

Explaining scientific networking with b2b network theories: the cases from the EU and Russia

Olga A. Tretyak and Nikita I. Popov

State University – Higher School of Economics, Moscow, Russia

Abstract

Purpose – The purpose of this paper is to extend existing theories of b2b networks over non-profit networks.

Design/methodology/approach – The paper sheds light on the network organisational forms recently implanted in the academic community. The analytic induction method is used to extend b2b network concepts to a non-profit context. The concepts of b2b networks are critically analysed and applied to explorative case studies of networks in academia. The paradox of open knowledge exchange in these networks is revealed and an attempt is made to elucidate it.

Findings – B2b network concepts should be modified before being extended to non-profits. Propositions are suggested to adapt b2b network concepts to explain non-profit networks. Questions to address in further research are developed.

Research limitations/implications – The main conclusions are only applicable to specific types of networks. Only academic networks are reviewed. The case study approach does not allow for generalizing the findings and deriving a set of concepts for non-profit networks, and thus, calls for further research.

Practical implications – There may be space for achieving excellence in research by facilitating interpersonal rather than interorganisational research networks. This is important, since by facilitating interpersonal networks one can escape from organisational bureaucracy.

Originality/value – The study reports networking between the non-profits, an issue largely neglected by marketing researchers, and contributes to its understanding in the frame of existing b2b network concepts.

Keywords Networking, Knowledge management, Russia, European Union

Paper type Case study

Introduction

Numerous advantages of flexible organisations for turbulent business environments attracted attention of managers and policymakers in as far as 1980s, and this was carefully documented in research (Miles and Snow, 1986; Piore and Sabel, 1984). Networking became a fashionable topic (Jarillo, 1988), and since then recognition of value and unique flexibility of many-faced interorganisational networks has been spreading within business community with a tremendous speed (Chesbrough and Teece, 1996). Following rapid amplification of managers' interest towards networking, some scholars have even declared these structures as a prototype of the organisational form of the future (see Snow *et al.*, 1992).

In search of new keys to national economic prosperity, policymakers were swift to place networks at their own service. The Danish Ministry of Labour pioneered to implant SME networks in 1989, soon thereafter British Commonwealth countries followed (Chaston, 1995), while UNIDO made SME networks a pillar in its industrial development programmes for two dozens of developing

countries of Asia, Africa and Latin America in 1990s (Ceglie and Dini, 1999; UNIDO, 2001).

However, as their use in business practice increased, network configurations gradually delivered new challenges for both managers and business researchers. Despite there is a certain consensus regarding understanding networks, i.e. their definitions, classifications, success factors and areas where these organisational forms are best applied and are most successful, there is a debate on how they should be managed (see Ritter *et al.*, 2004). The specific skills and competences that bring success to network managers, the ways networks are managed and the rules for evaluating their effectiveness remain largely uncovered, especially for those networks that are emerging value systems (Möller and Rajala, 2007).

Networking is an important up-to-date issue for non-profit sector as well. By now, education alone can boast of proliferating international academic exchanges, joint educational programs and joint-venture schools gradually becoming routine practices. Governments have a keen sense of the pulse of partnerships between business and scientific institutions, which are crucial for technology development and commercialization. Moreover, one might recall that at its early days, the emphasis of the studies of interorganisational networks was on non-profits (Thorelli, 1986, p. 37). Alas, it seems to be out of current account of the management thinkers, judging from the fact that recent research on network collaboration between non-profit organisations is comparatively rare. Notable exceptions are several articles on health and social care sector (Page, 2003; Provan and Milward, 1995, 2001; van Raak and Paulus, 2001) and

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charities (Galaskiewicz *et al.*, 2006). Hence, we feel it necessary to draw attention to collaboration phenomena in non-business settings, and to induce new research on networking with a focus on non-profits.

We devoted our study to formal interorganisational alliances implanted in science and higher education sector by various policy initiatives. In spite of already being widespread for years, they have not yet been analysed, except for in few papers on public policy (Fisher *et al.*, 2001; Luukkonen *et al.*, 2006). This paper's main purpose is to lay ground for the network view of these alliances, to demonstrate how they are designed and implemented, and to reveal new challenges they bring to the theory and practice of managing networks and relations. We reveal a paradox between what can be derived from b2b network concepts about knowledge management practices in these alliances and their actual knowledge management practices. We try to elucidate this paradox by combining perspectives.

