IJER © Serials Publications
13(7), 2016: 2719-2734
ISSN: 0972-9380

AN INTEGRATED APPROACH TO DELIMITATION AND DEMARCATION OF A SPATIAL NETWORK BOUNDARY

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Abstract: *This article reflects on the concepts that substantiate the logic behind spatial and a-spatial networking, determine the virtual border at the macro-, meso- and micro-levels, define compatibilities that enable actors to engage in a sustainable system of interactions and, ultimately, form a certain community within a particular locality. Paper presents a critical assessment of these provisions in the light of formulating an approach capable of identifying the structural composition of a spatial network – a multidimensional type of territorial socio-economic system, as well as delimitating and demarcating its boundaries. It is argued that favourable institutional and organizational setting, socio-cultural resembles, and a type of mindset that follows an established pattern of a particular community, forms properties of a network, which are the cornerstone in its self-determination.*

Keywords: *spatial networking, spatial community, territorial community, network delimitation, network demarcation*

JEL Classification: *L14, L22, R12, R58*

1. INTRODUCTION

In the new – knowledge-based economy, the geographical location still has a prevailing role in ensuring market competitiveness. In addition to the impact on the traditional factors of competitiveness (i.e. the factors of production), the lack of spatial proximity entails a weakening of the relationship between a "community of people and a population of firms" (Becattini 1990, 38), hindering the development ofsuch positive effects as the diffusion of knowledge and local learning (i.e.'buzz','local buzz', 'noise','knowledge spillover', 'learning spillovers', etc.), the formation ofan inventive-enabling environment (i.e. 'creative field', 'creative space', 'creative millieu', 'regional collective learning','innovation ecosystem', etc.) and the unintended, 'untraded interdependencies' (Storper 1995), that impalpable intangible component – 'something in the air'(Marshall 1920, 225), which ultimately supports a non-linear innovation process at both intra- and inter-organizational level.

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As noted by Curran (2010), Maskell and Malmberg (1999), Morgan (2004), Storper and Venables (2004), Vissers and Dankbaar (2013), innovations need informal interpersonal communication, collective learning, casual contacts, trust and a certain level of unity (based on a common identity, inclusion, social community, a sense of belonging, a common knowledge base, etc.), all that is usually formed within a certain location. Thus, being physically close, within a particular region or a district, plays a significant role in facilitating interaction and cooperation (including through informal communication), promoting the transfer of knowledge and innovation, mutual adaptation, facilitating the exchange of tacit knowledge between stakeholders, ultimately increasing the likelihood of collaborations.

Despite the undeniable importance of the territorial (i.e. geographical, spatial, local, physical) proximity, in itself it is neither an essential nor a sufficient condition for building effective inter-organizational relationships (Boschma 2005; Korotka 2015; Ratinho and Henriques 2011). Moreover, according to a number of scholars, due to the increased mobility of people, goods, and information, the need for physical proximity of the networking actors is not constant, and may be replaced by 'temporary geographical proximity' (Torre 2008), which is expressed in an association of people on a short-term basis, i.e. at business meetings, conferences, trade fairs, etc.

In the end, both ideological groups of scientists pointed out that with the expansion of the international forms of collaboration, the globalization and transnational regionalization processes, the growing complexity of heterogeneous actors involved in networking (e.g. in the innovation process), increases the need to find the rationale for spatial networking, namely the virtual binders that connect the actors and those properties that represent a particular spatial community (i.e. a network) itself. This article reflects on the conceptsthat substantiate the logic behind spatial and a-spatial networking, define compatibilities that enable actors to engage in a sustainable system of interactions and, ultimately, form a certain community (territorial, spatial, local). Author proceeds with the critical assessment of these provisions in the light of formulating an approach to identify the boundaries and a structural composition of a spatial network.

2. KNOWLEDGE AS A KEY FACTOR IN ECONOMIC DEVELOPMENT AND COMPETITIVENESS

From the 1990s, the Organization for Economic Cooperation and Development (OECD, 1996) began to use the 'knowledge-based' definition in relation to the modern economy, what Lundvall and Johnson (1994) have described as 'learning economy'. Ever since the scientific literature has increasingly rooted in the belief that knowledge is the driving factor of economic development and competitiveness, hence, economic relations. The popularity began to find the papers, including previously published ones, describing various aspects of generation, diffusion and the commercialization of knowledge, skills and competences, as well as those, describing the nature of knowledge itself.

