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Conference Paper

Clusters As Vehicles Stimulating Regional and Local Development

46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece

Provided in Cooperation with:

European Regional Science Association (ERSA)

Suggested Citation: Bojar, Ewa (2006) : Clusters As Vehicles Stimulating Regional and Local Development, 46th Congress of the European Regional Science Association: "Enlargement, Southern Europe and the Mediterranean", August 30th - September 3rd, 2006, Volos, Greece, European Regional Science Association (ERSA), Louvain-la-Neuve

This Version is available at:

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CLUSTERS AS VEHICLES STIMULATING REGIONAL AND LOCAL DEVELOPMENT

Ewa Bojar, Jan Stachowicz, Piotr Kordel

Abstract

Past experience of the European Union member states acknowledge significant role of regions in the process of European integration. As a matter of fact regions compete for capital but, what should be simultaneously highlighted, they also collaborate in many fields. To a large extent regional and local development is determined by groups of complementary enterprises having certain similarities with one another as well as linked institutions engaged in a certain area (clusters). Clusters can play crucial role in improving competitiveness and stimulating innovation in regions, especially those economically backward, as well as in the Polish economy as a whole.

The authors describe the process of shaping industrial clusters as a very important part of managing regional innovative system. Regional innovative system is based on many local innovative subsystems joined and interconnected by various relations of cooperation. Regional industrial clusters as an essential component of regional innovative system is described as an outcome of conscious managerial activity. Important indicator of effectiveness of this managerial process is social capital within given regional cluster. In this context authors propose model which is to measure social capital on the bases of four dimensions: perceptive social capital, structural social capital, trust based social capital and strategic social capital. In this context regional cluster is defined as a process of organizing and developing the specific network of cooperation among regional companies and institutions oriented toward creating and maintaining their common additional competitive advantage. This cooperation is achieved during the process of social capital management measured by the level of inter-organizational trust.

1. Regional innovative strategies, knowledge based economy and today regions

The development of current economy is increasingly shaped by knowledge management processes. Knowledge as capital creates new trajectories of creation of value added and within this context trajectory of network innovation is especially interested. Development strategies of contemporary firms go out beyond their traditional boundaries in searching the sources of competitive advantages. Building the effective network of external relations with strong exploitation of their social potential is now becoming the essential part of firms' development path. The outcome of such strategies is process of shaping various networks of inter-organizational cooperation. The geographical proximity as well as entrepreneurial environment on the given territory (region) 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 innovative clusters. Besides the highly qualified labor force, the development

of so called “engine industries” (e.g. automobile industry, aircraft industry, space industry) which attract huge amount of small suppliers can be considered as a reason for development of regional clusters (Francois 1982). Although there are different definitions of clusters, it is generally agreed that clusters are a collection of companies that are geographically co-located and interrelated (Porter 1998, 2001). The change in economic infrastructure and today economic world which is very often named “knowledge base economy” isn’t direct reason for geographical concentration of firms. Today economic world is just moving the priorities toward innovation as an outcome of network cooperation and commutation of social capital within this network. 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 entrepreneurial environment, innovative social system that is consciously managed by regional innovative strategy.

The main assumptions of regional innovation system theory are following: (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 one of them;
- 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 forms, 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. firms from different branches, research and development institutes, business support institutions, local regional governments, etc.) and with orientation on cross – sector industrial cooperation. Regional innovative systems are based on assumption that localization and geographic proximity enhance innovative activity (Cooke 1998).

2. Social capital as a main driver of regional innovation strategy implementation

Efficient management of region (as an economic entity) needs taking into consideration various circumstances deriving from knowledge based economy. Good understanding of different regional development processes that are based on knowledge processes and oriented by innovative 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 (Gancarczyk 2001). Profound analysis of last theoretical and empirical research outcomes (Bourdieu et al. 1986), within both the field of knowledge management and regional management, permits on recognition the social capital category as a key mechanism of processes of entrepreneurial knowledge management (incl. on the regional level).

There are many analyses 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 and various regional joint undertakings. Regional undertakings can be defined as these undertakings created by

regional entities, which enhance regional development strategies (incl. innovative undertakings that enhance regional innovative 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 bases of five categories: honesty, loyalty, competencies, consequence, openness); (c) cognitive social capital, regarding common understanding and sharing the development vision of given group of regional organizations; (d) strategic social capital, dealing with various capabilities of group of organizations in the field of social capital self-organization (around joint undertakings). So understood social capital has the transformative function in regard to other regional resources (especially human regional resource) 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 (or even a system) 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 innovative 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 (potential of social capital).

