions of intellectual capital, respectively human, relational and structural capital, on employees' work satisfaction Longo & Mura (2011, pp. 278-287) demonstrate by means of a structural equation that there is a positive influence of the human capital, as a whole, but there are differences between the influences of the three dimensions. Thus, human and

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relational capital does not directly affect the employees' satisfaction and retention, but they are mediated by the structural capital. In addition, the results of this study identify two measures that positively influence the intellectual capital and contribute to the employees' satisfaction and retention, namely communication and employee alignment to the company's strategy and the building of a collaborative organisational environment in which knowledge and information flows freely, thus stimulating the development of relational capital.

Regarding the measurement of intellectual capital, Guthrie, Ricceri & Dumay (2012, pp. 68-82) consider that reporting and counting may refer to: the size and development of the following knowledge resources: employees' skills, relationships with the customers, financial relationships and information and communication technology. The literature shows numerous works that emphasise the idea that the difference between the market value and the value of the company's assets may be explained in terms of intellectual capital (Brennan, Connel, 2000, pp. 206-240; Han & Han, 2004, pp. 519-527; Kitts, Edvinsson & Beding, T., 2001, pp. 35-50, Drucker, 1995, Sveby, 1997). Han & Han (2004, pp. 519-527), after having done an analysis of the intellectual capital indicators specified in previous research, mention that the most important indicators and assessment dimensions concern: customers, processes, innovation and human capital, but that the earlier models do not include the specific weight of the indicators used in the decision making process. It is estimated that many researches came to the result that between the firm's investment in R&D, advertising and market value of the firm there is a significant association. The authors choose the following indicators: for **customer capital** – *the rate of customer growth, customer satisfaction index, customer retention rate, average revenue per customer*; for **human capital** – *the index of motivation, leadership index, quality of training programmes and staff training, IT literacy*; for **structural capital** – *investment in IT, business partners satisfaction index, businesses with new products, quality of corporate performance*.

Knowledge and knowledge management are key areas for most organisations today, particularly for those that are knowledge intensive. In this context, the implementation of knowledge management involves more than implementing certain IT tools, it requires changes in the organisational structure, culture and processes, and the first step in changing a company into a knowledge intensive company is to become aware of the knowledge it has, materialised in the intellectual capital. Montequin et al. (2006, pp. 525-538) after doing an analysis of the most important factors that ensure success in the implementation of knowledge management, explained by Bixler (2002), namely: *vision and leadership – the existence of a strategic plan for knowledge management, organisational and communication training, measurement of performance in business, infrastructure for knowledge management, resources, governance: policies and procedures* and Skyrme and Amidon (1997), namely: *clear and explicit business strategy, extensive savvy of knowledge, a convincing vision on knowledge, the existence of a leadership of knowledge, of certain systematic processes of knowledge, of a well-developed infrastructure in terms of knowledge*, propose a new non-monetary assessment model with a tree-like structure, on three levels: blocks, clusters and indicators. Thus, starting from the formula of intellectual capital, as sum of the human, structural and relational capital, they propose for the qualitative measurement the following indicators: for the **human capital** – *the proficiency of people, improvement of these skills, staff stability, improvement of individuals' and groups' capacity*; for the **structural capital**: *ICT penetration, technology production, business philosophy and process, organisational structure, intellectual property*, and for the **relational capital**: *the customer base, customer loyalty, market proximity, sales effectiveness, vendors, networking with other market players*. After an analysis of the most important conceptualisations of intellectual capital and of the variables of the three components of intellectual capital,

Martin-de-Castro et al. (2011, pp. 649-662) identifies the following dimensions and variables. Thus, **human capital** has the following three dimensions: *knowledge* – formal education, specific training, development and experience of the staff, *skills* – individual learning, collaborative teamwork, individual knowledge sharing through communication, know-how and leadership and *behaviours* – patterns, paradigms, sense of belonging, self-motivation, job satisfaction, flexibility and creativity. **Structural capital** is developed on the following dimensions and variables: *technological capital* – efforts on research and development, technology infrastructure, intellectual and industrial property. **Organisational capital** includes organisational culture, shared values and attitudes, telecommunications and information capabilities, as well as organisational design.

