

Social Capital, Clusters and Regional Innovative System: The Case of Medical Instruments Cluster in Silesia Region in Poland¹

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Abstract: authors describe clusters as basic components of regional innovative system in the paper. Social capital and entrepreneurship are theorized to be key features of the clusters as networks of inter-organizational relations. Social capital is described on the base of four-dimensional model, including: structural social capital, cognitive social capital, cultural social capital, and strategic social capital. Entrepreneurship is measured using four-dimensional model, including: innovativeness, strategic orientation, ethics and willingness to take a risk. The above theoretical considerations are verified drawing on the case analysis of implementation process of RIS in Silesian Voivodship (region in Poland). The project on clusters building in Silesian Voivodship started in 2005 as a very important part of RIS - Silesia implementation. During the works within this project the industrial group of medical instruments producers was identified as a potential regional technological cluster. The outcomes of research confirms the role of social capital in creating innovative clusters but simultaneously indicate that the level of social capital is too low to create joint entrepreneurial behaviors.

1. Regions as territorial innovative systems

Today regions as territorially restricted and managed areas create entrepreneurial environments, within which innovative undertakings are occurring. In the context of knowledge based economy these undertakings are more and more network oriented. Enterprises, as the central part of value creation processes in region, are shaping their

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investment decisions (incl. territorial investment decisions) on the basis of growth of their market value. Efficiently shaped regional entrepreneurial environment should be oriented toward creation specific territorial factors which are adding something to the market value of firms that are investing on this area. The geographical proximity as well as entrepreneurial environment on the given territory are important determinants of inter – organizational networks, especially when taking into account tacit knowledge and social capital. On one hand territory is crucial dimension of today firms' development strategies, on the second networks of inter-organizational relations determine development possibilities of today regions.

The phenomenon of territorial concentration of firms can't be perceived as entirely new issue. Already in the end of 19th century the companies using high technology were concentrating inside areas with high potential of qualified labor force. Such areas were created both by companies and technological universities (Marshall 1890). This trend is to some extent convergent with today theory and practice of regional technological clusters. Besides the highly qualified labor force, the development of so called "engine industries" (e.g. automobile industry, aircraft industry, space industry etc.) which attract huge amount of small suppliers can be considered as a reason for development of regional clusters (Perroux, 1982). This example is in turn similar to today concept of industrial clusters. Thus, today economic world which is very often named "knowledge base economy" isn't direct reason for geographical concentration of firms. This world is just moving the priorities toward innovation as an outcome of network cooperation occurring within the structure of social capital. In the global world based on highly developed communication and transport technologies the meaning of spatial proximity is socially determined. From this point of view territory should be analyzed as an entrepreneurial environment and innovative social system that is consciously managed by regional innovative strategy.

The main assumptions of regional innovation system theory are as follow (Niosi and Bas, 2003):

- region plays very important role in the context of shaping innovation processes in current economic world;
- innovative firms shape their development strategies based on multidimensional approaches and dimension of regional entrepreneurial environment is important one;
- investment strategies of innovative firms are oriented toward knowledge exploitation and research and development activities;

- high technology firms are using the knowledge of their external stakeholders (e.g. universities, public research and development institutes, other firms, support institutions, financial institutions);
- firms aren't willing to invest in research and development activity without clear pro-innovative policy of regional and local governments.

Regional innovative systems differ from traditional networks of inter-organizational relations with commitment of wide range of various regional entities (e.g. research and development institutes, business support institutions, local regional governments, etc.) and with intensive horizontal cooperation. Regional innovative systems are based on the assumption that localization and geographic proximity enhance innovative activity occurring on given geographic area (Cooke, 1998).

2. Social capital and territorial innovative system

Efficient management of region needs taking into consideration various circumstances deriving from knowledge based economy. Good understanding of different regional development processes that are based on knowledge processes is necessary from efficient management of the region point of view. Current knowledge theories are delivering us with different models of knowledge management, especially in the context of analysis of development processes of companies. There are some examples of adopting knowledge management theories to regional needs in the literature of management (Gancarzyk, 2001). Analysis of theoretical and empirical research outcomes (Bourdieu et al., 1986), within both the field of knowledge management and regional management, allows for recognition the social capital category as a key mechanism of processes of entrepreneurial knowledge management (incl. territorial knowledge management).

