

## THE ROLE OF INTELLECTUAL CAPITAL IN THE DEVELOPMENT OF THE LUBELSKIE REGION

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### **Abstract:**

Lubelskie voivodeship belongs to the low-urbanized areas, less industrialized, with a large share of the agricultural sector, with an undercapitalized and less developed infrastructure in the past, which was also associated with its peripheral location. As a result, it is the region (NUTS 2 level) with a lower level of economic development in Poland and the EU (in 2007-2013 was qualified for the Convergence objective, while for the period 2014-2020 to less-developed areas, supported by the EU cohesion policy). The analysis covers the main part of intellectual capital, namely: human, social, structural and relational capital. Characteristics of their key components and variables can evaluate the level of intellectual capital of the region and its impact on stimulating its development. The abstract has been presented and published at the MakeLearn&TIIM 2015 International Conference.

*Keywords: intellectual capital, human capital, social capital, structural capital, relational capital, regional development, cohesion policy*

# 1. THE CONCEPTS OF INTELLECTUAL CAPITAL OF THE REGION

The concept of intellectual capital (IC) is derived from the analysis of the economic efficiency of enterprises. In recent years more and more popular in the world and in Poland is the use of the theory of intellectual capital in relation to the competitiveness of countries, regions and cities. But you cannot agree with the statement eg. Andriessen and Stam (2004), that there is a simple transfer of the theory of micro scale to the macro scale. The region is a more complex system than the company; therefore it has other development objectives, actors and policies implementing them. As a result, research and measurement of intellectual capital of the region requires consideration of other components and other weight distribution.

Significant impact of human capital on economic growth confirmed by studies G.Mankiw, D.Romer and D.N.Weil (1992). Their results showed that the level of education has an impact on the differences in GDP per capita between countries. Similarly R.J.Barro (2001) shows that an increase in the level of education is associated with increased future growth rates. Interdependence of human capital and economic growth, among others, studied D.H.C.Chen and C.J.Dahlman (2004), R.J.Barro and X.Sala-i-Martin, A.de la Fuente, M.Herbst (2007). Relationship of human capital and economic growth, among others, have studied D.H.C.Chen and C.J.Dahlman (2004), A.de la Fuente (2002) and M.Herbst (2007).

The pioneers of research on the intellectual capital of the country and the region are, among others: D.Amidon, Y.Malhotra (2000), Andriessen and Stam (2004) or N.Bontis (2004). According to N.Bontis, the intellectual capital of the country includes a *hidden value of the country's citizens, businesses, institutions, communities and regions that are current and potential sources of wealth generation. These hidden values are the basis for improving the social welfare of the future.* Referring to the definition, Y.Malhotry and N.Bontisa Team of Strategic Advisors for the Polish Prime Minister define IC as *general intangible assets of people, businesses, communities, regions and institutions, which are respectively used, which can be a source of current and future welfare of the country,* (Polish intellectual capital, 2008, p. 6).

**Table 1:** Conceptual overview of measurement and components of intellectual capital of the country or region

The Authors	The concept of measuring	The components of intellectual capital
Y.Malhotra	Skandia Model	human capital, market capital, process capital, renewal & development capital
N.Bontis	National Intellectual Capital Index	human capital, process capital, market capital, development capital
Andriessen and Stam	Intellectual Capital Monitor	human capital, structural capital, relational capital
Lerro, Carlucci, Schiuma	Knoware Tree	Wetware, Hardware, Software, Netware
A.Wodecki	The methods of fuzzy sets and structural equation modeling	individual capital, social capital, structural capital, relational capital

Source: Own

Difficulties in measuring intellectual capital of the region due to the multi-level and multi-dimensionality of the concept. Multidimensionality of the IC is connected with the horizontal structure and manifests itself in the form of various components, which in turn can be described by a number of specific categories and variables. Multi-level is taken into account in the process of generating the intellectual capital of the region with the contribution of different actors, (Rószkiewicz&Węziak&Wodecki, 2008, pp. 62-63.):

- individual residents of the region as the first unit level (individual);
- enterprises and other social and economic organizations (second level), which group individuals and households, which consist of individuals, the fact of participation in the group affects the level of the individual;
- characteristics of the region (the third level), which act on the second level organizations and individuals on the first level.