Existence of social resource in network of inter-organizational relations doesn't assure that connected 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 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): (a) innovativeness, (b) strategic orientation, (c) taking a responsible risk, (d) ethics. So that, entrepreneurial behaviors are determined by long term orientation of made decisions, taking a responsible risk, taking active role in systemic innovation process and taking into account widely shared ethical priorities during the process of making decisions. Entrepreneurial behaviors of regional organizations are the base for 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 building process of regional innovative system.

3. Clusters as an essential parts of regional innovative system

The region understood as an entrepreneurial environment creates the specific infrastructure that affects innovation development processes. Subjective structure of this environment is created by these regional enterprises and institutions that are active in shaping regional path of knowledge

commercialization processes. The main subjects of regional innovative infrastructure are: enterprises, research and development institutions, business support organizations, financial institutions and local governments. Objective infrastructure of this infrastructure is created by inter-organizational relations that are gathering regional subjects around project oriented groups.

The analysis of region as entrepreneurial environment allows for revealing its three components that can be considered as three following stages of regional innovative system development: (a) regional cluster, (b) regional innovative network, (c) regional innovative system (see table nr 1.).

Tab. 1. Key components of region as entrepreneurial environment

Component	Definition
Regional cluster	Concentration of mutually dependant enterprises and institutions which are acting on the same geographical area. They are creating local innovative subsystems.
Regional innovative network	Growing cooperation among local innovative subsystems which are stimulated by trust, communication and common development visions.
Regional innovative system	Cooperation among local innovative subsystems based on knowledge creating, protecting and enhancing processes (on the whole knowledge commercialization path).

Source: Adopted from: Isaksen A.: Building Regional Innovation Systems: Is Endogenous Industrial Development Possible in the Global Economy?, Canadian Journal of Regional Science 2001, nr 1, s. 101–120.

The path of regional innovative system development 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 (clusters), in the case of less developed economically regions. Clusters play very important role in the context of current innovative processes that are characterized by following (Steiner 2004): (a) the role of interaction and coordination processes in the economy that are beyond the individual maximising concept; (b) the necessity and forms of proximity for knowledge exchange (regional dimension); (c) the necessity of guiding and coordinating institutions for their new forms of behaviors on a regional level. Interactions need institutions (e.g. centers for technology transfer, support business institutions, venture capital institutions etc.).

Inter – organizational networks (such as clusters) are the combination of above described three perspectives. 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.). There two dominant trends regarding methodology of analysis of clusters in the literature of management. One trend focuses on the analysis of the industrial structure within the cluster. The most frequently used technique within this type of research is value-chain analysis. Another kind of research about clusters focuses on the benefits that companies can get from geographical proximity with other enterprises or institutions. Very important part of second branch of research on clusters is their social aspect, especially learning processes. Summarizing the outcomes of research carried out within these two branches, two the most important conclusions can be derived: (a) first type of cluster analysis confirmed the important role of external relations of enterprise in the context of process of its competitive advantage building (Porter 1990); second type of cluster analysis

is less developed and attempts to reveal the social mechanisms that enhance systemic innovations processes (Wolfe 2006).

Clusters as specific groups of various organizations differ in many dimensions, according to (Ketels 2003): the type of products and services they produce, the locational dynamics they are subject to, their stage of development, and the business environment that surrounds them, to name a few. At a first level, clusters can be classified by the type of product and/or services they provide. The performance of a cluster at a specific location is driven by the business environment that the cluster is operating in. "Business environment" is a broad and naturally vague term: almost everything – from the quality of the schools to the strategies of local competitors – matters for the level of productivity and innovation that companies in the cluster reach at this specific location.

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 play a 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 wide 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 among its partners.