There are many definitions of social capital and social capital on regional level can be defined as (Stachowicz, 2005): network of regional enterprises, institutions and relations that are binding them into particular parts of social capital that in turn shapes their entrepreneurial behaviors (which are reflected in various regional joint undertakings). Regional undertakings can be defined as these undertakings created by regional entities, which enhance regional development strategies. The main constituencies of social capital on regional level are (Stachowicz and Kordel, 2005): (a) structural social capital, regarding the structures of communication within the given group of regional entities; (b) cultural social capital; encompassing trust as basic

measure of social capital and innovative culture (trust is described on the basis of five dimensions: honesty, loyalty, competencies, consequence, openness); (c) cognitive social capital, regarding common understanding and sharing the development vision of given network of regional organizations; (d) strategic social capital, dealing with various capabilities of network of organizations in the field of social capital self-organization (around joint undertakings). So, social capital has the transformative function in regard to other regional resources (especially human resources) and is creative mechanism when regards innovative development of region.

Social capital is necessary condition of performance of whole regional innovative system. Treating the set of regional entities as a network needs the existence of critical mass of social capital. This is especially important when regarding the innovative networks that play a special role of creation additional value added. This role is evident in the light of modern network innovation theories, (i.e. systemic innovation theory according to which innovation arises from complex interactions between individuals, organizations and their operating environment – “Oslo Manual” 1997). The process of evolving the current regions into entrepreneurial and innovative systems is determined by efficient co-existence of groups of various regional organizations. This groups need to be internally and externally connected by critical mass of social capital.

Existence of social resource in network of inter-organizational relations doesn't assure that interconnected group is entrepreneurial and innovative; we can say that sometimes “social capital can be empty” (Edvinsson and Malone, 2001). The potential of social capital, defined as the level of its share in value added creation processes is dependant on various aspects (e.g. existence of critical mass of human capital understood as human knowledge, abilities and competencies). The social capital of inter-organizational relations, together with strategic competencies of organizations in the network, is the base for success of their joint entrepreneurial efforts. The entrepreneurial behaviors of organizations are widely characterized in the literature, according to the presented in this paper approach these behaviors can be described by (Stachowicz, 2004): innovativeness, long term orientation and willingness to take a risk. Entrepreneurial behaviors of regional organizations are the base for success of regional undertakings and growth of regional welfare (measured by the level of life of its inhabitants).

Summarizing the above considerations, conscious process of social capital management on the regional level oriented toward creation local innovative subsystems

(e.g. scientific and technological parks, industrial parks, centers of technology transfer, technological and industrial clusters) should enhance the systemic innovative processes, that in turn enhance the process of building of regional innovative system.

3. Clusters as essential parts of territorial innovative system

The region understood as an entrepreneurial environment creates the specific infrastructure that affects innovation development processes. Structure of this environment is created by these regional enterprises and institutions that are active in supporting regional path of knowledge commercialization processes (e.g. technology transfer centers, technology parks, technology incubators, etc.). Process of shaping this environment is determined by social capital, which in turn determines entrepreneurial behaviors of regional entities. The most important regional entities which create both structure and process of territorial innovative system are: regional governments, research and development institutions and enterprises. The role of regional governments is central when taking into consideration regional pro - innovative policy creation. This policy should enhance the development of specific regional innovative system that is very complex process. It should be shaped by social capital management oriented toward transforming the regional groups of enterprises and institutions into regional innovative subsystems, in other words clusters.

Clusters play very important role in the context of current innovative processes that are characterized by following circumstances (Steiner, 2004): (a) the role of interaction and coordination processes in the economy that are beyond the individual maximizing concept; (b) the necessity and forms of proximity for knowledge exchange and creation; (c) the necessity of guiding and coordinating institutions for territorial knowledge processes development. Regional clusters can be defined as the regional specializations that are created on the basis of project oriented group of regional organizations equipped with complementary assets (e.g. horizontally and vertically connected enterprises, public research and development institutions, business support institutions etc.). Clusters as specific groups of various regional organizations differ in many dimensions, according to (Ketels, 2003): the type of products and services they produce, the existence of knowledge creation processes within the cluster, the locational dynamics they are subject to, their stage of development, and the business environment that surrounds them, to name a few. According to the second typology regional innovative system should be based on two complementary subsystems: (a) system of

knowledge commercialization based on vertically concentrated groups of organizations. This kind of regional subsystem is named industrial clusters; (b) system of knowledge creation and diffusion based on horizontal cooperation with strong role of universities, research and development institutions, business support institutions and regional governments. This kind of regional subsystem is named technological cluster. Regarding these two kind of regional clusters we can compare two dominant trends regarding methodology of analysis of clusters in the literature of management: (a) first type of cluster analysis, well developed, confirmed the important role of external relations of enterprises in the context of their competitive advantage building (Porter, 1990); (b) second type of cluster analysis, less developed, attempts to reveal the social mechanisms that enhance systemic innovations processes as way of building additional value (Wolfe, 2006). Technological clusters as the main territorial indicators of region as innovative system and social approach to cluster analysis as essential for systemic innovation are adopted in this article.