We keep focus on cases of networks related to studying organisations and relationships: we believe that the analysis of such networks is of double importance for relationship marketing researchers who are also studying organisations and relationships. What's more, some argue that science is marketing (Peter and Olson, 1983), and so it may be a logical explanation that contemporary practices of relationship marketing now penetrate into processes of scientific inquiry.

In the subsequent section we discuss the theoretical basis and methodology of the study: the business network concepts and the qualitative approach employed to put these concepts to trial. The plot of the paper consists of two cases of collaboration in science and education. This discussion leads to insights into mechanisms of value creation through alliance relationships in science and education and to propositions to extend existing theories of b2b networks. The final section is devoted to comparisons, policy implications and conclusions for further research.

Concepts and methods

Theoretical framework

Theorists from economics, sociology and management sciences claim that business networks are valuable for their participants. Economists argue that by integrating into a group and making relationship-specific investments, independent entities can lower cost of transacting with each other (Williamson, 1985), as well as transformation cost due to specialization, scale effects and pooling of resources (Blois, 1972; Richardson, 1972). Sociologists emphasize mutual learning and control effects in terms of strong and weak ties (Granovetter, 1983), innovation generation (Powell *et al.*, 1996), control over and mediation of information flows between network actors (Burt, 1992), reputation benefits and access to market (Podolny and Page, 1998).

Management thinkers have elaborated on these arguments by pointing that relationship is a precious asset that grants access to partners' competencies, brings sustained competitive advantage and generates substantial relational rents (Dyer and Singh, 1998; Gulati *et al.*, 2000; Kotabe *et al.*, 2003; Zaheer and Bell, 2005). They also put in the picture that networks are means to make leaps in value creation, such as designing new complex products and technologies (see Chesbrough and Teece, 1996; Gomes-Casseres, 1994).

Besides, they emphasize the key role of effective relationship governance (Dyer and Singh, 1998, pp. 669-671) and alliancing skills (see Kale *et al.*, 2001) in creating value from relationships.

The issue of governance attracted attention of relationship marketing scholars who investigated relationship management practices, techniques and skills. They stressed the value of both customer loyalty and supplier commitment, and suggested that relationships between exchange participants are governed by norms (see Heide and John, 1992), informal self-enforcement mechanisms that emerge and evolve after certain level of trust, commitment and satisfaction is achieved by exchange participants (Dwyer *et al.*, 1987; Håkansson and Snehota, 1995). Violation of norms may destroy trust and dissolve relationships. Moreover, researchers in marketing are in agreement with strategic management scholars that virtual organisations can be virtuous in developing innovative technologies and solutions, but explain that for a certain technology to become a dominant design, it should first break the old norm, and next itself turn into a new norm for the market players (see Srinivasan *et al.*, 2006).

Relationship benefits become sustainable due to mechanisms and strategies to preserve them from being copied by competitors. Laws protect the means of establishing and maintaining relationships, e.g. brands and advertising, and relationship outcomes, such as technological know-how. But relationship-specific investments put partners at risk of opportunism and leave them unprotected by laws. For example, exchange of valuable knowledge that takes place between the partners, puts them at risk of a learning race, i.e. asymmetrical knowledge and technology exchange (Dyer and Singh, 1998, p. 666; Gulati *et al.*, 2000, p. 211) that can be destructive for those who share their know-how without reasonable return. Norms of internal knowledge development and means to enforce reciprocation in exchange are thus necessary mechanisms to preserve relational rents. Internally developed knowledge should be protected from being copied by potential competitors, including the current alliance partners.

Interorganisational network was also acknowledged as a separate unit of analysis in both strategic management (Jarillo, 1988; Miles and Snow, 1986; Thorelli, 1986) and marketing disciplines (Achrol, 1991; Gummesson, 1994). Various forms of such networks were identified and typified, and many novel terms were introduced to name different types of networks, including "mutual firm" (Child, 1987), "hollow", "vertical" and "horizontal" corporation (*Business Week*, 1986, 1993a, b), "dynamic", "layered", "flexible", "virtual", network (Achrol and Kotler, 1999; Cravens *et al.*, 1996; Snow *et al.*, 1992) to name a few. Among them, the term "strategic networks" seems the most relevant to the cases we discuss, so we will explore it in more detail. In line with highly-cited conceptualizations (e.g. Jarillo, 1988; Miles and Snow, 1986; Möller *et al.*, 2005), we define strategic networks as interorganisational alliance systems, purposefully designed by some organisation(s), individual(s) or group(s), pursuing goals shared by all participants and having a common strategy. Such networks can be formed either through disintegration of a (usually) large corporation, or through integration of autonomous entities.