2. Objectives and methodology of the scientific research

The purpose of this paper is to provide a comparative analysis of the main pillars of intellectual capital in the companies from the member countries of the European Union, focusing on the place held by Romania in this context. We also consider pointing out the main directions in which Romanian companies must intervene to reduce the gaps compared to the countries that gain performance as a result of promoting an appropriate policy of intellectual capital.

As such, **the specific objectives of this study** aim at:

O1: Analysis of the performance of companies in the EU countries on certain key variables representative of the human capital dimension, such as: Extent of staff training, Cooperation in Labour - Employer Relation, Brain Drain for the period 2007 – 2010, for which there is data at the level of international organisations.

O2: Analysis of the performance of companies in the EU countries on the variables related to the relational capital dimension, namely: Intensity of local competition, Degree of customer orientation, Extent of marketing, University - industry collaboration in R & D, for the same period, namely 2007-2010.

O3: Analysis of the performance of companies in the EU member countries on certain significant variables of the structural capital dimension, such as: Production process sophistication, Company spending on R & D, Ethical Behaviour of firms.

O4: Analysis of the correlation between the variables related to the three dimensions of intellectual capital and GDP/capita in 2010, for which there are the most recent data in the World Economic Forum Reports on global competitiveness.

In order to select the variables we conducted a content analysis of the relevant reports of the international organisations such as: World Bank, World Economic Forum, Eurostat and UNCTAD statistics and publications, Eurobarometers and EU reports on intellectual capital. Given that this area subject to our analysis is essentially intangible, we consider it is appropriate to have an assessment that uses the qualitative variables, the only ones that we have identified in this regard, as the ones provided by the Reports of the World Economic Forum on global competitiveness.

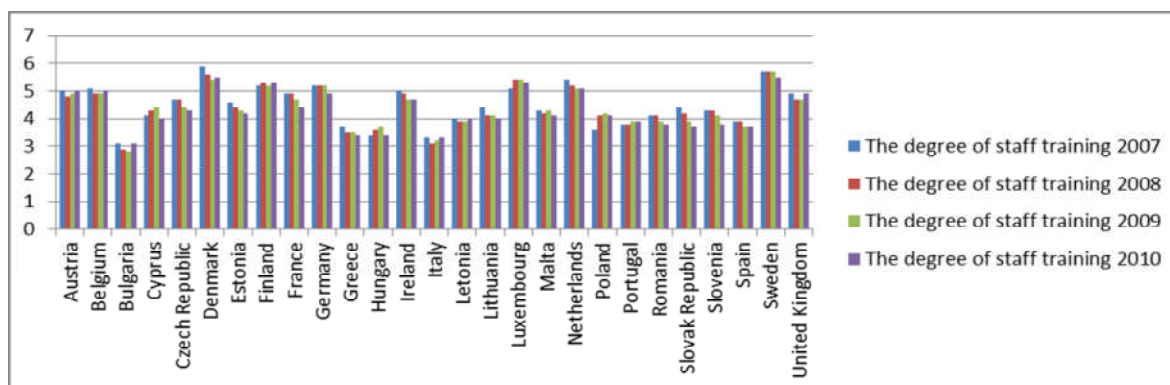
The data collection was conducted for the period 2007 – 2010, for which there is the most recent data for all the European Union countries. All variables are expressed on a value scale ranging from 1, the minimum value, undesirable, to 7, the maximum value.

3. Data analysis, collection and interpretation of results

Statistical methods of analysis were applied for the data analysis, from the most simple ones (descriptive statistics) up to achieving complex analyses of the links-between-variables type, respectively correlations. For the statistical processing of the data collected, we used the EXCEL computer software, the Data Analysis module.

