Abstract. *This paper aims to explore the correlations between the competitiveness of nations, the spread of the knowledge-based economies and the way national intellectual capital is exerted. Following an exploratory data analysis, the study answers the following question: does IC truly affect the competitiveness of the countries? Deductive reasoning and a blend of qualitative and quantitative methods are used in the study. The paper analyzes the national IC along four dimensions: human capital, market capital, process capital and renewal capital. A pool of 10 countries is scrutinized through 23 indicators, pertaining to these dimensions. Results show that countries in the highest stage of development also rank high at innovation and competitiveness, which suggests that it is a positive correlation between these three variables. The countries in lower stages of development have weak positions, which means are not able to sustain reliable sources of competitive advantage. Moreover, their innovation patterns show a diminished potential for creating added value through developing new products and services. The originality of this study arises from attempting to shade more light regarding the importance of IC in the development of the countries in an inclusive manner.*

Keywords: competitive development, national intellectual capital, innovation, wealth.

BRIDGING INTELLECTUAL CAPITAL AND THE COMPETITIVENESS OF NATIONS

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1. Introduction

Economic development is a topic that constantly has been tackled in research because the wealth and prosperity of a nation is a mutual concern for both society and policymakers. In the past two decades, the competitiveness of nations concept emerged as a new paradigm of economic development. This study investigates the hypothesis that knowledge and intellectual capital, innovation and entrepreneurship are key drivers of economic development and renewal. Unlike traditional resources, human-related resources are steady and their value can be significantly increased. In the knowledge economy, the value of organizations and individuals is directly related to their knowledge and intellectual capital. Especially in the developed countries, the global trends show a clear transition towards an economy based on intellectual capital assets. These countries have most chances to benefit from using and incorporating them in their economic activities. However, as developing countries strive to improve their local factors, they are also searching for ways to broaden their competitive advantages in the international competition. Lately, there has been a strong emphasis on the role of regional development as a key driver for national wealth. Around the world, authorities in charge of regional development focus more and more on computing maps of regional knowledge assets and IC. Such tools may bring a real edge in terms of implementing policies that would sustain economic and social progress. New political agendas and scientists focus on finding methods to quantify the knowledge capital of nations, to boost it and to capitalize it in terms of collective wealth. Development and competitiveness arise due to a fine mixture between skills of individuals, institutions that sustain a healthy innovative environment and proper legislation that supports entrepreneurship. Internationally successful industries with high productivity are those that in which human and structural capital interact in a synergic way. In the global economy, IC research has the potential to make an important contribution to understanding new facets of competitiveness. The development of reliable methodologies for identifying, assessing and measuring national IC may help in terms of coping in the knowledge economy.

The main hypothesis of this study is that development, IC and national competitiveness are strongly connected. This paper aims to deepen the discussion related to this liaison and seek for evidence of a certain correlation between these three concepts. The purpose of the study is to outline how the national IC of a country influences the level of economic development. An underlying concept of competitiveness is national productivity. Productivity implies the efficient use of both physical and intangible resources. Efficiency emerges from choosing the right inputs and that often entails skills and ideas, which are part of IC therefore it can improve the wealth of nations. The wealth of a nation derives from a proficient and clever way to manage its resources.

2. Literature review

Over the last years, the competitiveness of nations has become a major interest for governments, civil society and academics. Due to the pressure and challenges of globalization, new theories had emerged in order to explain the reality and to shape the direction in which economies should be heading. Synchronously, the importance of knowledge as an economic resource has been reviewed from multiple angles, each underlining a different but related aspect of the phenomenon. Professor Michael Porter coined the concept of competitive economic development in the early 1990s and his research had a tremendous impact on the competitiveness strategies of many countries. He introduced the most evolved model of economic development based on stages. He identified four stages of development (factor-driven, efficiency-driven, innovation-driven and wealth-driven) and explained how the microeconomic competitive advantages are transferred at the macroeconomic level. Researches regarding competitiveness strongly increased especially during the years 1995-2000 (Roessner et al, 1996; Clark and Guy, 1998; OECD, 2000), when the international markets turned into a fierce confrontational arena and states have been determined to innovate, develop and customize their competitive advantages. The different approaches of national competitiveness provided by the literature emphasize the multidimensional dependencies of competitiveness with various economical, societal and cultural issues. One valuable idea is that prosperity has microeconomic foundations. The way national companies use their resources and compete in the international markets determines the economic development. Competitive advantage of organizations is based on the ability to exploit knowledge resources (Drucker, 1993).

