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The impact of intellectual and social capital on the competitiveness of Polish regions

Abstract. This article looks at competitiveness from a regional perspective (NUTS-2). After the establishment of indicators for regional competitiveness in Poland, social and intellectual capital, the relations among the three were analysed for the 16 Polish regions using 2SLS. GDP per head is positively affected by the level of competitiveness. It was found that an increase in competitiveness by 1% increased the GDP per head by 0.53%.The analysis done here showed that there was not a significant correlation between the presence of social capital and regional competitiveness. However, intellectual capital had a highly significant impact on competitiveness: an increase in intellectual capital by 1% would increase competitiveness by 0.47%.

Key words: Regional Competitiveness, Polish Regions, Social Capital, Intellectual Capital

Introduction

Competitiveness has an immense impact on regional development and growth. It is: "*a way of discussing the relative performance of economies in a benchmarking sense. It can help identify areas of the economy that are lagging behind but not the reason for those lags*" [Dunning et al. 1998]. Competitiveness is affected and described by many different factors. Social and intellectual capital are two forms of capital to which much attention has been paid in recent literature on economic development. Social capital is commonly considered a fourth form of capital, along with financial, human and physical ones. Just as the other forms, it is an important determinant of prosperity and its purpose is to make productive activity possible [Coleman 1988]. Although the definition of social capital has remained elusive and ambiguous, this notion is also considered an important factor in explaining economic success. Hanifan defined it as: "*those tangible substances that count for most in the daily lives of people: namely good will, fellowship, sympathy, and social intercourse among the individuals and families who make up a social unit*" [Hanifan 1916]. Social capital is the opposite of physical capital, which comprises land, buildings and all other forms of privately or publicly-owned physical capital. Much of the general literature concerning social capital is focused on using it to build human capital, in the sense of developing strong communities. However, in recent years, research has grown around social capital building for community development [Servan 1997] and for economic development. Relationships among individuals, norms and trust all help facilitate coordination and cooperation that enhance productivity [Routledge and von Amsberg,

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2002]. Putnam et al. [1993] emphasise that traditions of civic engagement, voter turnout, active community group and other manifestations of social capital are necessary for both good government and economic and financial development. Undoubtedly, in an economy based on information and knowledge, intangible assets have gained in importance and have become perceived as the undeveloped source of future success and a key determinant of growth. The key factor of success and foundation of competitive advantage is knowledge [Bradley 1997; Bontis 2004; Daley 2001; Edvinsson 2002; Edvinsson and Stenfelt 1999; Malhotra 2000; Pasher 1999] and that is why the theory of intellectual capital attracts so much attention. Intellectual capital (IC) is understood as a multidimensional concept that is reflected in a variety of definitions, different components and features. One of the widely used definitions explains it as the difference between the market value and the book value of the firm [Brooking 1997; Daley 2001; Pasher 1999; Petrash 1996]. According to Bontis [2004] IC is *"hidden values of individuals, enterprises, institutions, communities and regions that are the current and potential sources of value creation"*, whereas Andriessen and Stam [2005] define it as *"all intangible resources available to a country or a region, that give relative advantage, and which in combination are able to produce future benefits"*. In the economy of knowledge, values created by countries, regions, organizations and individuals are directly connected to their knowledge and intellectual capital [Edvinson 2002]. The key point is to show that intangible factors create value and determine growth and competitiveness. This paper is structured as follows: First, theoretical approaches on the relation of social and intellectual capital and competitiveness are discussed. In the next part data and method of the empirical part is presented, then the results of the impact of social and intellectual capital on the competitiveness of 16 Polish regions are revealed. Finally, the conclusion and discussion are included.