Summarizing above considerations on regional clusters one can say that transforming a given group of organizations into cluster requires creating social structures of cooperation among organizations that are activated around different innovative undertakings. Apart from enterprises, other regional institutions plays very important role in the context of regional innovative system (such as: universities, research and development institutions, technology transfer institutions, regional and local agencies of development, local and regional governments). In the above context we can define regional cluster as (Stachowicz, 2005): process of organizing and developing the specific network of cooperation, oriented toward process of additional competitive advantage building among enterprises (incl. supply chain partners, allies, competitors etc.) and other regional institutions (incl. research and development, business support). The cooperative mechanisms are built on the basis of creating and developing the social capital and are oriented toward knowledge creation and diffusion.

4. Outcomes of empirical investigations: network of medical instruments manufacturers in Silesia Voivodship

The aim of research was to analyze social capital of territorial set of firms in the perspective of its influence on their entrepreneurial behaviors. Main assumption was that the value of territorial sets of firms is created by network oriented innovation processes (processes which are reflected in common innovative undertakings).

Empirical research was descriptive and it regarded static illustration of social capital and entrepreneurial behaviors.

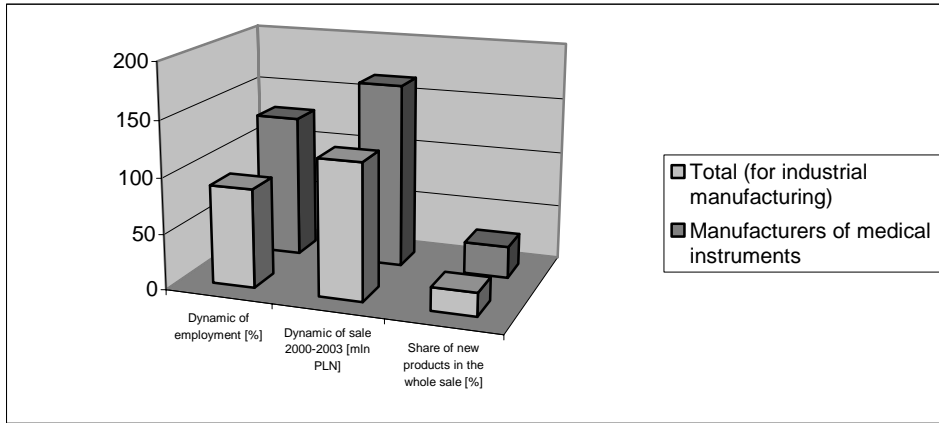
Research population was consisted of medical instruments manufacturers concentrate geographically on the territory of silesian voivodship (region in southern Poland). The researched group was connected with regional research and development institutions and business support sector. Although the above contacts weren't deeply developed, the network seemed to have a potential of transforming into technological cluster. Structure of research sample included four product oriented groups: producers of rehabilitation devices and equipment for hospitals, producers of surgical tools and dentist's, the preventive devices and diagnostic, the laboratory equipment as well as computer software.

Investigations were carried out in the fourth quarter of 2005. During the performance of empirical investigations the network of firms was at the beginning phase of regional project oriented toward transforming them into regional cluster. So, the network was at the beginning phase of influence of animator (formal position) and the outcomes of research are its opening navigator of social capital. The investigations are planned to be repeated in one year, which allows for dynamic analysis of social capital. Then the work of animator will be evaluated and the relations between entrepreneurial behaviors and social capital will be verified.

The basic research tool was questionnaire of social capital and entrepreneurial behaviors analysis in the territorial networks of firms (Stachowicz, Kordel 2005)². The questionnaire was consisted of twenty measures evaluated on the basis seven points Likert scale (1=strongly disagree, 2= disagree, 3=slightly disagree, 4=neutral, 5=slightly agree, 6=agree, 7=strongly agree). Respondents were chosen from among the managers as the most recognized person in internal and external reality of researched companies.