It should be noted that while the interest for examining the creation of economic wealth has never faded, a new research trend slowly emerged. The shift to extensive investigations of the intellectual wealth of nations is in itself a major advancement in economics. Progress is also being made on a number of other fronts as the true impact of the knowledge economy is beginning to be comprehended. Bontis (2004, p. 31) defines IC as "hidden values of individuals, enterprises, institutions, communities and regions that are the current and potential sources of value creation" while Andriessen and Stam (2005) perceive it as intangible resources available to a country or a region, that give relative advantage and which together are able to produce future benefits. Intangible resources refer mostly to knowledge, whether it is explicit or tacit, cognitive or emotional (Brătianu and Orzea, 2009, 2010). Knowledge has been regarded upon as a key factor that influences the production functions. The main difficulty of understanding and operating with knowledge and intellectual capital comes from the intangible nature of those and their strongly nonlinear character (Brătianu and Orzea, 2011, p. 384). Knowledge could be defined as a "fluid mix of framed experiences, values, contextual information and expert insight" (Ivanovici, 2008, p.106). In the past two decades, the sources of competitive advantage have started to shift from tangible assets to intangible ones. Knowledge is a special type of resource for an economy and it is a non-rival input in generating new knowledge.

Unlike most resources that become depleted when used, knowledge can be shared and enriched by applying it, which leads to innovation. This points out that intangible assets are increasingly turning into competitiveness determinants.

A clear consensus regarding the elements that comprise IC has not been achieved but most scholars refer to three broad dimensions of it: the human capital, the structural capital and the relational capital. The correlations between IC components were investigated by Bontis, who concluded that dependencies range from negative to positive, significant and non-significant (Bontis and Wu, 2005). Moreover, he argues that different IC components may relate to the level of GNP as financial capital, either directly or via other IC components. The combination of human capital and the associated factors surrounding IC dimensions have turned out to be a key source of wealth at both organizational and national levels. There are several relevant questions that researchers in this field are seeking to answer. Some studies concentrate on explaining how do the dynamics of the intangibles work on a national scale? Can the IC of organizations determine the national economic performance? Other parts of literature focus on how national intellectual capital can be optimized and steered to enforce economic growth. The major offset of IC research is the difficulty to operationalize this concept. In order to quantify and assess the contribution of national IC to the competitiveness of a certain country, a set of compelling metrics is required. Since there is a relatively common understanding about the importance of knowledge as a source of economic competitiveness, several IC models have been presented to operationalize its essence, function and benefits (Andriessen, 2004; Edvinsson and Malone, 1997; Steward, 1997). The findings of Bounfour (2005), Edvinsson and Lin (2008) who measured the national intellectual capital (NIC) of the Nordic countries as well as the various studies conducted by Ståhle (2007) stress the same idea that NIC is an economic driver. Some studies concentrate on explaining the dynamics of intangibles at national scale, while other parts of literature concentrate on how national intellectual capital can be optimized and steered to enforce economic growth.

Conceptually, NIC and competitiveness overlap each other to a wide extent. The future of a nation is dependent on the national competitiveness, which is influenced by the national intellectual capital and the capability to extract value from it. The expansion of the global economy redefines the factors that bring competitive advantage for the nations in different circumstances. Competitive advantage is based on both material and immaterial resources. Particularly in developed countries, this advantage is presumed to be partially derived from the national intellectual capital (Teece, 2000; Castells and Himanen, 2002; Ståhle and Grönroos, 2000; Suciu, 2006). In a powerful international competition, the countries with knowledge intensive activities will be the winners in terms of future wealth creation. Intangible assets influence productivity and further, the competitiveness and prosperity of a country. Currently in the literature there is a quest for computing indicators that can assess the value of the output of knowledge-based work. These measures will lead the way

towards improving economic conditions. The approaches of national IC still have significant limits, as the field is in the emerging phase and much of the research is based on theoretical assumptions rather than quantitative analysis.