The most popular classification of knowledge given from the economic point of view is the one presented by Polanyi (1966), whoidentified 1) codified or explicit knowledge and 2) tacit (i.e. implicit, silent, elusive) knowledge, which bottom line is that "we know more than we can say" (Polanyi 1966, 4). The tacit type of knowledge is based on the abilities, skills, and all that knowledge that is characterized by Japanese scientists as the 'knowledge of experience'(Nonaka and Takeuchi 1995). It is important to notethat there is no fully codified knowledge, according to Polanyi (1966), as explicit knowledge is always based on capabilities and competences – the implicit knowledge, hence, both types can only be conditionally divided.

Particularly sharp debate has arisen out of considering Polanyi's knowledge typology through the prism of social and economic geography, in which the question about the peculiarities of the dissemination of knowledge in geographical space was raised. Some scientists have suggested that tacit knowledge, being embedded in a social context and interpersonal communications is difficult to alienate and transfer over distance (Boschma 2005; Gertler 2003). The dissemination and acquisition of such knowledge is suggested to be based on the interactions grounded in trust, friendship, relational bonds, in the so-called 'shared social familiarity'(Amin and Roberts 2008), generally, limited to certain locality (i.e. territorial community). In turn, the codification and transfer of explicit knowledge over distance is regarded to be much easier, largely obscured from absorption due to other factors than physical distance, such as cognitive distance, institutional barriers, etc.

Following this logic, the process of generation, transmission, assessment, extraction, adaptation, perception of new knowledge, its absorption and integration into the existing knowledge base was conceptualized in the learning process (both planned and unplanned), as a combination of a non-uniform flow of information from geographically close and remote sources, being delivered via 'global pipelines' (Bathelt et al. 2004) and locally disseminated through the effects of knowledge and learning spillovers. Each element of the highly complex learning process is the subject of an individual attention. For example, the concept of 'absorptive capacity' (Cohen and Levinthal 1990) examines the ability of an actor to perceive new knowledge and use it for its own purposes.

Considering the possibility of knowledge transfer at a distance, Lundvall and Johnson (1994) proposed to classify the types of knowledge by their 'alienability' from the source: the first group – codified knowledge, which does not require physical proximity of counterparties, including: knowledge of the facts ('know-what') and knowledge of the key principles and methods ('know-why'); The second group – hardly codified and tacit knowledge, which requires personal contact and presence: the practical knowledge, including abilities, skills, competence ('know-how'), and socially embedded knowledge, including 'tried and tested' contacts and established network of relations ('know-who').

Sorenson et al. (2006), in turn, introduced a gradation of knowledge complexity – from less to highly complex, reflecting the ease of its transmission over distance.

According to this concept, the transfer of complex knowledge is associated with a necessity of personal contact (i.e. presence) and regular communication, hence,the geographical proximity of the counterparts. Passing less complex as well as the highly complex knowledge is less dependent on geographical proximity, as simple knowledge is easy to learn, whileextremely complex knowledge, generally, has a strong dependence on mutual understanding (i.e. cognitive distance), as few can understand and absorb it, therefore, itrather reflects the association of like-minded people, rather than of spatially proximateentities.

Cohen and Levinthal (1990) point out that the process of learning can be done via interactions (i.e. B.-A. Lundvall's'learning by interacting'), processes (i.e. K.J. Arrow's 'learning by doing'), and use (N. Rosenberg's 'learning by using'). In general, "interactive learning and collective entrepreneurship are fundamental to the process of innovation" (Lundvall 1995, 9), as innovationimplies"ability to integrate, build, and reconfigure internal and external competences [of a network] to address rapidly changing environments" (Teece et al. 1997, 516). This means that the exchange and accumulation of knowledge is a social process that requires the involvement of a number of parties, therefore, depends on the compositionof a network and the nature of the interactions involved.Networking has become increasingly regarded as a source of innovation, as the 'learning chances' and opportunities to acquire 'additional expertise' and 'additional knowledge'[1], because it enables to accumulate and share heterogeneous knowledge, generate creativity, and develop new ideas that could not occur in solitariness.