Based on the graphs presented below, many studies can be carried out. We do not aim at an exhaustive analysis of these variables, but at a synthesis of the variables of the three dimensions related to intellectual capital:

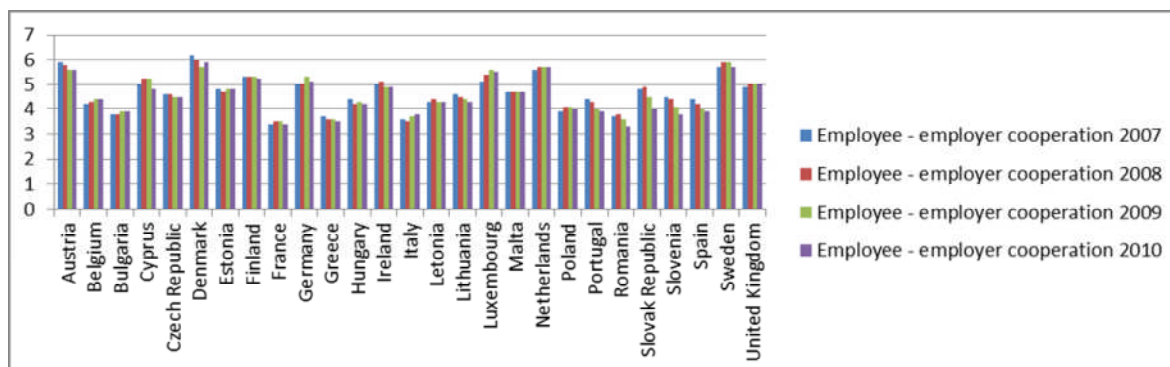
- Concerning the variable related to the human capital, respectively **the readiness of the personnel in the companies from the EU member countries (HCV1)** the supremacy of the Nordic countries stands out, namely: Denmark, Sweden, Finland, Luxembourg, Netherlands. Romania, although recorded decreases in the period 2007 – 2010, recorded higher values than Bulgaria, Italy, Greece, Hungary and even Portugal, in the years 2007, 2008 (Chart no. 1).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 1 The degree of staff training in the companies from the EU member countries in the period 2007 – 2010

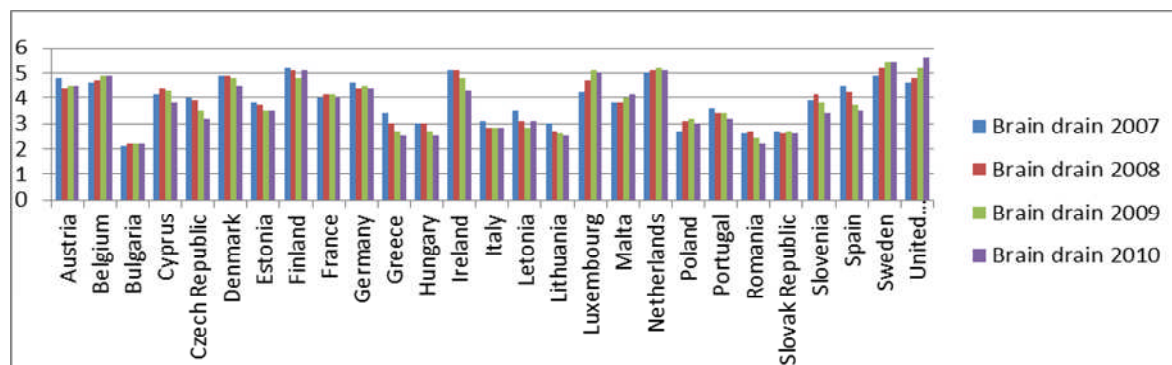
- Concerning the variable also related to the human capital dimension, namely the **employee - employer cooperation (HCV2)**, its highest value was recorded in Denmark, although even in this country there has been a downward trend during the period under review. Other countries with high values for this variable are: Austria and Sweden, the Netherlands, Luxembourg. Another aspect that stands out is that of the downward trends regarding the employee - employer cooperation, in the vast majority of EU countries in the period under review, one of the causes is most likely the effect of the financial crisis. Romania recorded a slight increase in 2008, and afterwards decreases of the values of this variable. In 2010 Romania was positioned at the end of the ranking, holding the lowest value of **the employee - employer cooperation** variable, compared to the other EU countries (Chart no. 2).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 2 Employee – employer cooperation in the EU countries in the period 2007-2010