3. Research methodology

While a consensus regarding a compelling methodology that captures IC status and patterns on a national scale hasn't yet been reached, each study undertakes its own rationale and method depending on the purposes of the analysis. In the attempt to estimate the IC, this paper develops its own methodology. However, the starting point is the framework suggested by Edvinsson and Lin (2008), which decomposes and analyzes the national IC along four dimensions: human capital, market capital, process capital, financial capital and renewal capital. While considering their guidelines, this paper adjusted their approach in a manner that serves the goal of the research. The study replaced some of the indicators with ones that are a better fit with the topic. The most relevant variables indicated by the literature were selected and other ones were added. The study uses 23 indicators, evenly distributed for each type of capital, with one exception (market capital has only 5 indicators). The financial capital (usually captured by a single variable GDP per capita) was on purpose excluded because it isn't relevant for this analysis. The GDP per capita does not capture the underlying base for the competitiveness of nations and much less uncovers any information about the IC traits.

The analysis has two broad parts. In the first section, the 15 most competitive countries in the world (according to the World Economic Forum) are scrutinized in terms of the development stage (most of them in the last phase, innovation-driven), the KEI rankings (Knowledge-economy Index) and the Global Innovation Index rank (Table 1). The reference years are both 2011 and 2009 in order to observe the dynamics of competitiveness of the countries as well as a general outlook on the propensity towards innovation and knowledge. Another pool of 15 states (Table 2) is scrutinized on the same criteria but these countries are in a lower development stage. Comparing the two pools reveals the extent to which the performance of the economies could relatively be determined by IC and points out interesting contrasts between groups of countries. In the second section, 10 out of the 30 countries initially considered are selected (as a mixture from all stages) and each of them is evaluated in terms of human capital, market capital, process capital and renewal capital. The indicators employed to encompass these four dimensions of IC were considered the best choices due to the relevancy for competitiveness and data availability. Appendix 1 contains information about these indicators and their sources. WEF classifies the countries into three stages of development (factor-driven, efficiency-driven and the highest stage, innovation-driven), each with a transition phase towards the next one. The GCI (Global Competitiveness Index) is a benchmark tool that makes it possible to reveal the strength of the competitive advantages of a country against others. The Knowledge Economy Index elaborated by the World Bank is useful in this study as

the ranks indicate the role that ICT, innovation, education and economic incentive regime have in the competitive development. The ranks of the Global Innovation Index give an insight to the extent to which countries rely on innovation as a key driver for economic growth and prosperity. The situation shows that developed countries such as Switzerland and Sweden are highly competitive, innovative and knowledge-driven, but Netherlands, UK and USA also have a strong performance. The second pool (Table 2) reveals a different situation. The implications and findings are discussed in Section 4.

Table 1

Pool 1: Innovation-driven countries ranks

Country	Stage of development	GCI 2011	Global Innovation Index 2011	GCI 2009	KEI 2009
Switzerland	Innovation-driven (3)	1	1	2	10
Sweden		2	2	4	2
Singapore		3	3	5	19
USA		4	7	1	9
Germany		5	12	7	12
Japan		6	20	9	20
Finland		7	5	6	3
Netherlands		8	9	8	4
Denmark		9	6	3	1
Canada		10	8	10	6
Hong Kong		11	4	11	23
UK		12	12	12	7
Taiwan	Transition (2)-(3)	13	n/a	17	18
Norway	Innovation-driven (3)	14	18	15	5
France		15	22	16	22

Source: Data compiled from WEF, INSEAD and World Bank.

A comparison between the two pools gives a first image on the link between the economic performance of states and the spread of IC within their activities. It points severe discrepancies between groups of countries, which will be tackled in the following sections.