3. DIMENSIONS THAT DETERMINE THE VIRTUAL BORDER OF SPATIAL NETWORKING

As it was noted by McPherson et al. (2001, 415), "similarity breeds connection", or the 'multiplex bonds' (Boissevain 1974) between individuals, groups or organizations that possess a certain degree of resemblance. In the past quarter of a century, there has been a boost of research on the identification of determinants other than geographical closeness that define spatial networking. This process of finding additional binders of spatial communities (as well as the 'communities of practice'; Brown and Duguid 1991) and delineation of the aspect of common territory from social inclusion is characterized as 'de-territorialisation of closeness' (Bunnelland Coe 2001, 96). French proximity school (as well as GREMI group, the French school of economies of proximity, etc.) was among the first and leading in terms of complex studies on these matters. Torre and Gilly (2000, 176) suggest that the fist classification it produced had complemented the geographical dimension of proximity with organizational, which implied "economic separation and relations in terms of the organization of production". Gertler (1995; 2003) proposed an extended classification of the industrial 'closeness', where, in addition to geographic and organizational proximity, he included cultural proximity (i.e. common language, customs, social norms, as well as administrative and territorial boundaries). Torre and Gilly (2000) justified the allocation of institutional dimension

in addition to spatial and organizational, whileKnoben and Oerlemans (2006) distinguished the cognitive dimension that was initially elaborated by Nooteboom (1999a).Boschma (2005) suggests using five proximities, divided into those dealing with coordination of interactions – institutional, organizational, and social, and those, essential for the learning process – geographical and cognitive. In turn,Caragliu and Nijkamp (2016) argue for an entirely different structure: socio-cultural (i.e. the unity of values), technological (i.e. cross-flow of expertise), cognitive (i.e. the transfer of implicit, tacit knowledge) and relational (i.e. informal contacts) proximity. Subsequently, leaving the geographical type of proximity relatively unchanged (except the variety of titles – spatial, physical, territorial, etc.), the structure of 'non-spatial' (Goessling 2004), 'non-geographic' (Torre and Wallet 2014) proximity dimensions began to get a more detailed view.

Naturally, the definition of each proximity dimension differs according to author's perception and interpretation. This is especially true when considering the interpretation of fundamental intangible dimensions, such as organizational, or their intersection between the newly introduced ones (e.g. personal, relational, etc.). Some of the identified proximities are very similar in their essence, e.g. cultural vs. institutional, social vs. relational, some use ambiguous terminology (e.g. spatial proximity), and follow an uncertain methodology (e.g. dyadic vs. systemic approach). Consequently the logic behind each proximity dimension, their intersection as well as the set of proximities to be considered also differs. The following section summarizes the rationale behind the 'conventional' (i.e. commonly used) proximity types and provides an insight into their applicability concerning the allocation of the boundaries of spatial networking.

Geographical proximity (GP) implies the co-location of economic subjects, and is generally characterized as "the degree to which two cooperating entities can have daily personal contact without excessive costs" (Capello 1999, 357). In applied research, the study of GP is generally based on the allocation of agglomerations or groups of interacting organizations "specialised by product type, product components or process phases, held together by inter-personal links, by common 'social culture' amongst the workers, entrepreneurs and politicians and enveloped by an 'industrial atmosphere' " (Bianchi 1998, 96). Respectively, it follows one of the two measurement approaches: 1) the absolute geographic distance between interacting actors, and 2) the relative distance, characterized by perceived accessibility – the efforts that are required for the formation and maintaining of interpersonal communications.

Most researches consider GP as an auxiliary factor to other proximities (e.g. Boschma 2005; Korotka 2015; Ratinho and Henriques 2011), helping generate trust and a sense of involvement (Maskell and Malmberg 1999; Morgan 2004; Vissers and Dankbaar 2013), facilitating personal interactions and informal relations (Storper and Venables 2004; Torre and Gilly 2000), easing access to heterogeneous types of knowledge and the information exchange (Menzel 2008), and promoting like-mindedness (VissersandDankbaar 2013). Ultimately, GP contributes significantly to

the creation of social, organizational and institutional proximity (Amin and Roberts2008; Kirat and Lung 1999; Matters 2011).