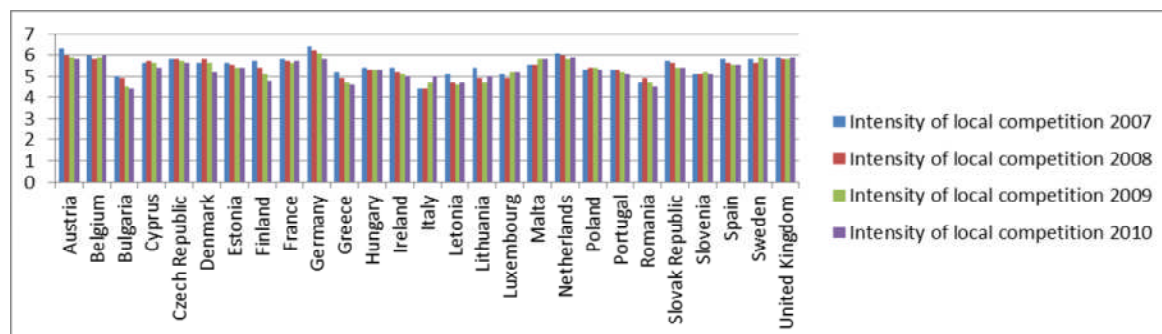
- The third variable of the human capital dimension, **Brain drain (HCV3)**, a phenomenon so current nowadays (Voicu I.I., Talmaciu I., 2011, pp. 2084), polarises at the two extremes the economically developed countries, in which the infusion is very high and, at the other extreme, the less developed countries such as Romania, Bulgaria etc. which export plenty of brain drain (Chart no. 3).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 3 Brain drain at the level of companies from EU countries in the period 2007-2010

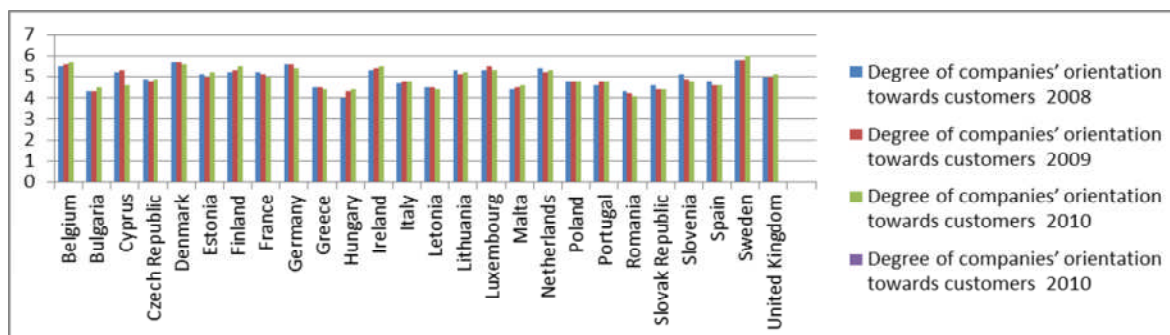
- The first variable related to the relational capital dimension which will be analysed, the **Intensity of local competition (RCV1)** does not create big differences between the EU member countries, as in the case of the variable previously analysed, namely that of the brain drain. Germany along with Austria and the Netherlands have very high scores for this variable. Romania, except in 2008 when it had a slight increase, has recorded decreases of the scores related to the intensity of the local competition, being situated, alongside with Bulgaria and Greece, at the end of the ranking (Chart no. 4).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 4 Intensity of local competition related to the companies in the EU countries in the period 2007-2010