Table 2

Pool 2: Mixed stages – Ranks

Country	Stage of development	GCI 2011	Global Innovation Index 2011	GCI 2009	KEI 2009
India	Factor-driven (1)	51	62	50	109
Philippines		85	91	71	89
Pakistan		123	105	101	118
Qatar	Transition (1)-(2)	17	26	26	44
Indonesia		44	100	55	103
Kuwait		35	52	35	52
Morocco		75	94	73	99
Brazil	Efficiency- driven (2)	58	47	64	54
China		27	29	30	81
Mexico		66	81	60	67
Turkey		61	65	63	61
Croatia	Transition (2)-(3)	77	44	61	40
Estonia		33	23	32	21
Poland		39	43	53	37
Hungary		52	25	62	27

Source: Data compiled from WEF, INSEAD and World Bank.

The measurement of national IC requires a system of variables that aim to quantify the invisible wealth of a nation. As stated in the literature review section, researchers with distinct backgrounds have suggested several models to evaluate it. This particular study uses a customized framework and measurement model which encompasses qualitative and quantitative indicators available in the World Bank and IMD databases. World Bank (2002) has developed its own methodology for evaluating knowledge and IC, known as KAM (Knowledge Assessment Methodology). Their framework consists of 69 structural and qualitative variables classified in five different dimensions that capture the correlations between knowledge and economic and institutional regime, population educational level, the existence of efficient innovation systems, dynamic information structure and the overall performance of the economy. On the other hand, IMD has developed a Competitiveness Index including 331 indicators based on which countries are ranked. This study follows the guidelines of Edvinsson and Lin (2008) in their attempt to measure the IC of Nordic countries but it adjusts their model (which mixed the KAM and IMD methodologies). In this study, the national intellectual capital (NIC) of countries is evaluated along these components (measured through sets of indicators), as follows:

- Human capital – comprises competencies and skills of individuals in realizing national goals, often gained as a result of education that involves explicit knowledge (Table 3);

Table 3

Human Capital

Human capital indicators						
Country	Rate of literacy [1]	Pupil-teacher ratio (primary) [2]	Public expenditure on education (% of GDP) [3]	Education attainment (aged 25-64 with tertiary education) [4]	Expenditure per student, secondary education (% of GDP per capita) [5]	Internet usage (% of population) [6]
USA	99.0	14	5.5	38.6	24.7	78.2
Switzerland	99.0	15	5.4	31.0	31.1	80.5
Denmark	99.0	13	7.8	31.5	31.6	85.9
France	99.0	19	5.6	24.1	26.8	69.5
Brazil	88.8	23	4.91	10.0	18	37.4
India	74.0	40*	3.1	7.0	15.7	8.4
China	92.2	17	4.0	4.3	n/a	52
Poland	99.8	10	4.9	18.8	22	58.4
Qatar	89.0	11	2.6	19.3	10.1	66.5
Estonia	99.8	12	5.7	27.5	29.7	75.7

* For India, latest data available for variables [1], [3] and [5] were the years 2005, 2006 and 2006.

- Process capital – fuses non-human national sources of knowledge that are conducive for the creation and dissemination of information (Table 4);

Table 4

Process capital

Process capital indicators (world ranks)						
Country	Capital access [7]	FDI and technology transfer [8]	IP right protection [9]	Government efficiency [10]	Ease of doing business [11]	ICT Development index [12]
USA	4	49	28	19	5	17
Switzerland	24	27	3	3	27	8
Denmark	24	29	6	13	6	4
France	48	43	7	44	26	18
Brazil	98	28	84	55	127	64
India	40	38	68	22	135	116
China	67	80	47	33	79	80
Poland	8	37	61	35	70	38
Qatar	98	2	15	6	50	44
Estonia	16	26	32	20	17	33

- Market capital – joints national capabilities in providing an attractive, entrepreneurial environment for businesses and the level of integration in the global economy (Table 5).

Table 5

Market capital

Market capital indicators (world ranks)					
Country	Join ventures/ strategic alliances deals [13]	E-commerce uptake (extent of business internet use) [14]	Use of talent (brain drain)* [15]	Globalization Index (KOF) [16]	Value chain breadth [17]
USA	27	7	3	27	15
Switzerland	23	15	1	5	4
Denmark	11	17	23	6	8
France	38	21	41	7	6
Brazil	53	25	39	78	60
India	31	54	34	n/a	42
China	36	53	37	73	41
Poland	54	50	79	28	39
Qatar	21	41	2	43	86
Estonia	28	2	57	24	58

*This variable is negatively correlated with IC therefore the scores were computed on the reversed rationale than the other variables.