Statistic analysis of development potential and regional importance of medical instruments network of manufacturers confirms its important role from regional economy development point of view (see fig. nr 1.).

² Stachowicz J., Kordel P., 2005. "Questionnaire of Social Capital in Regional Networks of Enterprises", paper made within the project nr KBN 2H02D 03225, *Intellectual Capital Management in Regional Pro-innovative Networks*, Warsaw: Systems Research Institute, Polish Academy of Sciences in Warsaw (project leader: Stachowicz J.).



	Employment			Sale (mln PLN)			Share of new products in the whole sale	
	2000	2003	Dynam.	2000	2003	Dynam.	2003	%
Total (for industrial manufacturing)	290041	257537	88,79	54303,7	66224,8	121,95	13923,2	21,02
Manufacturers of medical instruments	3366	4331	128,67	339,0	563,5	166,22	161,1	28,60

Fig. 1. Analysis of sector of medical instruments producers in the context of whole manufacturing in silesia voivodship 2000-2003.

Source: self study on the basis of data obtained from Main Statistic Office in Warsaw.

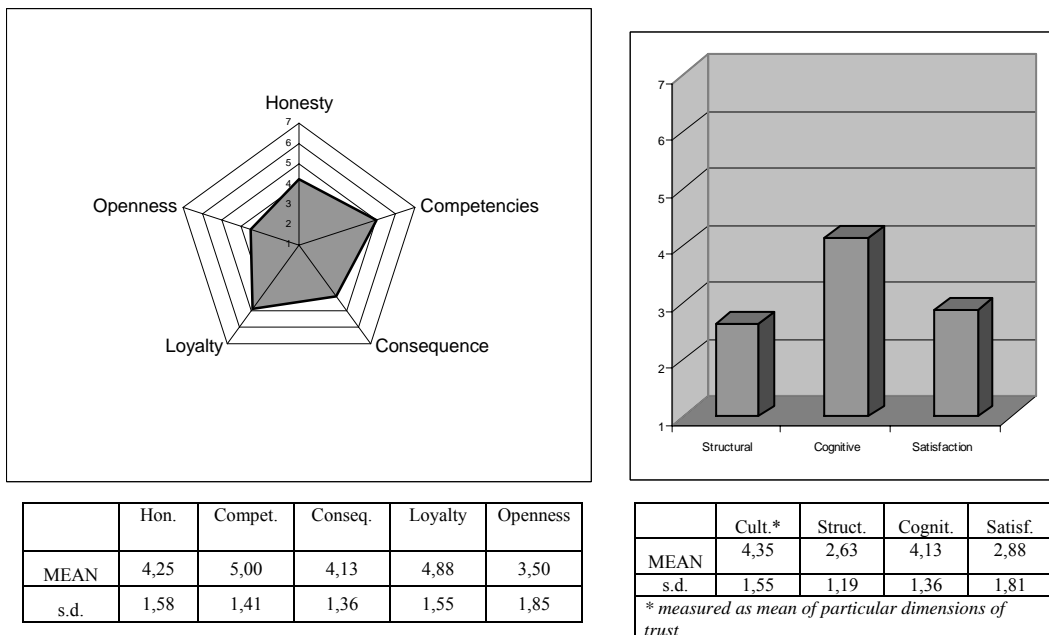


Fig. 2. Social capital analysis in the network of manufacturers of medical instruments in silesia voivodship – fourth quarter of 2005.

Source: self study. On the basis of outcomes of investigations carried out within the project financed by Polish Ministry of Science and Higher Education, nr KBN 2H02D 03225, titled: Intellectual Capital Management in Regional Pro-innovative Networks, Systems Research Institute, Polish Academy of Sciences in Warsaw (project leader: Stachowicz J.).

Dynamic of growth of three indicators of development potential (i.e. employment, sale and share of new products sale in the whole sale) in the years 2000 – 2005 for medical instruments producers in the context of whole manufacturing in region confirms over average meaning of researched sector in the regional innovation system.

Social capital analysis of researched network indicates as follow (see fig. 2.): (a) neutral level of trust which is based mainly on competencies and loyalty, openness as a dimension of trust is negative; (b) negative level of communication processes among companies in the network; (c) neutral level of mutual understanding of common development goals. At the same time investigated companies articulated low level of satisfaction from existing in the network profile and level of social capital in the context of their development perspectives. In the field of received entrepreneurial profile of researched companies each dimensions was estimated on the level of low positive (i.e. innovativeness - 4.62, long term orientation 4.75 and willingness to take a risk 4.62). The received profile of entrepreneurial behaviors didn't show statistically significant correlation with social capital.