4. Empirical findings: Regional Innovative Strategy – the cases of medical instruments and railway transport clusters in Silesia Region

Regional Innovative Strategy – "RIS – Silesia" was accepted by regional government of Silesian Voivodship (region) in 2003. This strategy is based on three priorities: (1) greater share of highly innovative firms in whole number of regional SME's; (2) higher level of using regional research and development potential; (3) building Regional Innovative System based on trust, creativity and excellence. Above priorities are more detailed in the form of strategic purposes and operational activities. Within the borders of operational activities some pro-innovative projects are today implemented. Regarding the convergence among different operational projects, the coordinative role plays project titled "Management Unit of Regional Innovative System in Silesia Region". The operational project, when regards regional clusters building, is project titled: "Creating the Regional Cooperative Network and Support Structures in Silesian Region". The main purpose of this project is: enhancing the competitiveness of enterprises by the means of creating sectoral networks of cooperation and networks of support institutions. The detailed purposes of this project are: (a) enhancing the level of consciousness among the firms and institutions on benefits derived from cooperation in clusters; (b) enhancing the intensiveness of cooperation among firms, research and development institutions and support institutions; (c) identification and practical verification of tools supporting functioning the networks of cooperation; (d) enhancing the level of productivity, quality and innovations in three chosen sectoral networks. Up till now in Silesia Region, two industrial (medical instruments cluster and railway transport cluster) and one service (touristic cluster) clusters were identified and analyzed during the works carried out. Each sectoral networks has its animator who is responsible of shaping cooperative networks among organizations in network.

4.1. Research methodology

The empirical research addresses a problem of social capital of regional cluster and its impact on entrepreneurial behaviors of enterprises within this cluster.

The main research assumptions was that innovative activities of given group of organizations are crucially determined by critical mass of social capital in network of relations, created by this group in the perspective of current network theories of innovation. The structure of analysis of social capital was based on four – dimensional model of social capital described in second chapter (i.e. structural social capital, cognitive social capital, cultural social capital and strategic social capital). The main estimator of the level of social capital was five dimensional construct of trust presented in the second chapter of this work (i.e. honesty, loyalty, competencies, consequence, openness). Structural and cognitive dimensions of social capital prerequisites trust as central dimension of level of inter-organizational social capital. Strategic dimension of social capital indicates the level of growth of social capital in the given period of time (during the process of completing a given undertaking). The entrepreneurial behaviors of firms were estimated on the basis of four dimensional model also presented in second chapter (i.e. innovativeness, strategic orientation, taking a responsible risk and ethics).

The sampling frame consisted of manufacturers of medical instruments (MIM) and manufacturers of railway transport equipment (RTM), both located in Silesia Region in Poland. MIM were operating in seven fields of production: rehabilitation devices, hospital equipment, surgical tool the, dentist's tools, diagnostic devices and laboratory equipment. RTM were operating in three main product domains: rail vehicles, spare parts to rail vehicles, rails and railway equipment (incl. electric equipment). In local external environment of these firms strong public research and development sector exists (including three UE Fifth FP's Centers of Excellence). Up till now, regional business support sector is in initial phase and is attempting to fit to demands of enterprises. The structure of inter-organizational relations is vertically oriented in accordance with supply chain flow. Vertical cooperation among firms is scarce, mutual competition is rather low and companies concentrate on their own products and markets (mainly mutually complementary).

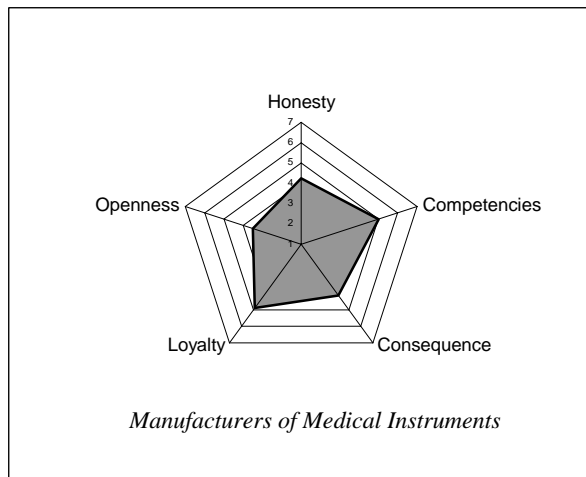
On the basis of empirical and theoretical analysis, following research hypothesis were constructed:

- H1: Structural and cognitive dimensions of social capital enhances trust as basic measure of level of social capital of network of inter-organizational relations.
- H2: After achieving the critical mass, the social capital of network of inter-organizational relations enhances entrepreneurial behaviors of organization in the network.