Renewal capital – captures the impact of knowledge, indicates the nation's future intellectual wealth and the capability for innovation that sustains its competitive advantages (Table 6).

All these dimensions of NIC are equally important therefore their significance in connection with economic development and international competitiveness is further explained. The first type of national capital considered by this study is human capital. The variables which were used to scale it refer to educational attainments (the degree of employee training, the population rate of literacy or at the level of enrollment in institutions of higher education). Human capital is relevant to economic development because it is linked to productivity and efficiency. Productivity is at the core of microeconomic competitiveness and it is the foundation of national prosperity or wealth. Labor is one of the factors that contribute to the overall level of productivity therefore well-educated employees are key assets for firms across all sectors. Highly-productive and competitive industries are those which are supported by properly skilled labor force. Further, the process capital is assessed by using primary business-related indicators but also considering issues such as the government efficiency or intellectual property rights protection. Process capital reflects the sources that facilitate the creation, accessibility and dissemination of information. This component relates to the business infrastructure (ICT development, e-commerce usage) which supports the production and delivery of goods and services. The third dimension of NIC that is scrutinized in this paper refers to the market capital. This particular side can be a driver for attracting FDIs, which had been confirmed as having a strong correlation with economic development. Basically, market capital embeds indicators related to trade performance, to the propensity towards business networking (strategic alliances that entail knowledge flows) and to the degree

of globalization. The purpose of evaluating the market capital is to reveal how countries keep the pace with the international environment and how do they compare in terms of global trends. Although this study uses a limited set of indicators for capture the market capital, the literature also uses indicators such as transparency, openness to foreign culture or even country image. Finally, renewal capital evaluates a nation's ability to foster innovation which is vital for international competitiveness. Innovation entails permanent value addition by creating new products and services and delivering them to the final markets. New technologies and new processes arise through innovation. Due to the fact that renewal capital apprehends the way individuals, companies and public authorities manage tangible and intangible inputs (knowledge) it becomes clear how important innovation is for achieving competitive advantages. Innovation thrives economic upgrading and business sophistication. Fundamental and applied research activities are enhancers of long-term economic growth and development. The indicators that capture it include the R&D spending in the GDP, number of researchers and patents and the spread of creative industries. While the human and renewal capital are long-term national intellectual capital, the market and process capital are perceived as short-term IC.

Table 6

Renewal capital

Renewal capital indicators (mixed)						
Country	Researchers per million inhabitants [18]	Creative goods and services (rank) [19]	R&D spending/ GDP [20]	Patents per million capita [21]	Capacity for innovation (rank) [22]	Trademark intensity (per million) [23]
USA	4,673	18	2.79	800.17	6	810
Switzerland	3,320	11	3.00	224.10	4	1554
Denmark	6,390	3	3.02	303.95	9	755
France	3,690	34	2.21	238.58	8	1126
Brazil	696	20	1.13	20.12	29	510
India	136*	39	0.76	4.79	33	67*
China	1,199	45	1.70	116.10	21	446
Poland	1,598	24	0.68	62.75	50	386
Qatar	n/a	123	0.90	n/a	46	n/a
Estonia	3,210	13	1.42	32.79	34	1064

*Latest data available for [13] and [23] was from 2004 and 2005.

Two types of data are used as inputs in the analysis: the absolute value of the indicators (quantitative) and ranks (qualitative). In order to proxy the IC components and assure a degree of comparability, all data is converted into a score. The algorithm is presented in Appendix 2. For each variable from [1] to [23] a country rank is assigned (based on the performance). In the case of indictors that were already based on ranks, they were re-scaled resulting a hierarchy with 10 places. Then, a score from 1 (best

rank) to 10 (last rank) is provided for each country. The final score for each nation is then used along with its GCI position in order to analyze qualitatively the status.