Social and intellectual capital in relation to competitiveness

Social capital has attracted much attention from scholars and practitioners. The phenomenon of social capital is a very popular concept covering both economic and social dimensions, widely used in multidisciplinary research. It is considered an important factor in explaining economic success and development. There are many different approaches and definitions attached to the concept of social capital. However, there is some consensus within the social and economic sciences towards a definition that emphasizes the role of networks and civic norms. Social capital is generally understood as the property of the group rather than the property of the individual. The key indicators of social capital include social relations, formal and informal social networks, group membership, trust and civic engagement. Social capital emerges in numerous manners. This notion is defined and explained in various ways, depending on the context and application of the concept, so it is difficult to conceptualize this phenomenon precisely. A number of academics and researchers emphasize the increasing role of social capital in relation to many different human areas including economic development. However, it was the work by Robert Putnam [et al.1993; 2000] that launched social capital as a popular form for research and policy discussion. According to Beekman [2008] social capital *"can be recognized by social interactions and their by-products: trust relations, reciprocity and exchanges, common rules and norms, and networks and groups."* The OECD defines social capital as "networks together with shared norms, values and understandings that facilitate cooperation

within or among groups" [cited in Cote and Healy 2001], whereas The World Bank [1998] provides a more extensive explanation of this term and suggests that *"social capital refers to the institutions, relationships and norms that shape the quality and quantity of society's social interactions" and emphasizes that "social capital is not just the sum of the institutions which underpin a society – it is the glue that holds them together."* The definition created by The World Bank is similar to the most commonly used definition that originates from Putnam et al.[1995]. Putnam [2000] also argues that social capital *"has forceful, even quantifiable effects on features of social life – networks, norms, and trust – that enable participants to act together more effectively to pursue shared objectives. Social capital, in short refers to social connections and the attendant norms and trust"*. Social capital relates to many different aspects of our lives, which include diverse dimensions such as better health [Wilkinson 1996], lower crime rates [Putnam 2000], improvement in education [Coleman 1988], greater levels of income equality [Wilkinson 1996], less corrupt and more effective government [Putnam et al. 1995], better economic achievement and lower transaction costs [Fukuyama 1995]. Coleman [1990] points out that *"social capital is defined by its function, it is not a single entity, but a variety of different entities having characteristics in common: they all consist of some aspect of a social structure, and they facilitate certain actions of individuals who are within the structure."* Social capital generates many advantages. Woolcock [2001] notices that *"one of the primary benefits of the idea of social capital is that it is allowing scholars, policy makers and practitioners from different disciplines to enjoy an unprecedented level of cooperation and dialogue."* Much of the general literature concerning social capital is focused on using it to build human capital, in the sense of developing strong communities. However, in recent years, research has grown around social capital building for community development [Servan 1997] and for economic development [Grisham 1999; Flora 1998 and Flora et al., 1997]. Relationships among individuals, norms and trust all help facilitate coordination and cooperation that enhance productivity [Routledge and von Amsberg 2002]. Flora et al. [1997] call the social capital necessary for successful economic development in the entrepreneurial social infrastructure. They assert that cooperation, not competition is more likely to foster economic activity. Putnam et al. [1993] emphasize that traditions of civic engagement, voter turnout, active community group and other manifestations of social capital are necessary for both good government and economic and financial development. However, the connection between economic prosperity and social capital is not always clear. Definitely, social capital is a multidimensional and dynamic concept and that is why it can be described in numerous ways. Dasgupta [2002] argues that social capital should not be defined only in terms of the presence of cooperation or some other outcome. It should rather be directly regarded as social structure, because social capital is an aspect of human capital; it is also a component of what economists call total factor productivity. Ostrom [2000] points out that social capital is the shared knowledge, understanding, norms, rules and expectations about patterns of integration that groups of individuals bring to a recurrent activity. Undoubtedly, one of the greatest weaknesses of the term of social capital is the absence of common agreement of how to measure it. This notion is usually depicted by such categories as trust, associational activity, groups, networks and knowledge. Social capital measures are also indicated as educational achievements and family structures [Peterson et al., 1999]. Furthermore, non-governmental organizations are considered a key factor in building social capital. Social capital is always desirable, since its presence is equated with beneficial consequences. It measures the degree to which a community can