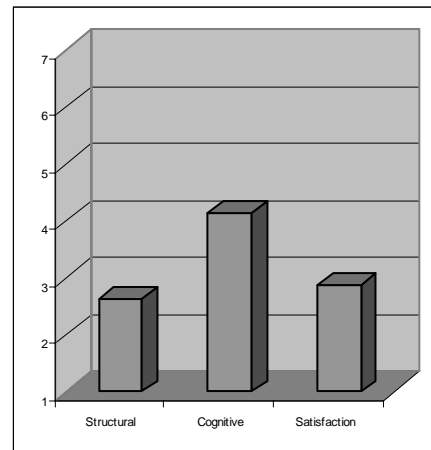
The empirical investigations were carried out in fourth quarter of 2005. For the purpose of research constructed a questionnaire was constructed. Preliminary version of the survey instrument was pretested among a group of 100 executives of 100 regional industrial enterprises. Feedback from those executives was incorporated into a revised version of the survey instrument. The final questionnaire consisted of twenty three items were responded by group of operational managers of MIM and RTM. We directed the survey to operational managers because our preliminary field interviews indicated that those individuals were best able to respond to our questions on social capital of inter-organizational relations. The scale used to operationalize all the above described theoretical constructs was the same (1=strongly disagree, 2= disagree, 3=slightly disagree, 4=neutral, 5=slightly agree, 6=agree, 7=strongly agree).

4.2. Analysis and results

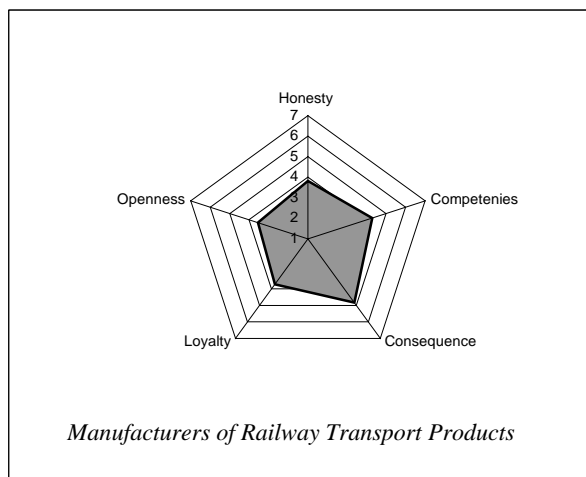
Fig.1. Social capital profiles of manufacturer of medical instruments (above figure) versus manufactures of railway transport products (below figure) in Silesia Region in Poland



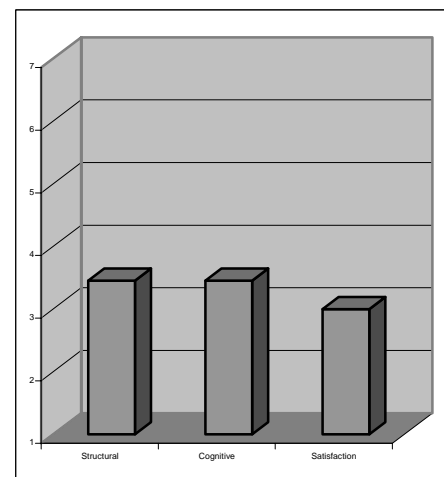
	Hon.	Compet.	Conseq.	Loyalty	Openness
MEAN	4,25	5,00	4,13	4,88	3,50
s.d.	1,58	1,41	1,36	1,55	1,85



	Cult.*	Struct.	Cognit.	Satisf.
MEAN	4,35	2,63	4,13	2,88
s.d.	1,55	1,19	1,36	1,81
* measured as mean of particular dimensions of trust				



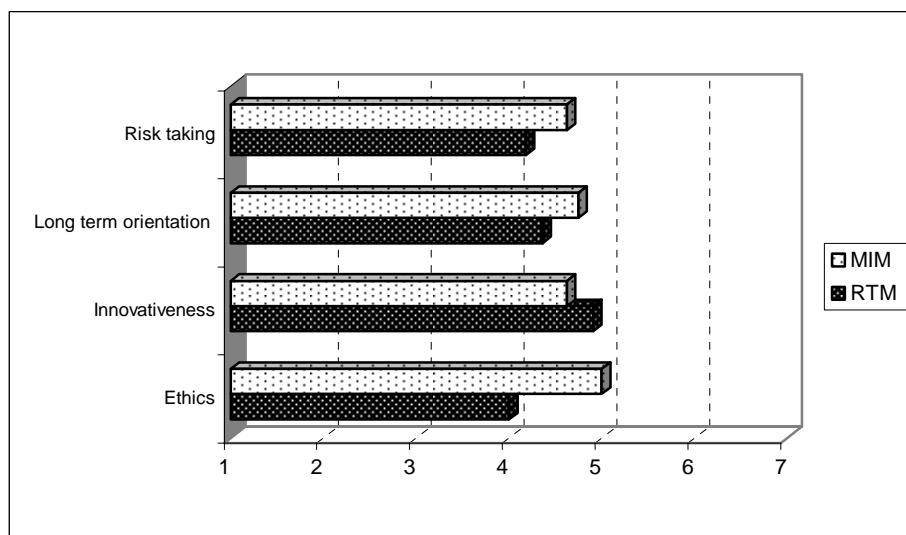
	Hon.	Compet.	Conseq.	Loyalty	Openness
MEAN	3,82	4,27	4,82	3,73	3,55
s.d.	1,60	1,35	1,83	1,62	1,86