As a result, these concepts of the IC include differences in the approaches to its measurement in the country and region, which have the following consequences for the quality of the results:

- the results obtained by various methods are not comparable;
- a variety of operational definitions for each category of capital intellectual causes various indicators used for their operationalization;
- a use of the same aggregation methods and various indicators do not necessarily lead to the comparability of the results.

## **2. ANALYSIS AND ASSESSMENT OF KEY COMPONENTS IC IN THE LUBELSKIE REGION**

Lubelskie voivodeship (NUTS 2 region) is located in the eastern part of Poland, which is also the Polish and the EU eastern border with Belarus and Ukraine. This region is the third largest region in Poland, covers an area of 25122 km<sup>2</sup> and has a population of 2156.2 thousand people, which accounts for only 5.6% of the population of the country. The largest city is the capital of the region - Lublin, where 347,678 people live. The next cities, in terms of population, are: Chełm, Zamość, Biała Podlaska and Puławy (counting from 49,000 to 68,000 inhabitants). The region is dominated by small towns with up to 5000 inhabitants.

Historically, the voivodeships of Eastern Poland were poorly urbanized, industrialized, infrastructurally developed and undercapitalized and thus less socially and economically developed in relation to the rest of Poland. Many researchers point out that the processes of transformation and internationalization in CEE tend to favor metropolitan and western regions, as well as regions with strong industrial base G. Petrakos, G. Maier, G. Gorzelak (2000, 131-149). Actually, poorly developed agriculture with small farms dominates in the developmentally lagged Lubelskie Region. Moreover, this insufficiently urbanized region has poorly developed services and private sectors, infrastructures, business environments, insufficiently educated and trained population, hidden unemployment, and thus suffers from migration, especially of young people, and least foreign investment. Also, the political and economic crisis beyond the eastern Polish border limited export opportunities and economic operation.

When Poland joined the European Union (EU) in 2004, the entire country was qualified under Objective 1 as a less developed area because its GDP per capita for all of its regions (corresponding to NUTS 2) was below 75% of the EU average. However, Lubelskie and others voivodeships of Eastern Poland were the poorest EU regions in 2004-2006 (with Regional Gross Domestic Product (PPS) per capita at 35% of the EU-25 average). During the programming period 2007-2013 Lubelskie was under the Convergence objective, while for the period 2014-2020 it is eligible for EU cohesion policy as a less-developed area.

The question then arises: whether the less developed and peripheral region has assets that contribute to the endogenous development? In knowledge-based economy and information society the intellectual capital and its key components: human capital, social capital, relational and structural capital become essential for growth and development processes.

Human capital includes knowledge, skills, abilities. It is collected from all potential residents, expressed in their education, life experience, attitudes, skills that may serve to improve the current and future social welfare, (Kapitał Intelktualny Polski, 2008, p. 6).

Human capital can be analyzed by such features as educational level, participation in vocational training, accessibility to education and culture, expenditure on education and culture, standard of living, professional and geographical mobility, quality of life etc.. The net enrolment rate (NER) is lower in Lubelskie Region at the level of children attending pre-primary education (92.4), significantly lower for pupils of primary schools aged 6 (12.5 only) and slightly lower for the pupils of primary schools aged 7-12 (94, 2), compared to the national average (respectively - 93.6; 15.5 and 94.5). In recent years, Poland has reduced the level of enrollment at lower secondary schools (students aged 13-15), secondary school - basic vocational (aged 16-18) and post-secondary (aged 19-21). The NER was higher in the Region than in the country at the level of lower secondary school, general secondary schools (51.1 vs. 44.4 in Poland) and post-secondary (8.4 vs. 6.3 in Poland). Generally, a huge increase was recorded in the population with higher education and those, who continue their education at postgraduate and doctoral programs. The net enrolment rate in higher education has