Summarizing the outcomes of research, one can say that although medical instrument sector in silesia voivodship has high growth potential, it doesn't create technological cluster at the moment. Development strategies of companies are based on their supply chain (vertical relations) and they don't exploit innovative chances placed in horizontal relations. The development of network toward technological cluster needs strong intensification of horizontally oriented communication processes in order to create their common base of purposes. Low level of satisfaction from existing social capital in the network confirms the awareness of losing the chances among companies and at the same time create potential for transforming this network into cluster.

References

- Bourdieu P., 1986. "The Forms of Capital. Handbook of Theory and Research", [in:] *The Sociology of Education*, J.G. Richardson (ed.), New York: Greenwood, 241–258.
- Cooke P., 1998. "Introduction: Origins of the Concept", [in:] *Regional Innovation Systems—the Role of Governances in a Globalized World*, H.J. Braczyk, P. Cooke, M. Heidenreich (eds), London: UCL Press, 2–25.
- Edvinsson L. and Malone M. S., 2001. "Intellectual Capital", Warsaw: PWN.

- Gancarczyk M., 2001. „Entrepreneurial and Innovative Environment as Intellectual Capital of Territory”, [in:] *Intellectual Capital: Dilemmas and Challenges*, A. Poczowski (ed.), Nowy Sącz: National-Louis University w Nowym Sączu, 66.
- Ketels Ch.H.M., 2003. “The Development of the Cluster Concept – Present Experiences and Further Developments”, Duisburg: NRW conference on clusters.
- Marshall A. 1890 (1986 edition). “Principles of Economics”, London: Macmillan.
- Niosi J. and Bas T.G., 2003. “Biotechnology Megacentres: Montreal and Toronto Regional Systems of Innovation”, *European Planning Studies* 7.
- Oslo Manual 1997, OECD – Eurostat.
- Perroux, F., 1982. “Dialogue des Monopoles et des Nations, Grenoble”: Presses de l’Université de Grenoble.
- Porter M.E., 1990. “The Competitive Advantage of Nations”, New York: The Free Press.
- Stachowicz J., 2004. “Entrepreneurial Behaviors of Inter-organizational Relations: Measurement Model and Tools”, paper made within the project nr KBN 2H02D 03225, *Intellectual Capital Management in Regional Pro-innovative Networks*, Warsaw: Systems Research Institute, Polish Academy of Sciences in Warsaw (project leader: Stachowicz J.).
- Stachowicz J., 2005. „Social Capital of Regional Projects as Main Factor of Regional Development”, [in:] *Management of Local and Regional Development in the Context of Integration of Europe*, E. Bojar (ed.), Lublin: TNOiK, 57–76.
- Stachowicz J., Kordel P. (2005) Social Capital of Inter-organizational Relations: Measurement Model and Tools, paper made within the project nr KBN 2H02D 03225, *Intellectual Capital Management in Regional Pro-innovative Networks*, Warsaw: Systems Research Institute, Polish Academy of Sciences in Warsaw (project leader: Stachowicz J.).
- Stachowicz J., Kordel P., 2005. “Questionnaire of Social Capital in Regional Networks of Enterprises”, paper made within the project nr KBN 2H02D 03225, *Intellectual Capital Management in Regional Pro-innovative Networks*, Warsaw: Systems Research Institute, Polish Academy of Sciences in Warsaw (project leader: Stachowicz J.).
- Stachowicz J., Kordel P., 2005. “Social Capital of Inter-organizational Relations: Measurement Model and Tools”, paper made within the project nr KBN 2H02D 03225, *Intellectual Capital Management in Regional Pro-innovative Networks*, Warsaw:

Systems Research Institute, Polish Academy of Sciences in Warsaw (project leader: Stachowicz J.).

Steiner M., 2004. "The Role of Clusters in Knowledge Creation and Diffusion – an Institutional Perspective", [in:] *Regions and Fiscal Federalism*, Porto: ERSA.

Wolfe D. A., 2006. "Social Capital And Cluster Development in Learning Regions", [in:] *Knowledge, Clusters and Learning Regions*, J.A. Holbrook, D.A. Wolfe (eds), Kingston: School of Policy Studies, Queen's University.