cooperate to achieve desired results [Buckland 1998]. Educational institutions do not simply transmit human capital; they also pass on social capital in the form of social rules and norms [Fukuyama 1999]. Over the past few years there has been increasing focus on the issue called knowledge paradigm. In the economy based on information and knowledge, these intangible assets have gained in importance and have become perceived as the undeveloped source of future success and a key determinant of development and competitiveness. The concept of intellectual capital is a new way of thinking about new forms of economic value. Knowledge is considered the key factor of success and foundation of competitive advantage [Bradley 1997a, 1997b; Bontis 2002, 2004; Daley 2001; Edvinsson 2002; Edvinsson and Stenfelt 1999; Malhotra 2000; Pasher 1999]. Knowledge is perceived as the basis of intellectual capital, the crucial factor of competitiveness and widely comprehended development. According to Bontis [2004] intellectual capital is defined as: *"hidden values of individuals, enterprises, institutions, communities and regions that are the current and potential sources of value creation"* whereas, Andriessen and Stam [2005] describe it as *"all intangible resources available to a country or a region, that give relative advantage, and which in combination are able to produce future benefits"*. In the economy of knowledge, values created by countries, regions, organizations and individuals are directly connected to their knowledge and intellectual capital [Edvinsson 2002]. But the key point is to show that the intangible factors create value and determine the growth and competitiveness. Although in the literature the notion of intellectual capital is not used in precisely the same way and there is not one interpretation, a significant number of researchers and practitioners have focused on key factors to be regarded as components of intellectual capital. Undoubtedly, intellectual capital is perceived as a dynamic and qualitative category. Different kinds of approaches to intellectual capital have been developed. Nevertheless, one of the widely used is the typology created by Bontis [2002; 2004]. He singled out three main components of intellectual capital: human capital, structural capital and relational capital. Each of the distinguished components contains a series of assets that are measured by means of a series of indicators. Human capital represents anything related to the people and comprises variables concerning the potential of people, such as their educational background, life experience, attitudes, skills and tacit knowledge. Structural capital encompasses both the organizational framework and the tangible elements of social and technical infrastructure designed to ensure a high quality of life. And lastly, the relational capital illustrates the potential related to the external image, cooperation, attractiveness and networks.

Data and method

This part of the article aims at evaluating Poland's regional performance of competitiveness, social and intellectual capital. In order to present the position of 16 Polish voivodships, which correspond to the EU NUTS II level, we employed the following research approach: We selected a list of variables that potentially might have influence on the phenomenon of competitiveness, social and intellectual capital. Furthermore, we carried out the principal component analysis (PCA). For competitiveness the variables are listed in Table 1, as are additional variables such as activity rate (share of people that are economically active), employment rate, innovation rate and three variables that relate to the unemployment rate (total, registered, age/sex subcategory). For social capital the variables

and the voting turnout are listed in Table 2; for intellectual capital the variables and additional variables regarding the exam results for the grammar school and other forms of secondary education are listed in Table 3. The usual criteria in PCA were applied: Eigen value larger than one, loadings on components eventually larger than 0.8, and theoretically sound labelling at least the main component. The final result for competitiveness is given in Table 1, for social capital in Table 2 and for intellectual capital in Table 3. The nine variables listed in Table 1 have high loadings (weights) on the component that can be clearly labelled as competitiveness, three variables listed in Table 2 can be understood as social capital and fourteen variables in Table 3 can be considered intellectual capital. In our model GDP per capita is positively affected by competitiveness, while competitiveness is positively affected by social and intellectual capital. The test of this model calls for a 2SLS procedure in which competitiveness is the predictor variable and social and intellectual capital are instrumental variables.

Table 1. Competitiveness

Variable	Factor loading
Entities entered in the National Official Business Register (NOBR) per 10 thousand population	.926
Entities unregistered form the NOBR register per 10 thousand population	.825
Investment outlays in enterprises by PKD 2007	.859
Investment outlays per capita (total)	.718
Investment outlays in private sector per capita	.721
Natural persons conducting economic activity per 100 persons of working age	.878
New entities of the national economy recorded in the NOBR register per 10 thousand population	.881
Structure of employed persons by economic sector (in services sector)	.867
Average monthly gross wages and salary in relation to the average domestic (Poland=100)	.831

*Explained variance 71 per cent.

Source: Own calculations.