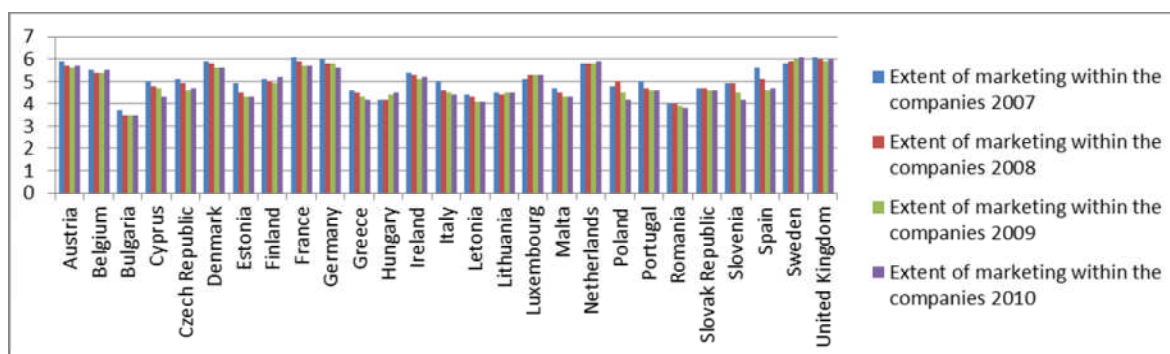
- Concerning **the degree of companies' orientation towards customers (RCV2)**, a variable also integrated to the dimension of relational capital, it is to be noted, as we have grown accustomed to leading scorers, the economically developed countries, the highest values being held by Sweden and Austria, but also by Belgium, Denmark, Germany, Ireland, Luxembourg, and the Netherlands. Romania recorded values comparable to those of the companies in Bulgaria and Hungary (Chart no. 5).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 5 Degree of companies' orientation towards customers in the EU countries in the period 2007-2010

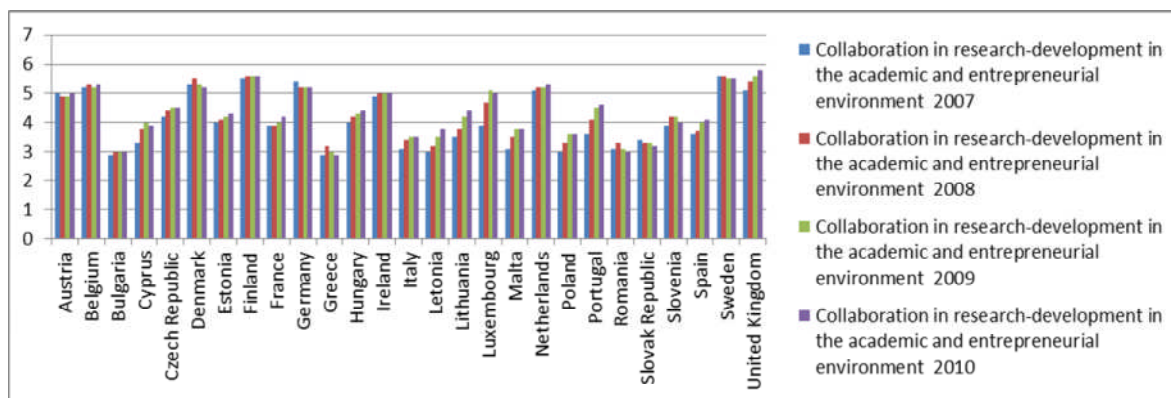
- Regarding **the extent of marketing in companies (RCV3)**, variable of the relational capital dimension, in most countries the decreases in the values of this variable in the period 2007-2010 are to be noted, which shows a decrease of the marketing budgets during the crisis. There are also countries in which the companies' managers have understood the positive effects of marketing which represent a springboard and which must be more aggressive just because of the crisis, such as Sweden, Hungary and Luxembourg. In Romania the measure of implementing marketing decreased during 2007 – 2010, yet recording higher values than those in Bulgaria and comparable to those in Latvia, Greece, Hungary (Chart no. 6).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 6 Extent of marketing within the companies from the EU countries in the period 2007-2010