*Social proximity (SP)*is regarded as both an individual type of proximity (Coenen et al. 2004) and as part of institutional (Boschma 2005) or organizational (e.g. Filippi and Torre 2003; Oerlemans and Meeus 2005) proximity. Social proximity implies that entities are engaged in a social relationship between individuals (equally represented by 'personal proximity'; Schamp et al. 2004 or 'relational proximity';Coenen et al. 2004), and possess the feelings of trust, friendship, familiarity. It is argued that SP facilitates sustainable interactions, knowledge exchange and mobilization of external resources (Boschma 2005; Oerlemans and Meeus 2005). It implies 'structural equivalence' (Mizruchi 1993), social embeddedness, 'shared social familiarity' (Amin and Roberts 2008), based on communities of practice. Social dimension of proximity focuses of shared social values at the micro-level, individual level, and takes a form of 'untraded interdependences' and non-economic relations.

Cultural proximity (CuP) incorporates the macro-level values – ethnic, religious, etc. As it is put by KnobenandOerlemans (2006, 76), "culture is publicly shared and accepted by a given group at a given time, binding members together and defining or separating one group from other groups". Early publications suggest there is a two-level approach to identify cultural distance (e.g. Gertler 1995;2003; Wilkof et al. 1995): 1) considering national and regional culture, and 2) considering organizational culture (thus, at the micro-level, it intersects with OP).

Organizational proximity (OP), being considered as the major non-territorial type of proximity identified, is highly ambiguous. The *first approach* focuses on coherence of the entities, their inter-dependence, and the state of hierarchical or legal affiliation (Kirat and Lung 1999; Mattes 2011; Oerlemans and Meeus 2005; Rice and Aydin 1991). The *second approach* deals with similarities of the interacting actors – company size, type of economic activity, product type, etc. (e.g. see Wilkof et al. 1995). The absolute OP is observed between the subsidiaries of a single legal entity, followed by intra-industry networks, the communities of practice, and inter-organizational networks. The higher the OP, the more flexibility and speed it has in terms of actions taken and resources used. In general, there are following indicators of OP used: common rules, beliefs,behaviours, and procedures (Rallet and Torre 1999), complementarity of information and knowledge of cooperating parties (Burmeister and Colletis-Wahl 1997), self-identity of belonging to a certain community or network (Schamp et al. 2004), use of a single pool of resources, material and technical R&D base (Gertler 2003), common organizational structure (Boschma 2005), performance measurement system, business language (Rallet and Torre 1999), etc.

*Institutional proximity (IP)*reflects commonality of formal (national and regional laws, legal regulations and norms) and informal (e.g. traditions, morals, taboos, customs, codes of conduct) restrictions that structure the socio-cultural, economic and political context of interactions, complex combination of which simultaneously

promotes and constrains development, affects the coordination of actions (Boschma 2005; Kirat and Lung 1999; North 1991; Xu and Shenkar 2002). It is assumed that the entities embedded in a similar institutional framework are more likely to cooperate because they face the same incentives and constraints of the legal and socio-economic environment (Freel 2003; Kirat and Lung 1999; Torre and Gilly 2000). The informal type of institutions highly correlates with cultural proximity, as they are often called "cultural artefacts" (Morgan 1997, 493). Their interdependence is articulated as follows: "culture defines institutions that, in turn, reinforce the existing culture" (Hofstede, 2001, 10-11).Identification of the IP at the macro-level is often reduced to identifying similarities of formal institutions of countries and regions, such as the legal conditions, labour relations, accounting rules, etc. (e.g. see Zeller 2004). At the micro-level IP reflects similarity in the characteristics of the organizations' standards, business practices, etc., which are not identical in spite of the institutional setting at the macro-level (Knoben et al. 2006).

*Cognitiveproximity (CoP)*implies that the dialogue and the effective knowledge transfer require similar but not necessarily identical reference points. The concept was initially elaborated by Nooteboom (1999) inspired by M. Granovetter's 'strength of weak ties' and the 'absorptive capacity' concept of Cohen and Levinthal (1990), and is generally defined as the similarities in how people perceive, interpret, understand, and evaluate the world around them (Huber 2011; Wuyts et al. 2005), speak the 'same language' (Menzel, 2008), have common thinking, values and ideas, possess a certain mindset displayed by'mutual understanding' (Mattes, 2011) and apply 'common interpretative scheme' (Markusen 1996). Thus, CoP is responsible for the process of learning (i.e. acquisition, interpretation, and assimilation of new knowledge – the 'absorptive capacity'), as well as formation of sustainable relationship based on mutual benefit of possessing complementary knowledge (Lane and Lubatkin 1998; Mattes 2011; Nooteboom et al. 2007). The influence of CoP on the completeness of the perceived ('decoded') and integrable information by the recipient is reflected in the Denzau-North's dyadic 'sender-recipient' model.