For those strategic networks that emerge through integration, several "life-cycle" concepts of step-by-step development through a sequence of stages were proposed (Burlat *et al.*, 2003; Ceglie and Dini, 1999; Chaston, 1995;

Sprenger, 2001; Varamäki and Vesalainen, 2003). By and large, the sequence includes stages of network emergence/design, formation/implementation and “normal” operation. A network emerges when mutual trust and understanding are well-established among its participants, and they agree to work together. Network formation is itself a multi-stage process of gradual integration and tie routinization. Durable integration and normal functioning of a network are meant to be achieved during the third stage due to regularity, self-sustainability and autopoiesis of network ties. Such “mature” networks are characterised by strong mutual commitment and high mutual dependence of partners that may result in high relational rents (see Blankenburg Holm *et al.*, 1999). Needless to say, benefits do not emerge by themselves, but merely result from management processes and other coordinated activities of network participants during network operation.

We summarise this brief theoretical discussion in Figure 1.

We do not provide a fair and complete summary of all theories we reviewed, we only make a “simplistic” summary suitable only for those strategic networks that emerge and grow through integration. We acknowledge that the theories we reviewed can lead to other causal links, however, the picture we provide is not in contradiction with them. We focus on internal dynamics of a formal network consisting of a closed set of relations. What is beyond the scope of such network, including business network context and structural inertia, remains subject to further study.

It seems important that the above-mentioned theories were designed to explain networking in b2b and b2c settings, i.e. among for-profits. Large samples as well as single cases used for both theory development and validation consisted of business organisations. Is networking between non-profits different, and why do we not simply extend the business network concepts to explain it?

What is special about non-profits is that they are more like households than firms (James, 1983). To achieve their mission, they expand the scope of their activities and resources, maximise budgets, as well as consumption and social welfare, but not profits. This difference in goals is fundamental to interaction patterns and coordination

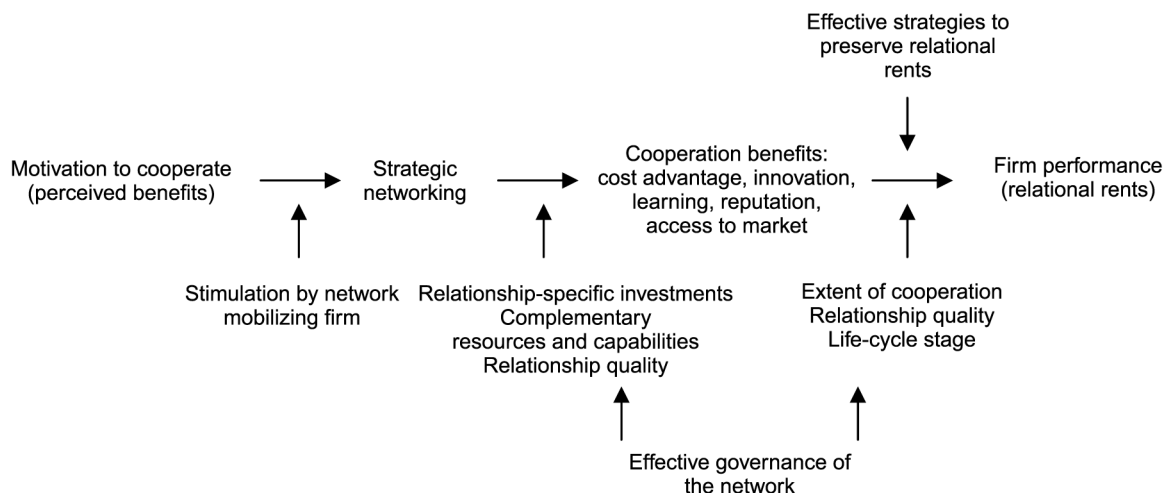
mechanisms, since structure depends on strategy, at least in businesses (Chandler, 1980). Moreover, non-profits are different because of the kind of value they create (public goods vs. private goods) and due to unique value-creating activities they rely on, such as volunteering.