increased from 9.8 in 1990. to 40.6 in 2011, and the highest value reached 40.9 in 2009 (The Polish Ministry of Science and Higher Education, 2013, p. 5.). The number of doctoral students has increased from 2695 in 1990 to 35671 in 2010, more than 13 times. Lublin region's population is characterized by a high level of education at the secondary and higher education (66%). Compared to the country, Lublin is distinguished by the highest share of students in relation to the number of inhabitants. The region's capital is a major academic center with differentiated education in many fields, ranging from social sciences, economics and law, medicine, engineering and construction, agriculture, education, humanities, arts and other services. Access to educational institutions at all levels of education in the region is relatively good, but unfavorable to the availability of cultural institutions and cultural offer, especially in the countryside. Negative evaluation of human capital for the Region relate, for example: professional qualifications (only 32.4% of the respondents participated in them in the years 2010-2013), as many as 41% of respondents did not incur expenditure on education and training, (Raport Końcowy Kapitał Intelktualny Lubelszczyzny, 2013, p. 19-21.). The relatively high cost of education in the formal education system make a small share of after-school forms. Reduced spending on these objectives refers especially to older people living in rural areas and small towns. These problems relate to the situation of income and material resources of the population. The average monthly gross wages and salaries constituted in 2013 only 90.3% of the national average (PLN 3306.12). Whereas the average monthly income per capita available in households amounted to PLN 1105.58 and was among the lowest in the country (85% of the national average). The registered unemployment rate is about one percentage point higher in the region (13.2% at the end of January 2015) compared to the national average. Unemployment is very diverse in the region and the lower-level administrative units (districts - "powiaty") and ranges from 8.9% in Lublin to 24% in the Włodawa district. Higher than the average in the country is the percentage of unemployed young people (under 30 years) in the total number of registered unemployed, most of whom live in the countryside. On the other hand, the employment rate is positively shaped, which is calculated as the share of the employed persons in the population aged 15 and more. In the Lublin region it is about 2-3 percentage points higher than the national average, in 2013 it reached 34.1 (in Poland - 31.6). The inhabitants of the Lublin region are characterized by relatively low occupational and geographical mobility. Research shows that 42.5% of respondents did not change their domicile from birth, 3.5% is going to move to another voivodeship (usually Mazovia and Warsaw), and 1% - abroad, (Raport Końcowy. Kapitał Intelktualny Lubelszczyzny, 2013, pp. 32-33.). Outflow of human resources relates primarily to young people, graduates of colleges and universities (who are looking for jobs, better wages and living standards), and it will have a negative impact on the demographic and social potential in the future.

It is really difficult to take into account all the variables describing the human capital in such a complex entity that is the region. It is even more difficult to define and assess social capital. This concept was propagated by J.Coleman and R.Putnam, and by P.Bourdier, F.Fukuyama et al. Putnam (1995) has defined social capital as those features of social organization, such as networks (systems) of individuals or households and related norms and values that create externalities for the whole community. Social capital is a "common good", both public and private, contributes to the benefits for all communities and individuals (reduction of transaction costs, corruption, crime, etc.). According to Francis Fukuyama, it is a stable attribute for communities where there is a persistent political and legal system. Social capital can be defined as a set of informal values and ethical standards common for members of a particular group, and which enables them to effectively interact. The essential features of social capital are: trust and shared values, relationships and civic engagement, which act as "grease" increasing the efficiency of operation of each group or institution (Sierocińska, 2011, p. 70-71.).