As it is with regard to any proximity dimension identified, there is a threshold of 'closeness', which marks the negative influence of being 'identical'. Ambiguity with regard to CoP is that innovation process is always interfaced with the need for 'cognitively distant' knowledge;that is the absorption (incl. alteration, adaptation) of new information from outside the familiar environment, which requires interactions with entities of different knowledge base (Kirat and Lung 1999; Nooteboom 1999). The phenomenon of interaction with the aim of complementary competencies is presented in the 'related variety' concept (Broekel and Boschma 2012), in which the probability of 'cross-fertilization' increases with increasing cognitive distance between entities. However, the ability to understand and use new knowledge depends on 'cognitive capabilities' of a particular actor (Arthur 2007; Nonaka and Takeuchi 1995).

It shall be noted that the learning process takes place in close cooperation of CoP – mutual understanding and SP – the willingness of the parties to communicate with

each other (Mattes, 2011), andshare knowledge (Breschi and Lissoni 2001; Capello 1999), whereas the matter of learning (i.e. the matter of exchange) itself is represented in knowledge proximity, and technological proximity in particular. *Knowledge proximity(KP)*could be regarded as a subtype of CoP, which is more applied, and is divided into 1) technical knowledge (i.e. know-how) and 2) business knowledge – the awareness of the entrepreneurial environment (i.e. the resource investigator knowledge – the 'know-who' and 'know-where'; Balland et al., 2016; Capello 1999; Kogut and Zander 1992). The proximity of specialized knowledge is reflected in the concept of *Technological proximity (TP)* that refers to the knowledge that underlie a particular technology or market offering (i.e. product or service), hence, the similarity or degree of overlap of the bases of technological knowledge of the two cooperating entities, which are sometimes referred to as 'virtual proximity' (Schamp et al 2004) that facilitates the acquisition and development of technological knowledge and development (Fung 2003; Knoben and Oerlemans 2006; Lane and Lubatkin 1998; Tremblay et al. 2003; Tushman and Anderson 1986; Zeller 2004).TP can be identified via technological specialization, the products, the scientific and technological field of registered patents (Caragliu and Nijkamp 2016; Fung 2003; Mikhaylova and Mikhaylov 2016). It is argued that successful cooperation requires comparable technological knowledge base as to identify the opportunities offered by cooperation and ensure effective and creative use of new knowledge (Cohen and Levinthal 1990; Colombo 2003).Following the concept of 'learning spillovers', it can be stated that knowledge coming from activities in one technology may spill over to other technologies that are related in various ways because there are knowledge externalities and spillovers.

4. AN INTEGRATED APPROACH IN IDENTIFYING THE BOUNDARIES OF SPATIAL NETWORKING

Summarizing the aforestated, it can be argued that, *firstly*, learning depends on the type of actors and the kind of interactions they are engaged in, *secondly*, spatial networking requires physical proximity, favourable institutional and organizational setting, socio-cultural 'compatibility', and a type of mindset that follows an established pattern of a particular community. The conventional approach, as described above, suggests that a spatial network or a spatial (territorial, local) community can be delimitated from a general population via dyadic proximities between the networking entities (micro-level), the totality of which represent the properties of the whole – inductive reasoning. Meanwhile, national or regional culture, social environment, institutional context, etc. (macro- or meso-level factors) may act as indirect indicators that actors possess a certain level of proximity, and are, hypothetically, able to establish a system of interactions grounded in these commonalities – deductive reasoning.