Table 2. Social Capital

Variable	Factor loading
Foundations, associations and social organizations per 10 thousand population	.915
Number of organizations per 10 thousand population (Foundations)	.960
Number of organizations per 10 thousand population (Social organizations and associations)	.835

*Explained variance 82 per cent.

Source: Own calculations.

Table 3. Intellectual Capital

Variable	Factor loading
Academic teachers per 10 thousand population	.979
Employment in R&D (Employed persons per 1000 economically active persons)	.944
Employment in R&D (Share of employed in R&D in economically active population)	.895
Expenditures on R&D (Share of entities incurring expenditure on R&D in the total number of entities)	.904
Graduates per 10 thousand population (social and behavioural science)	.894
Higher school students per 10 thousand population	.865
Lifelong learning of persons aged 25-64 (share)	.905
Professors per 10 thousand population	.930
Protection of industrial property in Poland (utility model applications) per 100 thousand population	.885
Protection of industrial property in Poland (rights of protection granted) per 100 thousand population	.978
Share of children covered by preschool education	.829
Students of doctoral studies per 10 thousand population	.864
The share of population (15-64) by level of education in the total population at this age (tertiary)	.978
The share of population (15-64) by level of education in the total population at this age (general secondary)	.878

*Explained variance 82 per cent.

Source: Own calculations.

The data used in our research come from the Polish Central Statistical Office from the year 2011 or 2010. For the construction of the competitiveness, social and intellectual capital indexes we used the method of relative distance comparison. All distinguished variables used in the analysis were divided, according to their impact on the phenomenon examined, into two groups i.e. stimulants-variables affecting in a positive way and destimulants-variables affecting in a negative way. For stimulants we applied normalization expressed by the formula (1) and for one destimulant - Entities unregistered form the NOBR register per 10 thousand population-the one by formula (2). It allowed for achieving all variables in the range of 0-100 points, which undoubtedly facilitated the positioning of the 16 regions.

$$H_{ij} = \frac{100\,(x_{ij} - x_{i\,\min})}{x_{i\,\max} - x_{i\,\min}} \tag{1}$$

$$H_{ij} = \frac{100\,(x_{i\,\max} - x_{ij})}{x_{i\,\max} - x_{i\,\min}} \tag{2}$$

where: x_{ij} – empirical value of i-th variable w j -th region,
$x_{i\,\min}$ – the lowest among the regions value i –th variable,
$x_{i\,\max}$ – the highest among the regions i –th variable.

Results

In the analysis of performance of regional competitiveness, the highest scores were achieved in the Mazowieckie region. In the top of the ranking we could find Pomorskie and Dolnoślaskie (tab. 4). These are regions that have the ability to attract skilled, creative and innovative people, to provide high quality cultural facilities, and to encourage the development of social networks and institutional arrangements that share a common commitment to regional prosperity. These are also regions that have the highest density of firms, the most knowledge-intensive firms and the highest level of economic participation. In these regions new firms stimulate competitiveness via market selection and competitive pressures, by forcing less efficient incumbents to exit or to improve their productivity. In this way, both the creation and destruction of firms may improve competitiveness. The more middle-ranked regions show more fluidity in their rankings. The most economically disadvantaged regions in Poland were Lubelskie, Świętokrzyskie and Podkarpackie. The poor economic performance of these regions can be caused by the predominance of agriculture in the regional economy. The problem of these regions is the absence of a basis innovative capacity in business. That is why more emphasis should be put on mobile investment and on creating environments where high-quality business can start and succeed [Turok 2004].

Table 4 Index of Competitiveness of Polish regions

Region	Index of Competitiveness	Rank
Mazowieckie	85,63	1
Pomorskie	59,80	2
Dolnośląskie	58,84	3
Zachodniopomorskie	53,42	4
Lubuskie	52,13	5
Wielkopolskie	48,90	6
Śląskie	47,23	7
Łódzkie	42,00	8
Małopolskie	41,76	9
Kujawsko-Pomorskie	32,42	10
Opolskie	27,17	11
Warmińsko-Mazurskie	25,61	12
Podlaskie	23,77	13
Podkarpackie	23,56	14
Świętokrzyskie	20,07	15
Lubelskie	18,83	16

Source: Own calculations.