To merge concepts, however, we should overcome the dichotomy of for-profits versus non-profits. We acknowledge that for-profit organisation can possess some properties and employ some practices of non-profits, and for that matter, we propose the concept of non-profit orientation of an organisation that can be defined in several different ways. It can be defined as the extent to which its activities are guided by non-profit goals. In relation to strategic network this comprises common and individual members’ goals, the goals of employees as well as non-profit motivation to cooperate. For example, non-profit orientation of a group of charities that completely rely on volunteering will be greater than that of a network of hospitals that cooperate for cost reduction. Thus, the level of non-profit orientation of a for-profit can be assessed by the extent to which it relies on volunteering, and the extent to which its actions are guided by goals other than profit-seeking.

There is no “grand” theory of (strategic) business networks. Instead, existing knowledge consists of numerous competing but closely interwoven concepts, and we have only provided a short simplistic summary of these concepts. Although different views and arguments always lead to contradicting conclusions about value of network interactions, this is the main way how this theory is currently being developed. What is more, discussion of networks in marketing largely relies on arguments from other disciplines.

To summarise, in this paper we explore a misfit between business network theories and deviant cases in non-profit context, and attempt to expand the theories to non-profit context using analytic induction method (see Flick, 2006, pp. 390-391). We neither aim at criticizing concepts, nor try to prove one concept’s supremacy over other. We rather demonstrate a paradox and make an effort to resolve it by combining perspectives. We adopt a multidisciplinary view, since we believe that it yields a better understanding of

Figure 1 Simplistic theoretical summary for strategic networks



Source: Authors

networking phenomena. This opinion is partially driven by recent calls in marketing literature to integrate perspectives (RMSummit2007), and to adopt midrange theories to overcome paradoxes (see Saren and Pels, 2008) and supported by the fact that other papers on networks of non-profits also used a mix of theories instead of a single concept (see van Raak and Paulus, 2001).

Methodology

In order to demonstrate observations of context and practice, and to ensure their understanding, we chose single case study approach. We explore two networks: a large-scale European network of institutions investigating innovation policy and a smaller scale network of researchers studying interfirm relationships in Russia. We specifically inquire into what kind of benefits the former network provides to its participating bodies, and into the way the latter network has emerged, evolved and sustained. For both case studies, triangulation of data was adopted as a strategy of research credibility. External validity of our preliminary findings has been supported by peer reviews of conference presentations and by occasional feedback from members of networks, similar to the cases under study, and from external observers of these networks.

The first case provides a rich description of European science and technology policy initiatives and outlines an example of recent successful policy-implanted network. It documents the chain of interrelation between the context (policy needs), the stakeholders and the declared purposes. We relied on a large amount of secondary data that initially was collected for practical purposes of studying European experiences of scientific networking. On collecting the policy-related documents and reports, several short cases of networks were produced. Data was triangulated by analysing and comparing network internal reports and web sites with those external publications about them that relied on primary data. We were satisfied with the amount of evidence about only one of the cases examined, and we present it in this paper. Although analysing facts on these networks and scarce existing scientific literature provided some insights, we came to conclusion that our findings are limited, since we only examine the data that is open to wide public, without taking informal interactions into account. However, this limitation simultaneously improves reliability of our findings compared to those based on constrained access data.

The second case is about nurturing research networks in a developing country (in Russia). We detail how environment influences dynamics of the network: its emergence, design and perspective. Data was gathered by summarizing personal experiences; next, exchanging experiences between participants, structuring the case and discussing it with external observers. To minimize potential bias we provided only the fact-based summary that was checked with network participants, external observers, internal documents and the literature.

Case 1: European networks of excellence

In this section we discuss the case of network facilitation through recent European science and technology policy. We structured it into subsections of “Design” that is dedicated to contextual factors and “Implementation” that is devoted to

case analysis. We devote substantial space to describing contextual factors for three reasons:

- 1 to provide some background information about these networks;
- 2 to explain the reasons why these networks were stimulated; and
- 3 to emphasize the design dimensions of these networks that are decisive for their functioning.

Together this supports systematic understanding of these networks, and hence, the subsequent case network. After explaining the context using concepts and terms from the policy documents and associated policy studies, we translate the argument into the language of relationship marketing and management. This brings a perception of paradox which is further revealed through the case study and examined in “Discussion” section at the end of the article.