However, applied research on delimitation of the boundary of a given spatial network, and its demarcation in particular, is faced with a substantial obstacle. Spatial network (similar to any other spatial community), as a representation of a system of interactions at a particular territory, is being characterized by the emergent properties

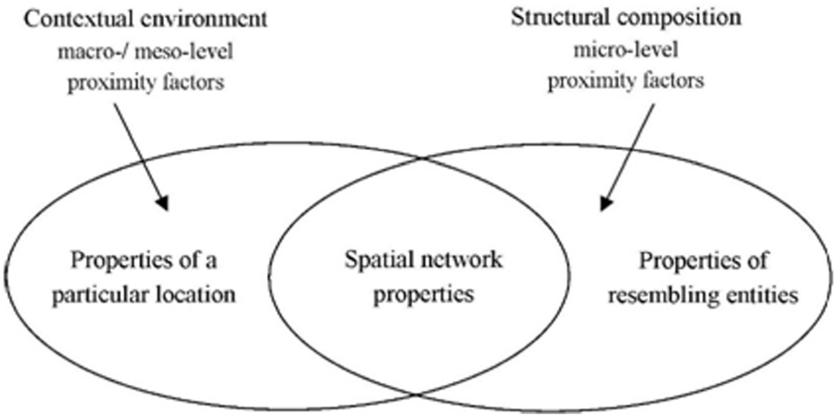

Figure 1: Factors affecting the properties of a spatial network

– common properties of a system that are not inherent in its subsystems (incl. individual entities, parts) or the sum of the elements. In essence, this means irreducibility of the properties of the system to the sum of its constituents. Hence, individual properties (characteristics) reflected in the dyadic proximities can only act as auxiliary element of the methodology, reflecting their compatibility to the properties of a network, similar to the indirect indicators of the macro- or meso-level. Thus, they cannot be applied directly for spatial networkidentification (i.e. delimitation and demarcation of the boundary of a spatial network). Therefore, identification of the network properties should capture the particularities of a contextual environment and the structural elements (i.e. the actors) of a network, being complimentary to the properties of a spatial network itself (see figure 1).

According to the proposed structure, delimitation of a spatial network is carried out both at the macro- / meso- and micro-levels. Analysis at the macro- (i.e. national) and meso-levels (at the level of the administrative-territorial entity, region or district, depending on the network under study) is required at the initial stage of research – identification of the territorial socio-economic system using statistical accounts, as well as for the following demarcation ofits borders. It enables to answer the basic questions of "where"– the approximate boundary of the network, and "what" – a type of network, to look for. Moreover, this data will provide initial insights on the properties of the spatial network: its maturity, composition (inter- or intra-industrial), reasoning of establishment (e.g. state support program, increased demand, etc.), the 'rules of the game' (i.e. institutional setting), etc.

Analysis at the micro-level – intranet, enables to distinguish the attributive and transactional characteristics of a population of entities outlined earlier. At this stage it is expected to investigate the major elements (i.e. the core, major actors) that could constitute the spatial network – the "who", including their properties and proximities, as well as the answers to "why" and "how" these entities are interacting (e.g. R&D

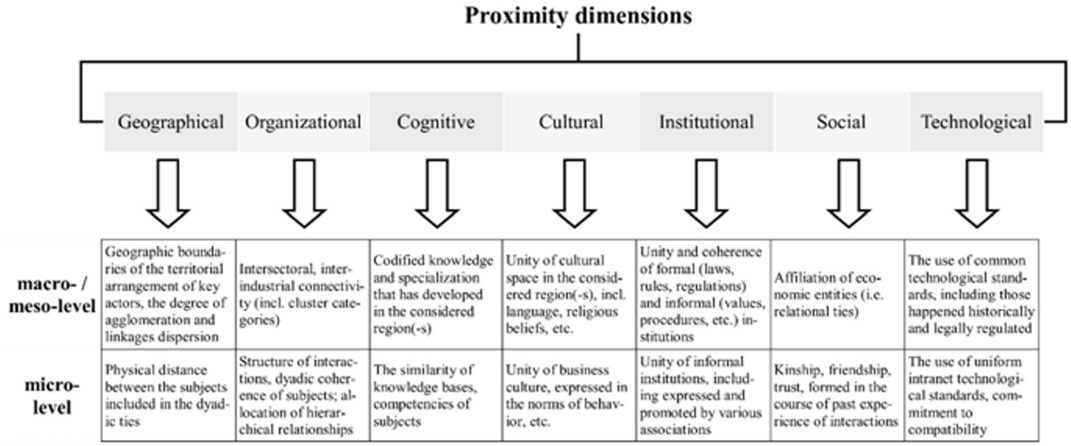

Figure 2: Application of individual proximity dimensions at different levels of consideration

collaboration, project cooperation, resource sharing, value chain engagement, etc.). Naturally, there are differences in interpretation of individual proximity dimensions depending on the level of consideration (see Figure 2).