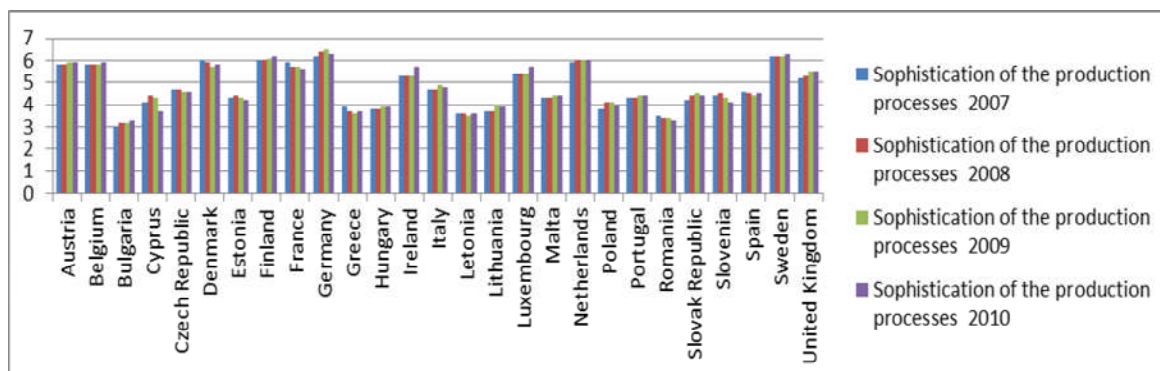
- **The collaboration in research – development between the academic and entrepreneurial environment (RCV4)** has fairly low values in many of the EU countries, recording scores much lower than the previously analysed variables. None of the countries analysed reaches the score 6, and most of them revolve around the values 3 and 4 out of the maximum of 7, which means poor collaboration in research – development between the two environments. Romania holds a position comparable to that of Bulgaria, managing to succeed only Greece. The highest values were recorded in the United Kingdom, which also had a significant increase in this variable during the period under review, in Finland and Sweden (Chart no. 7).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 7 Collaboration in research-development in the academic and entrepreneurial environment in the EU countries in the period 2007-2010

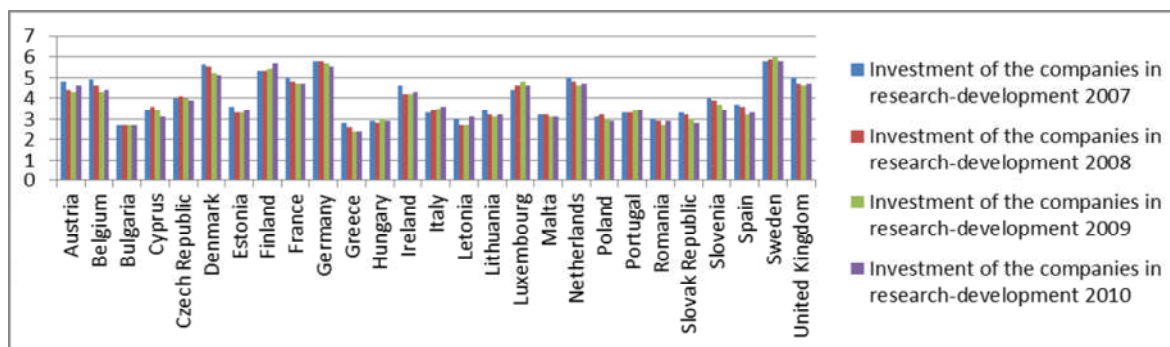
- The first variable corresponding to the structural capital dimension, which we analyse, respectively the **Sophistication of the production processes (SCV1)** produces big differences between the EU countries. There are countries which hardly exceed a score of 3, such as Bulgaria and Romania. Between the values 3 and 4, so with low scores of this variable, there are also Cyprus, Greece, Hungary, Latvia, Lithuania and Poland. A very favourable situation is found in Germany, Sweden, the Netherlands, Finland and Denmark, but also in Austria and Belgium (Chart no. 8).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 8 Sophistication of the production processes in the companies in the EU in the period 2007-2010