Design

In the twenty-first century European policymakers recognized the need to coordinate the research directions and priorities, and the national science, technology and innovation policies at the European level in order to achieve and sustain research excellence. The concept of the European Research Area (ERA) was introduced, an area of free movement and exchange of knowledge and technology (European Commission, 2000). To achieve more tense integration, two instruments were proposed in the 5th Framework Programme (FP5) (1998-2002) – “thematic networks” and “concerted actions” (The Council of the European Union, 1999). Their positive effect on integration inspired the Council and the Parliament to propose two new instruments in the FP6 (2002-2006): Integrated Projects (IPs) and Networks of Excellence (NoEs) (European Parliament and The Council of the European Union, 2002, p. 29), which survived into the FP7 (2006-2010). Prevailing thematic priorities are natural sciences topics, such as biotechnology, aeronautics or atomic energy. This fact may reflect both the importance of natural sciences for technical progress and the importance of scale effects in these research fields (Luukkonen *et al.*, 2006, p. 241).

The general purpose of a NoE can be described as achieving “scientific and technological excellence on a particular research topic” (European Commission, 2003, p. 1), i.e. the capacity to promote scientific progress. Reading between the strings, one can see a further sense – the scientific excellence is what should benefit to people of the European Community. Thus, it is stated in the “Provisions for implementing networks of excellence”, “these networks do not act as “closed clubs”, concentrating only on strengthening the excellence of the partners inside the network” (European Commission, 2003). This would really seem strange from the b2b network point of view, which prescribes network partners to protect their valuable knowledge from being copied and indeed to act as closed clubs.

Both academic and business communities are NoE stakeholders. In practice, though, NoE members were almost exclusively universities and research institutes. Businesses engaged in interaction with academia via different interfaces, e.g. Integrated Projects, ambitious large-scale research projects or programmes lasting for two to four years. A business-focused example is the ECOLEAD project (IP 506958), which:

...is expected to impact industrial competitiveness and societal mechanisms by:

- 1 provision of means to effectively exploit opportunities derived from the deployment of Collaborative Networked Organizations;
- 2 designing and enabling new professional work paradigms... (ECOLEAD, 2008a, p. 14).

More than half of the consortium members are businesses (ECOLEAD, 2008b), while the most important project deliverables are handbooks and electronic tools to support interfirm collaboration.

NoEs and other large-scale cooperation projects proliferated: overall, more than 300 projects were funded and launched under the FP6 in 2002–2004. Most active cooperation pioneers were members of the pre-existing research and development networks, those with extensive alliance experience. A prime example of research community that benefited from the Commission's financial contribution is Virtual Enterprise Forum (VE-forum) (VE-forum, 2008). Some of its thematic "special interest groups" (SIGs) managed to structure themselves in a way that fitted all criteria set by the "Provisions" and received European funding for their activities. Among them are ECOLEAD and a NoE called Concurrent Enterprising (IST-1999-29107) (CE NoE, 2008). Similar examples can be found in other scientific fields (see European Commission, 2008).

Europe was neither unique, nor first in launching integration initiatives of this type. Canada launched its programme of Networks of Centers of Excellence (NCEs) in as far as 1989; UNCTAD's (2007) Network of Centres of Excellence (NOCE) started in 2005 is another relevant example. UNCTAD's initiative aims at increasing mobility and raising excellence in methodology for researchers from developing countries in response to their need to close the gap with developed countries. It does not only provide better training but aims at creating links within the scientific community, and it is very similar to a European NoE in this respect, although it is less oriented towards reaching a common research platform. Unlike NoE, the NOCE has a wide agenda, including agriculture, medicine, and biotech. Canadian NCEs responded to a different need and served very different purpose. The situation in 1989 Canada could be better described like: "...the country can no longer afford researchers who isolate themselves in the academy, pursuing esoteric problems at public expense." (Fisher *et al.*, 2001, p. 322), and the aim of the programme was to promote "the commercialization of academic science and academy-industry partnerships" (Fisher *et al.*, 2001). So the Canadian programme was designated to change the culture of research and to make universities more commercially oriented, but again through facilitating networks.

If one compares the European Networks of Excellence with the both programmes, one can suppose that there should be fit between context and goals/strategy, as well as a balance between the stakeholders. The programmes by UNCTAD, the EU and Canada seem to have responded to the most important problems of underdevelopment of research, fragmentation of research, and weak partnerships between business and academia respectively. Still, it is interesting that the three different authorities chose by and large the same instrument, namely network facilitation to resolve all three problems in their unique contexts. Since our case is devoted to NoEs, we will further concentrate on analysing it.