Upon completion of the first phase of research – analysis at both levels of consideration (i.e. macro- / meso- and micro-levels), researcher obtains understanding on the type of spatial network being studied (note that this would correlate to one of the many theoretical concepts – industrial district, a particular type of cluster, technological district, technological complex, etc.). Thus, having convinced that there are preconditions of spatial networking of a certain type, the major challengeis to identify the specific (emergent) properties of a particular spatial network under study by matching the properties of individual actors to the network's core and analyse them against the contextual environment.A schematic representation of this process is reflected in figure 3, with the multidimensional boundaries of networking being reduced to a set of criteria of strong and weak virtual (i.e. a-spatial) proximities from a geographical perspective.

Weak proximity dimensions indicate blurred boundaries,which unable to delimitate a complete set of networking actors, thus, could be considered for exclusion from the following research process. Strong proximity dimensions are the ones to be used in defining the boundary of a spatial network, and its subsequent demarcation (i.e. the mapping process). To do so, each criterion is appointed with specific indicators inherent to a specific type of spatial network. For example, strong OP in a regional cluster would feature a cluster organization that would probably present common formalized approach to long-term development, to technological, quality and other standards, etc. Meanwhile the process of 'imitation', discovered by Polterovich (2009), ensures that actors tend to represent (i.e. imitate, duplicate) some of the key characteristics of the network, hence, resemble with the network on some key aspects.

		Dependent dimensions	
		strong	***weak***
Defining dimension	**Geographical proximity**	**Organizational proximity**	
		Institutional representation of the community	Agglomeration of specialized entities
		Social proximity	
		Meetings and events in particular expertise	Virtual linkages, dyadic relations
		Cultural proximity	
		Unified formal business standards, (e.g. fair trade)	Similarity of individual approaches and principles
		Institutional proximity	
		Unified formal quality standards (e.g. ecological)	Similar on key aspects that enables to cooperate
		Cognitive proximity	
		Common long-term development vision, mission	Interests coincide for a period of time on a particular issue
		Technological proximity	
		Single technological standards	Comparable technologies

Figure 3: Criteria on identification of the spatial network properties

This makesthe affiliating process possible, enabling the delimitation and demarcation of a spatial network boundary.

5. CONCLUSION

Each conceptualized form of spatial networking is characterized by a set of interacting entities – industrial enterprises, small and medium businesses, industry associations, universities, public authorities, engineering offices, research centres, associations and others, which are located in a certain area, at a certain physical distance from each other. This totality of actors varies depending on the area of cooperation and the transactional characteristics of the network, being initially interlinked by multidimensional proximities – attributive characteristics. Therefore, considering the boundary of different types of spatial networks is faced with an objective to identify and structure a miscellaneous set of particularities present at the macro- / meso- and micro-levels.

Current article suggests that identification of the boundaries of a spatial network, the delimitation and demarcation of the intranet border, is faced with the following methodological objectives. *Firstly*, it is required to grasp the particularities of a certain location – the contextual environment, featuring both tangible and intangible factors that affect the development of a territorial public system in general and a territorial socio-economic system in particular. Allocation of homogeneous and coherent districts outlines the study area, providing initial insights on the properties of the

spatial network, i.e. answers the questions of "where" and "what" to look for. *Secondly*,in-depth analysis on the attributive and transactional characteristics of a population of entities in the previously defined scope of study gives an assumption on the backbone of a spatial network under study, to the "who", "why", and "how" are engaged in the system of interactions. *Thirdly*, the specific properties of a particular spatial network are identified by matching the results of the previous phases of the methodology with multidimensional set proximity criteria, developed in order to capture the full range of networking actors at a given time period and undertake the mapping procedure.

Proposed methodological approach on delimitation and demarcation of a spatial network boundary is an integrated representation of recent conceptual developments on homogeneity and cohesion of local systems of regional development (e.g. local and regional development, local and global terrains, territorial ensembles) viewed through the prism of proximity concept. Further elaboration of the proposed approach should involve the appointment of each criterion of proximity dimensions with specific indicators, and its practical approbation.

ACKNOWLEDGMENT

The reported study was funded by RFBR according to the research project [1] 16-36-00258 «Equivocality in identifying the boundaries of spatial networking».

Notes

1. see the research of J. Cantwell, R.S. Burt, J. Zhang, et al.

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