Most of the inhabitants of Lublin declare caution in dealing with people, especially strangers, but the level of social trust is slightly higher (14.7%) than the national average (13.4%). They have high confidence primarily in their family, friends and neighbors (62.9% of respondents). In the public sphere, the highest positions are occupied by the clergy (53.8%) and the police (51.4%), there is an increased trust in the local authorities (38%) compared with the central authorities (23%). Social activity is focused locally, only 31.6% of the surveyed population belongs to social organizations, mostly religious and charitable ones. They prefer to participate in social micro-structures, civic activities for the benefit of its members (school committees, volunteer fire brigade, pensioners' clubs, women's organizations, gardeners, fishermen, etc.) and weakly institutionalized organizations. This is confirmed by the activity of political elections. Voting turnout in the elections of deputies to the European Parliament in 2014 was 23.4%, which is below the national average. On the other hand, the attendance in the elections for local and regional authorities was one of the highest among the

voivodeships (almost 43%). Other characteristics of social capital include: observance of the law, involvement in cultural, sport, social activities, entrepreneurship and self-employment etc. There is a high level of "inclusive social capital", while weak ties are directed outward, low openness to the formation of relationships between people from different backgrounds, structures.

Research within the region does not show the correlation between the level of individual and social capital. In areas achieving the highest scores on the human capital, lower social capital indicators are reported.

These features of social capital translate into the low level of relational capital in the region. Relational capital is the potential of the image outside the country, region, the level of integration with the global and national economy, its attractiveness for foreign "clients" - business partners, investors and tourists, (Kapitał Intelektualny Polski, 2008, p. 6). Relational capital allows establishing and maintaining relations based on cooperation with people, institutions, companies with near and further environment. The analysis of the Institute for Structural Research show that half of the companies located in the region operated on the local market (in the municipality or county), and about a quarter of the company had regional range of activities. Some marginal companies exported their products and services (only 1.2% of the country's export). The main partners of cooperation are economic partners (suppliers of materials, components, equipment and software). This is due to the dominance of small businesses, which represent 95% of business entities. The voivodeships of Eastern Poland are the least attractive for foreign investors. The share of companies with foreign capital was 0.8% of the total number of enterprises in 2013, to compare to the national average of almost 2%. In addition, the value of foreign capital invested in the region declined from PLN 851.62 million in 2000 to PLN 704.4 million in 2007 (a decrease of 17.3%), (Raport Końcowy. Kapitał Intelektualny Lubelszczyzny, 2013, p.114).

The Lubelskie region has a clean environment and landscape, cultural and architectural value. However, relatively few tourists visit the region (3.25% of all tourists and 2.2% of foreign tourists in tourist accommodation establishments in 2013, compared to the country). Tourist attractiveness of the region increases with the development of tourism infrastructure and the cultural offer. In recent years many cultural events were organized in the capital and in the region, including international events (music, theater, performance art, cultural meetings, meetings of folklore, food festivals, conjurers etc.)

Despite the scientific potential in the region, there is a low level of cooperation between science and business. This is due to such reasons as excessive bureaucracy in universities and research institutes, a focus on raising funds primarily for basic research than their implementation, the publication of research results which prevents them from patenting, etc. An opportunity to improve this situation is to develop a center for technology transfer, technological and scientific park, cluster initiatives. A creation of 16 cluster initiatives was recorded in the Lubelskie Voivodeship. The majority of them are located in Lublin (14), and others were established in the vicinity of the capital of region: in Świdnik (Lublin Aviation Cluster) and another in Nałęczów (The Land of Loess Gorges). Compared to other voivodeships, Lubelskie has the highest percentage of subjects in the services sector, which led to cooperation in the field of innovative activity (37,5%) and the highest percentage of companies cooperating within the cluster initiative (22,7%), Innovation activities from 2010 to 2012 (2013, 90-94.). Innovation activities are determined by the economic structure of the region, shown in Table 2.