The standard measure of regional success is GDP per capita. In recent years, the Polish regions have experienced rapid economic growth. However, this increase is not evenly distributed. In 2009, as in previous years, the share of regions in GDP was much differentiated. Four voivodeships i.e. Mazowieckie, Wielkopolskie, Sląskie and

Podkarpackie increased the share in GDP; simultaneously the value of GDP produced in Mazowieckie was almost 10 times higher than in Opolskie. At the same time two regions i.e., Mazowieckie and Śląskie, produced 35% of the total national gross domestic product.

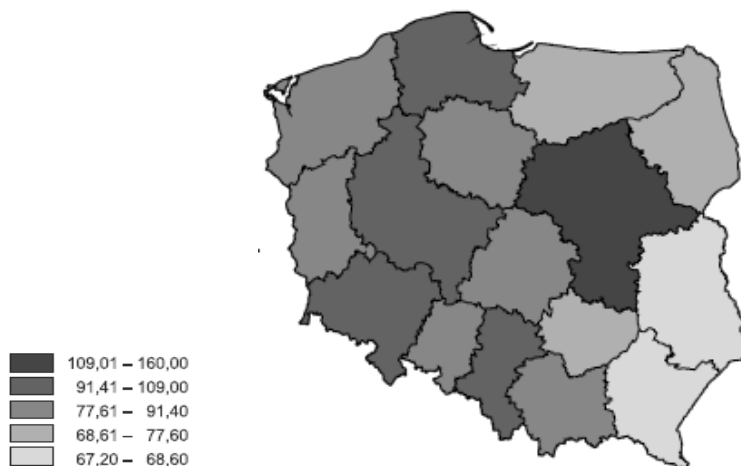|	
■	109,01 – 160,00
▨	91,41 – 109,00
▨	77,61 – 91,40
▨	68,61 – 77,60
▢	67,20 – 68,60

Fig. 1. GDP per capita in Polish regions in 2009 (Poland=100)

Source: Own calculations on the basis on data CSO, 2009.

In the analysis of performance of social capital (Table 5) the highest score was achieved in Mazowieckie region. Therefore, it is possible that the regional prosperity and competitiveness create or foster regional social capital. The presence of a high level of social capital facilitates mutually beneficial collective actions that foster prosperity of that region. On the other hand, in the top of the ranking were also Warmińsko-Mazurskie and Lubelskie voivodeships. These are less developed regions and a high level of the social capital can, at least theoretically, contribute to reduce regional disparities. In the analysis of the performance of the intellectual capital (Table 6) the highest score was achieved in Mazowieckie region. In the top of the ranking we find Malopolskie, Dolnośląskie, Pomorskie and Wielkopolskie. The middle-ranked regions are Śląskie, Lodzkie and Opolskie. Lastly, the lowest positions were taken by Lubuskie, Warmińsko-Mazurskie and Swietokrzyskie. Undoubtedly, the absolute leader is Mazowieckie, the capital region where economic concentration goes together with the political centre of the country. Mazowieckie owes its high position to its very dynamic growth, both economically and socially. Combining the index of intellectual capital with the competitiveness performance shows a positive relationship between intellectual capital and competitiveness. Regions which achieved high scores in the index of intellectual capital also have a high classification in the index concerning regional competitiveness.

Table 5. Index of social capital

Region	Index of Social capital	Rank
Mazowieckie	82.98	1
Warmińsko-Mazurskie	55.10	2
Lubelskie	54.71	3
Wielkopolskie	54.18	4
Podkarpackie	50.43	5
Małopolskie	50.05	6
Dolnośląskie	47.86	7
Pomorskie	42.03	8
Opolskie	40.25	9
Łódzkie	38.92	10
Lubuskie	38.89	11
Podlaskie	38.14	12
Zachodniopomorskie	36.95	13
Świętokrzyskie	32.58	14
Kujawsko-Pomorskie	32.39	15
Śląskie	4.38	16

Source: Own calculations.