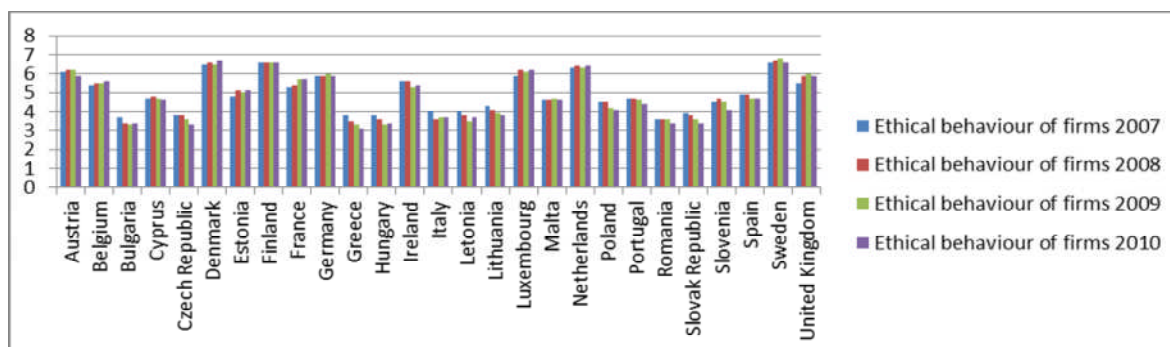
- This indicator as well, namely the **Investment of companies in research-development (SCV2)**, also integrated in the relational capital dimension, highlights big differences between the EU countries. There are also many countries with low scores of these variables, respectively between 3 and 4, such as Bulgaria, the Czech Republic, Greece, Hungary, Italy, Latvia, Lithuania, Romania and Slovakia. The highest values are held by Denmark, Finland, Sweden, the Netherlands, Luxembourg and Austria. The most unfavourable situation is in Greece which, in addition to recording the lowest values in terms of investment of companies in research – development, also records the highest decline in the period under review (Chart no. 9).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 9 Investment of the companies in the EU countries in research – development in the period 2007-2010

- **Ethical behaviour of firms (SCV3)**, the third variable related to the structural capital dimension subject to this review, polarises at the two extremes, namely the economically developed countries, which have high values of this variable, such as: Denmark, Finland, the Netherlands, Sweden, Germany, the United Kingdom, Austria and, at the other extreme, with low values, thus with poor ethical behaviours of the firms, countries less developed economically, namely: Bulgaria, Greece, Romania, Slovakia. Another feature that stands out in this indicator is the depreciation of ethical behaviours in the vast majority of the countries in the period under review (Chart no. 10).



Source: Data processed by the authors based on World Economic Forum Global Competitiveness Reports for the period 2007 – 2012

Chart no. 10 Ethical behaviour of firms in the EU countries in the period 2007-2010

In order to answer the fourth objective of this paper, namely that of analysing the correlations between the variables corresponding to the three dimensions of the intellectual capital and the GDP/capita, we used the correlation matrix, respectively the Pearson correlation coefficient. We have obtained the following results shown in the table below (Table no. 1)

Table no. 1 Matrix of correlation between the essential variables of the intellectual capital corresponding to the three dimensions: human capital, relational capital and structural capital and GDP/capita

	PIB/loc	HCV1	HCV2	HCV3	RCV1	RCV2	RCV3	RCV4	SCV1	SCV2	SCV3
PIB/loc	1.00										
HCV1	0.73	1.00									
HCV2	0.63	0.83	1.00								
HCV3	0.74	0.90	0.78	1.00							
RCV1	0.31	0.51	0.45	0.63	1.00						
RCV2	0.63	0.85	0.76	0.78	0.50	1.00					
RCV3	0.69	0.85	0.68	0.86	0.70	0.80	1.00				
RCV4	0.61	0.86	0.77	0.87	0.58	0.83	0.86	1.00			
SCV1	0.76	0.87	0.70	0.87	0.60	0.86	0.93	0.84	1.00		
SCV2	0.69	0.90	0.72	0.86	0.48	0.84	0.88	0.87	0.94	1.00	
SCV3	0.75	0.91	0.79	0.93	0.52	0.83	0.85	0.84	0.89	0.90	1.00

Data processed by the authors

The results of the analysis lead us to the following CONCLUSIONS:

- The strongest correlations are established between GDP/capita and the following variables: sophistication of the production processes ($r = 0.76$), ethical behaviour ($r = 0.75$), brain drain ($r = 0.74$) and degree of staff training ($r = 0.73$).
- Other correlation factors with very high values indicating very strong intensities of the links between the variables, with values ≥ 0.90 are the following:
 - Between the degree of staff training and: ethical behaviour ($r = 0.91$), brain drain ($r = 0.90$) and the company's investment in research – development ($r = 0.90$);
 - Between brain drain and ethical behaviour ($r = 0.93$);
 - Between extent of marketing and sophistication of the production processes ($r = 0.93$);
 - Between the sophistication of the production processes and the company's investment in research – development ($r = 0.94$);
 - Between the company's investment in research – development and the firm's ethical behaviour ($r = .90$).