**Table 2:** The Comparison of employed persons and gross value added by kind of activity in the Lubelskie Region to Poland (in % of total)

	Agriculture, forestry and fishing	Industry	Construction	Trade, repair of motor vehicles, transportation and storage, accommodation and catering, information and communication	Financial and insurance activities, real estate activities	Other services activities
Employed persons in % of total (31 XII 2013)						
Poland	17,1	20,5	5,8	24,3	4,0	28,3
Lubelskie	38,5	13,0	4,2	17,6	2,6	24,3
Gross value added in % (31.XII.2012)						
Poland	3,1	26,2	7,9	29,8	8,8	24,3
Lubelskie	5,9	20,7	7,4	28,8	9,9	27,3

Source: Own, based on data from Statistical yearbook of the Polish regions, Central Statistical Office, Warsaw 2014.

Table 2 shows the rural character of the region, where employment in the sector is two times higher than that of the country, and its share in GVA was less than 6%. The next place in the structure of employment is occupied by services; however, non-market services (education, health, social work activities, public administration and defense etc.) prevail. Traditional economic structure of the region is reflected also in labor productivity (in Lublin, it represents only 72.5% of the national average and is the lowest in Poland).

Structural capital includes the economy and management (e.g. labor market, production, management efficiency, UE funds absorption efficiency, trust in business), innovation (e.g. new firms, quality of certificates and patents, importance of environment protection, processes supporting innovations), B&R (investments in B&R, patents, research projects). Gross Domestic Expenditures on research and development (GERD), R&D entities and personnel in the Lubelskie voivodeship shown in table 3.

**Table 3:** Selected indicators of the R&D zone in the Lubelskie voivodeship

Indicators	Year	Poland	Lubelskie
Number of R&D entities	2012	2733	97
GERD per capita in PLN	2012	372	301
GERD/PKB in %	2011	0,76	0,65
Funds of business enterprise sector in GERD	2012	32,3	14,5
R&D personnel per 1000 employed persons in total	2012	5,8	3,8
Human resources in science and technology as percentage of labour force	2012	43,2	39,3
Participation in foreign licenses used by industrial enterprises in %	2012	100,0	1,0
Participation in patents granted by the Patent Office in RP in%	2012	100,0	5,2

Source: Own, based on data: Science and Technology, Central Statistical Office, Warsaw 2013.

These data show that in the Lubelskie region only 3.5% of all R&D entities are located. R & D is funded primarily by the government sector. Compared with the other voivodeships, Lubelskie reached minimum value of indicators such as: share of funds from business enterprises in GERD and foreign licenses used by industrial enterprises. This is also reflected in the low share in the region of high-tech manufacturing enterprises (1.6% of total manufacturing enterprises).

Besides major cities (Lublin, Chełm, Zamość and Biała Podlaska) areas of industry concentration are important for the development of the region- Puławy (chemical industry), Świdnik (mechanical engineering and aerospace, airport), Łęczna-Bogdanka (mining), Dęblin (military aviation college).

### 3. CONCLUSIONS

Intellectual capital is regarded as an important factor of sustainable socio-economic development. IC also affects future prosperity, potential, competitiveness and the possibility of development of the country and regions. However, these relationships are complex and differ from the point of view of its individual components: human capital, social capital, relational and structural capital.

Lubelskie human capital potential is primarily due to the level of education and access to institutions at all levels of education and training fields. However, problem is the unfavorable demographic trends and migration, which affects the quantity and quality of human capital.

Much more difficult is to verify the impact of social and relational capital for socio-economic development. Results of research on social capital are ambiguous (eg. in some areas of the region there was poor or negative correlation between the indicators of human and social capital). Social capital of Lubelskie is characterized by predominance of informal civic initiatives on a local scale. This is also visible in the limited cooperation between enterprises and enterprises with the environment, eg. with R&D institutions.

A key role in reducing development disparities can be played by clusters and network structures, focused on the manufacturing and services sector, which are crucial for the region (agriculture, health food, agri-food, furniture, machine industry, tourism). Entities belonging to "triple helix" should intensify cooperation, playing a special role the local authorities.

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