This component of IC is vital for economic upgrading and international competitiveness. Skilled and creative employees are essential in the innovation process and can be a major source of competitive advantage. Competitive advantage is given by the ability to create and apply intellectual capital based on expertise. The labor force of a nation must have specialized skills (industry-specific knowledge including both tacit and explicit types) and business processes knowledge. In the process of acquiring knowledge, companies are not the only ones responsible for training and education, but also the state. The support and input provided by the government must be sustained in order for such skills to develop and enhanced by private initiatives.

As emphasized above, competitiveness arises at the microeconomic level. For the companies to grow and create value in the economy there must be a certain degree of accessibility to capital. An understanding of technology among the labor force creates the premises for FDI inflows and a smooth technology transfer. Information and communication technology (ICT) is a major enabler of innovation and productivity growth through all the sectors of an economy. Moreover, entrepreneurship plays an important role in reallocating resources to more productive enterprises and creating innovative industry clusters. However, if the overall conditions for doing business are not conducive and proper, the national competitiveness is affected negatively.

The market capital, as part of national IC, focuses on operational aspects related to the activity of firms and organizations in the national economy but also to the interconnectivity with the world economy. Strategic ventures and strong value chains insure the flow of knowledge. Collaboration through the national value chain is essential for building information networks and it is also an excellent way to spark innovation. It is important for the countries to protect their talent and a large brain drain is unfavorable for their national IC. The electronic environment provides enormous opportunities and benefits for businesses across all sectors and industries. A wide spread of e-commerce in the economy of a country usually triggers a high level of efficiency.

Knowledge absorption and innovation are key elements in the relative success of societies and economies. Innovation shapes the citizens of a nation, and their own patterns determine ultimately the performance of firms. The skills of the employees are not static, they require continuous refreshing through life-long learning and training. Fundamental research in science, technology, engineering and mathematics is critical for economic renewal. Global markets are permanently changing therefore shaping new theories but also modeling business processes is a must. Understanding the shifts that are occurring requires significant advances in economics, econometrics, political sciences and other social sciences. Deepening and broadening the research creates the base for future new competitive advantages or for upgrading the existent ones.

4. Findings and discussion

The countries in the highest stage of development also rank high at innovation and competitiveness, which suggests that it is a positive correlation between these three

variables. The countries in lower stages of development have a weak competitiveness position, which means they are not able to find reliable sources of competitive advantage. Moreover, their innovation patterns show a diminished potential for creating added value through developing new products and services. The results tend to be mixed. Some of the indicators are part of the sub-indexes and pillars of GCI therefore they already correlated with the competitiveness results. A generalization for the pool of 10 countries is not scientifically appropriate, however, in most cases a high IC score can be matched with an upscale competitiveness rank. Estonia appears to be an exception by far. While this country is in the transition stage from the investment-driven economic development stage to the innovation-driven stage, it ranks 33^{ed} in the world hierarchy but it has a very solid intellectual capital. Its IC score is between the one of France and USA. These two countries are the 4th and the 15th most competitive according to GCI. In this case, other micro and macroeconomic factors weight more than its strong IC and determines a lower competitiveness rank. It is beyond this study to find the explanations to this particular issue.

The country with the highest IC score is Denmark, followed by Switzerland and USA. All of them are in the innovation-driven development stage and are among the top 10 most competitive nations in the world. Switzerland was ranked the 1st in the GCI report. Moreover, Denmark is the most knowledge-based economy in the world. To what extent the IC influences their current competitiveness position is hard to estimate. However, these three countries are leaders in terms of innovation, education and science, which are embedded in the intellectual capital of any nation. These countries score very high on all components of the national IC (described in Section 3). The weakest results are obtained by India, Brazil and China. India is still a factor-driven country but it is more competitive than Brazil, which is the upper, efficiency-driven stage. India has the worst performance in terms of competitiveness. When analyzing its IC, the human capital and the renewal capital appear to be major issues. Poland and Qatar show an average IC. While Poland scores higher than Qatar on IC, the situation is reversed in the competitiveness hierarchy. Qatar is the 17th most competitive country and Poland is the 39th. This situation could be explained by the fact that Poland is in a transitional phase heading to the innovation-driven status while Qatar is heading towards a stage that Poland left behind (efficiency-driven). The spread of knowledge-economy according to KEI is average. Poland's strength is the human capital but the process and market capital are overcastting the total IC score. On the other hand, Qatar doesn't appear to be strong in terms of renewal capital. It should be mentioned that due to data unavailability, Qatar's total score was affected.