Table 6. Index of Intellectual capital

Region	Index of Intellectual Capital	Rank
Mazowieckie	82,82	1
Małopolskie	62,52	2
Dolnośląskie	50,88	3
Pomorskie	44,99	4
Wielkopolskie	43,88	5
Śląskie	42,17	6
Łódzkie	41,17	7
Opolskie	35,26	8
Lubelskie	34,93	9
Podlaskie	32,29	10
Zachodniopomorskie	31,09	11
Kujawsko-Pomorskie	28,44	12
Podkarpackie	23,18	13
Świętokrzyskie	19,37	14
Warmińsko-Mazurskie	17,63	15
Lubuskie	12,05	16

Source: Own calculations.

An inspection of the correlations between competitiveness (*COMP)*, GDP per capita (*GDP*), social (*Socc*) and intellectual capital (Intelc) shows that all four are highly correlated. However this holds the least for social capital.

In our model GDP per capita is positively affected by competitiveness, while competitiveness is positively affected by social and intellectual capital. The test of this model calls for a 2SLS in which competitiveness is the predictor variable and social and intellectual capital are instrumental variables. Before doing so, we did an OLS-estimation to check whether social and intellectual capital both are to be taken as instrumental values in the 2SLS-equation, see equation (3). From this equation we can conclude that the impact of social capital on competitiveness is not significant. Hence we excluded social capital as an instrumental value.

$$COMP = 23,377 + 13.04 Soc + 73.47 Intelc \qquad (3)$$

with t-values for the constant and coefficients of 12.16,0 .551 and 5.070 respectively (adj R^2=0.79).

Equation (4) gives the loglinear specification that allows computation of the competitiveness- intellectual capital elasticity.

$$Ln(COMP) = 2.46 + 0.47 Ln(Intelc) \qquad (4)$$

with t-values for the constant and coefficients of 7.80 and 6.62 respectively (adj R^2=0.74).

Equation (5) gives the 2SLS-estimation, Competitiveness is the predictor variable and intellectual capital the instrumental variable.

$$GPD = 17,257 + 148.79 COMP \qquad (5)$$

with t-values for the constant and coefficient of 7.73 and 7.34 respectively (adj R^2=0.78).

Equation (6) gives the loglinear specification that allows computation of the elasticity.

$$Ln(GPD) = 7.96 + 0.53 Ln(COMP) \qquad (6)$$

with t-values for the constant and coefficient of 16.07 and 4.83 respectively (adj R^2=0.60).

Increasing competitiveness by 1% increases the GDP per head by 0.53%.

Conclusions

In the world of performance of indicators and rankings, it is apparent that regions are compared with one another in terms of their economic position. This article looked at competitiveness from a regional perspective (NUTS-2) and has attempted to conceptualise regional competitiveness for Poland, and also to investigate the relationship between social and intellectual capital and competitiveness for the 16 Polish regions. Our 2SLS- analysis shows that GDP per head is positively affected by competitiveness, intellectual capital being the instrumental variable. Furthermore that competitiveness is positively affected by

intellectual capital. The analysis done here proved that there is not a significant relationship between the presence of social capital and regional competitiveness. Increasing competitiveness by 1% increases the GDP per head by 0.53%., according to the 2SLS equation and, according to the OLS equation, an increase of intellectual capital by 1% leads to an increase of competitiveness by 0.47%. Though there is no significant relationship between competitiveness and social capital, social economic researchers dealing with issues of social capital emphasize the importance of this kind of capital for the integration of society. A high level of social participation can also be understood as a compensation for market failure and the welfare state [Sałustowicz 2007]. The development of scientific research, technological progress and innovation are crucial to attain high competitiveness. Knowledge and its quality, scientific research, technological progress, quantity and quality of human capital are considered crucial factors for economic growth and a high quality of life. Although the ability of regions to adapt to fundamental changes in the economic environment rests on a range of issues including their socio-economic structure, level of initial development and proximity to capital and innovation, as well as the way in which they are affected by national policy decisions [Gorzelak 2000], it is widely recognized that the development of regional competitiveness depends mainly on endogenous factors. In this respect we can expect that intellectual capital will be perceived as one of the most important factors for economic growth. In a globalised and strongly competitive world, only regions with the ability to attract and to keep intellectual capital can win [Florida 2012].

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