	Cult.*	Struct.	Cognit.	Satisf.
MEAN	4,04	3,45	3,45	3,00
s.d.	0,51	1,97	1,37	0,77
* measured as mean of particular dimensions of trust				

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.).

Fig. 2. Entrepreneurial profiles: manufacturers of medical instruments versus manufacturers of railway transport equipment



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.).

Presented outcomes of empirical research show low intensity of each dimension of social capital of inter-organizational relations networks both in case of medical instruments manufacturers and manufacturers of railway transport equipment. None of received characteristics of social capital achieves the level above which social capital starts to be important determinant of network business processes. Both profiles of trust indicate competencies as its dominant basis. In the case of MIM competencies are mainly enhanced by loyalty, in the case of RTM competencies are mainly enhanced by consequence. From among all dimensions of received trust profiles openness shows the lowest intensity in both cases. Cognitive dimension of social capital is clearly higher for MIM then for RTM. Level of satisfaction from existing social relations among firms is low in both cases. Intensities of constructs describing entrepreneurial behaviors of investigated firms are higher then the social capital ones. Apart from innovativeness, received characteristics of entrepreneurship are higher for MIM then for RTM. Especially ethical behaviors are more intense in the sample of medical instrument manufacturers.

Analyses of correlations among constructs allow the verification of theoretical hypothesis (some surveys from sample of manufacturers of railway transport equipment were still inflowing during the writing of this paper, so it wasn't possible to make statistically significant analysis for this group).

Hypothesis 1. The model provided strong support for the hypothesis predicting a positive relationship between structural dimension of social capital and trust of network of inter-organizational relations (gamma coefficients: honesty based trust 0,82; competencies based trust 0,41; consequence

based trust 0,65; loyalty based trust 0,50; openness based trust 0,82; $p \leq 0,05$). Simultaneously, positive relationship between cognitive dimension of social capital and trust was not supported.

Hypothesis 2. The prediction that social capital and entrepreneurial behaviors of firms would be positively related is not supported. Only ethical dimension of entrepreneurial behaviors of firms showed statistically significant and positive relations with all dimensions of social capital (gamma coefficients: honesty based trust 0,85; competencies based trust 0,50; consequence based trust 0,80; loyalty based trust 0,85; openness based trust 0,85; $p \leq 0,05$).

4.3. Summary

The findings from the research shows that both manufacturers of medical instrument and manufacturers of railway transport equipment are at the initial phase on cluster development curve. The level of social capital of network of inter-organizational relations, measured by different constructs (i.e. communication, cognition and trust) is rather low and doesn't create network innovative undertakings. Firms within both groups are focusing on their complimentary client-product domains and don't cooperate in entrepreneurial way. Social capital is based mainly on the mutual recognition on their competitive competencies. The insignificant level of correlations between social capital of networks of inter-organizational relations and entrepreneurial behaviors of firms existing within these networks confirms the assumption that only critical level of social capital can enhance network entrepreneurship. In researched group social capital was transformed only in ethical behaviors with no significant influence on the rest of dimensions of entrepreneurial behaviors. So, we can say that social capital wasn't "network entrepreneurship oriented". Entrepreneurial behaviors of investigated companies were rather individual with focus on vertical dependencies without horizontal cooperation.

Summarizing above consideration we can suppose that for the time being the most important thing for both group of enterprises is to intensify different processes of communication (structural dimension of social capital). These processes of mutual communication should be moderated toward building openness among firms and after that, building common network business ideas on the basis of fitting various entrepreneurial capabilities.

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