The results of the study confirm that economic development cannot be achieved without upgrading the human factors. Reaching the last stage of development is what many countries around the world seek for today. As for the well-developed countries, their goal is to maintain and renew their competitive advantages. Competitiveness can be improved in both cases. Productivity is a central pillar of competitiveness and it implies efficient use of physical and intangible resources. Efficiency means choosing the right input and it often entails skills and ideas, which are part of IC therefore it can improve the wealth of nations. Development and competitiveness arise due to a fine

mixture between skills of people, institutions that sustain a healthy innovative environment and proper legislation that supports entrepreneurship. Internationally successful industries with high productivity are those that in which human and structural capital interact in a synergic way. In the global economy, IC research has the potential to make an important contribution to understanding new facets of competitiveness. While countries have a wide array of economic development options (cluster-based, technology-based, polycentrism), regional development can be a reliable solution for certain economies, especially in Europe. Those who choose the path of territorial development and spatial cohesion need to develop regional map of knowledge assets and IC in order to locate where wealth is created in a given region or country. Knowledge channels are particularly important for cluster development and dense knowledge networks through the entire economy enhance the competitive advantages.

5. Conclusions

As countries move towards higher stages of development, they gradually learn how to make a better use of their IC and how to employ it in the process of value creation. Competitiveness drives prosperity and a high living standard for the citizens. Prosperity arises from designing valuable products and services and it is unlimited because the creativity of companies is infinite. Knowledge gives a country the opportunity to improve its wealth. The value of this study arises from shading more light on the connections between the intellectual capital status of the countries and their competitiveness. As it investigates the patterns of IC through its main components, the paper reveals the multidimensional concept of competitiveness and it takes a turn from the traditional perspectives of it in the literature. The productivity of input factors is considered to be the most important driver for competitiveness. The current paradigm oversights the role that knowledge productivity has in what concerns economic progress. Multiple benefits arise from discovering how to measure and boost it. All countries are turning into knowledge economies, some faster and others lag behind. While the gap most likely will never be closed, the process of knowledge creation strengthens the liaisons between countries. Incremental innovation can help the global economy to prosper and thrive. If we accept as true that knowledge productivity is one of the main sources of competitive advantage, then the biggest challenge in the knowledge economy is to find ways to foster IC. To be successful in the global economy, organizations have to continuously improve their processes, products and services, and radically renew from time to time. In these circumstances, a new direction for further research would be precisely knowledge productivity. One path could be to test these supposed relationships between conditions and results, between knowledge productivity and organizational performance. There is also a plethora of research questions that haven't been answered yet. Adding a time dimension to this notion could be another investigation direction. Could knowing the current situation of national IC help predict the economic evolution of a country? The development of reliable methodologies for identifying, measuring national IC and estimating its impact on the economic performance will shape further advancements in the development field.