We can **conclude** that this study, along with an analysis of the key variables of intellectual capital, in the companies from the EU countries, allows the identification of Romania's strategic directions to be followed to diminish the negative effects of the economic crisis. Furthermore, the research demonstrates the existence of very strong positive relationships between GDP/capita and some of the variables of intellectual capital. In the EU states, the need to develop intellectual capital is shown by the Europe 2020 Strategy, which set as target 40% of the people aged 30 to 34 to have completed higher education studies or their equivalent (Ioneci, Antonescu et Chirilă, 2011, pp. 609-612).

Bibliography:

1. Bixler, C.H., 2002. Knowledge management: practical aspects of implementation. *KMWorld* 11(7).
2. Brennan, N. and Connel, B., 2000. Intellectual Capital: Current Issues and Policy Implications. *Journal of Intellectual Capital*, 1(3), pp. 206-240.
3. Drucker, P. 1995. *Managing in a Time of Change*. New York: Truman Talley.
4. Edvinsson, L. and Malone, M.S., 1997. *Intellectual Capital*. New York: Harper Collins.
5. Guthrie, J., Ricceri, F. & Dumay, J., 2012. Reflections and projections: A Decade of Intellectual Capital Accounting Research. *The British Accounting Review*, 44(2012), pp. 68-82.
6. Han, D. and Han, I., 2004. Prioritization and selection of intellectual capital measurement indicators using analytic hierarchy process for the mobile telecommunications industry. *Expert Systems with Applications*, 26(2004), pp. 519-527.

7. Ioneci, M., Antonescu, E. and Chirilă, C., 2011. *The Romanian Economy and Europe 2020 Strategy*, Ovidius University Annals, Economic Sciences Series, vol. XI (2), pp. 609-612.
8. Kaplan, R. and Norton, D.P., 1996. *The Balanced Scorecard: Translating Strategy into Action*. Boston, MA: Harvard Business School Press.
9. Kitts, B., Edvinsson, L., and Beding, T., 2001. Intellectual capital: From intangible assets to fitness landscapes. *Expert Systems with Applications*, 20(1), pp. 35 -50.
10. London, K. and Siva, J.P.S., 2011. The role of reflexive capability in relation to intellectual capital on multi international partnerships. *International Journal of Project Management*, 29, pp.846-855.
11. Longo, M. and Mura, M., 2011. The effect of intellectual capital on employees' job satisfaction and retention. *Information & Management*, 48, pp. 278-287.
12. Montequin, V.R., Fernandez, F.O., Cabal, C.A. and Gutierrez, N.R., 2006. An integrated framework for intellectual capital measurement and knowledge management implementation in small and medium – sized enterprises. *Journal of Information Science* 32(6), pp. 525 – 538.
13. Roos, J., Roos, G., Edvinssons, L. and Dragonetti, L., 1997. *Intellectual Capital: Navigating in the New Business Landscape*. London: Macmillan.
14. Skyrme, D. and Amidon, D., 1997. *Creating the Knowledge – Based Business*. London: Business Intelligence.
15. Sveby, E., 1997. *The New Organisational Wealth: Managing and Measurement Knowledge Based Assets*. San Francisco, CA: Berret Koehler.
16. Voicu I.I., Talmaciu I., 2011. *Dimension and Directions of the "Brain Drain" Phenomenon*, Ovidius University Annals, Economic Sciences Series, Volume XI, Issue 1/2011; (p.2084) (REPEC, DOAJ) ISSN 1582-9383.
17. World Economic Forum, 2012. *The Global Competitiveness Report 2011-2012*.