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Appendix 1

Data sources

Indicator	Data sources
[1]	World Factbook CIA, 2010 https://www.cia.gov/library/publications/the-world-factbook/
[2]	World Bank, 2009 http://data.worldbank.org/indicator
[3]	World Factbook CIA, 2010 https://www.cia.gov/library/publications/the-world-factbook/
[4]	UNESCO, 2010 http://stats.uis.unesco.org/unesco
[5]	World Bank, 2008/2009 http://data.worldbank.org/indicator
[6]	Internet World Statistics, 2011 http://www.internetworldstats.com
[7]	Ease of Doing Business Index 2011, 183 economies. http://www.doingbusiness.org/rankings
[8]	Global Competitiveness Report, WEF, 2010-2011, 140 economies. http://www.weforum.org/issues/global-competitiveness
[9]	Idem [8]
[10]	World Competitiveness Yearbook, IMD, 2011, 59 economies http://www.imd.org/research/publications/wcy
[11]	Idem [7]
[12]	Measuring the Information Society 2010, 159 economies http://www.itu.int/ITU-D/ict/publications/idi/2010/index.html
13	(Thomson Reuters data) One Bank Private Equity; ranks 1-73 http://www.globalinnovationindex.org
14	The Global Information Technology Report 2010-2011, WEF Part of the Networked Readiness Index (index 8.03), 138 economies. http://www3.weforum.org/docs/WEF_GITR_Report_2011.pdf
15	Idem [8]
16	KOF, 2010, 191 economies. http://globalization.kof.ethz.ch/
17	Idem [8] (index 11.06)
18	UNESCO, 2008/2009 http://stats.uis.unesco.org/unesco/ReportFolders
19	Global Innovation Index 2011, INSEAD, 125 economies. http://www.globalinnovationindex.org
20	Idem [18]
21	World Intellectual Property Indicators 2011, WIPO http://www.wipo.int/ipstats/en/statistics/patents/
22	Idem [8]
23	Idem [21]

Appendix 2

Re-scaled country ranks and scores

Variable	USA		Switzerland		Denmark		France		Brazil		India		China		Poland		Qatar		Estonia	
	Score /Rank		Score/ Rank		Score/ Rank		Score/ Rank		Score/ Rank		Score/ Rank		Score/ Rank		Score/ Rank		Score/ Rank		Score/ Rank	
1*	9	2	9	2	9	2	9	2	6	5	5	6	8	3	10	1	7	4	10	1
2	6	5	5	6	7	4	3	8	2	9	1	10	4	7	1	1	9	2	8	3
3	7	4	6	5	10	1	8	3	5	6	1	10	3	8	4	7	2	9	9	2
4	10	1	8	3	9	2	6	5	3	8	2	9	1	10	4	7	5	6	7	4
5**	6	5	9	2	10	1	7	4	4	7	3	8	n/a**		5	6	2	9	8	3
6	8	3	9	2	10	1	6	5	2	9	1	10	3	8	4	7	5	6	7	4
7 ***	10	1	7	4	7	4	5	6	3	8	6	5	4	7	9	2	3	8	8	3
8	2	9	8	3	6	5	3	8	7	4	4	7	1	10	5	6	10	1	9	2
9	6	5	10	1	9	2	8	3	1	10	2	9	4	7	3	8	7	4	5	6
10	7	4	10	1	8	3	2	9	1	10	5	6	4	7	3	8	9	2	6	5
11	10	1	6	5	9	2	7	4	2	9	1	10	3	8	4	7	5	6	8	3
12	8	3	9	2	10	1	7	4	3	8	1	10	2	9	5	6	4	7	6	5
13	7	4	8	3	10	1	3	8	2	9	5	6	4	7	1	10	9	2	6	5
14	9	2	8	3	7	4	6	5	5	6	1	10	2	9	3	8	4	7	10	1
15**	3	8	1	10	4	7	8	3	7	4	5	6	6	5	10	1	2	9	9	2
16	6	5	10	1	9	2	8	3	2	9	n/a		3	8	5	6	4	7	7	4
17	7	4	10	1	8	3	9	2	2	9	4	7	5	6	6	5	1	10	3	8
18	9	2	7	4	10	1	8	3	3	8	2	9	4	7	5	6	n/a		6	5
19	7	4	9	2	10	1	4	7	6	5	3	8	2	9	5	6	1	10	8	3
20	8	3	9	2	10	1	7	4	4	7	2	9	6	5	1	10	3	8	5	6
21	10	1	7	4	9	2	8	3	3	8	2	9	6	5	5	6	n/a		4	7
22	9	2	10	1	7	4	8	3	5	6	4	7	6	5	1	10	2	9	3	8
23	7	4	10	1	6	5	9	2	5	6	2	9	4	7	3	8	n/a		8	3
Total	171		185		194		150		83		65		85		111		94		160	

*Several countries had the same absolute value for the indicator therefore they received the same rank and same score.

**When data was unable for a certain variable in the case of a country, it was excluded from the hierarchy.

***For the countries with the same ranks in the statistic data, the new scale attributed the same score and same new rank.