By design, a NoE is a large-scale formal professional network with clear boundaries, selective membership criteria and considerate entry barriers that are mentioned in the very name of "The Network of Excellence". NoE's members are the structural units of organisations or "labs". NoE activities fall into three broad categories:

- 1 integrating activity;
- 2 joint research programme; and
- 3 knowledge dissemination.

Financing is allocated between these labs via competition through a call according to the Joint Programme of Activities (JPA), a common working plan for the NoE that should be crafted yearly. The overall organisation of NoE, rights and obligations of its members, its management and voting rules are regulated by The Consortium Agreement signed by all NoE members. It serves as a "Constitution", and consolidates general rules of interaction within the NoE. Rules include common standards for intellectual property management and knowledge dissemination (European Commission, 2003, pp. 15–17). According to these rules, royalty-free access to knowledge developed by a certain NoE participant in joint research projects should be granted to other NoE participants whenever they need it to execute their own part of the JPA.

NoEs are required to have some management bodies or mechanisms to communicate with the Commission, control the behaviour of participants according to the standards set by the Commission, evaluate NoE progress, etc. (European Commission, 2003, pp. 3–4). This can be a collective, or several collectives of individual participants (as in INTEROP NoE), supported by an independent external management body (as in PRIME NoE). But in both cases, "(t)he consortium must designate one of its participants to act as the co-ordinator of the network" (European Commission, 2003, p. 10). Besides, management from the view of the network as a whole is supported by shared goals and priorities as well as shared interaction standards and communication channels, and includes several functional bodies and committees. Finally, the JPA's research projects and training programmes should have their personal coordinators (such as Lead Partners at PRIME NoE, Coordinators and Cluster Coordinators at DELOS NoE (2008), etc.). In practice, the management system of a NoE is not simple, because of the Commission requirements.

The general purpose of a NoE is to achieve excellence and to spread it, in economic terms, to provide a public good (purpose-outcome), e.g. a commonly beneficial new knowledge, such as a metastudy (ONCE-CS NoE, 2008) or megaproject (Epygenome NoE, 2008). This is meant to be attained through durable integration of participants, i.e. certain improvements in the process of producing public goods (which is purpose-process). Integration is not limited to human factor and communications, but should be supported with shared infrastructure and depends on attaining "the critical mass of resources and expertise" (European Commission, 2003, p. 1) which should allow for significant economies of scale. Critical mass is an intuitively defined substance that depends on the number and diversity of participants, and quality of their integration (shared communication and information systems, common data codification and intellectual property management systems, common research methodologies, shared databases, facilities for research, training, discussion, review, publication, etc.). European

experience shows that supporting the limited number of member organisations (optimally 6 to 12 participants) is important for the quality of integration: “it is better to have 5 institutions each dedicating 20 researchers to the network, rather than 20 institutions each dedicating 5 researchers to the network” (European Commission, 2006, p. 8). Integration includes many aspects, including social, economic and cognitive. Integration efforts are supported by large financial resources. The Community contribution in NoEs is around 50 per cent of their total budgets (see INTEROP NoE, 2008), just like it was for NCEs in Canada (Fisher *et al.*, 2001, p. 324). Figure 2 outlines NoE design framework.

To summarise, NoEs are organised around joint activities, partially financed by the European Commission and regulated by complex governance structures. They are nurtured intentionally, they share common purposes and development strategy, and even have a yearly plan with a budget (JPA). Hence, they suit to the definition of strategic networks. Can strategic network theories be applied to explain value creation in NoEs?

The left sides of “theoretical” and “practical” pictures are almost equivalent. Next, similarly to how the strategic networking process is expected to lead to positive effects subject to relationship-specific investments, complementary resources and capabilities, and certain level of relationship quality, pooling researchers is conceived to lead gradually to achievement of critical mass subject to maintaining shared infrastructure for cooperation between them. In both cases joint governing bodies are considered to influence costs and quality of coordination through enforcing norms, introducing shared standards and evaluating activities. The NoEs’ expected final outcomes, i.e. excellence in research, can be assumed a non-profit equivalent to relational rents or performance gains. The durable integration of participants is conceived to be the main catalyst of the move towards research excellence in NoEs. In essence, it is characterised by participants’ commitment and fairness (relationship quality), requires long-term interaction experience (thus, a certain state of network maturity), induces change in member organisations (including changes in norms) and causes irreversibility of these changes (due to the extent of cooperation). To summarise, the “practical” picture of NoE design as a policy instrument can be by and large explained by theories from economics, sociology, management and relationship marketing, developed for explaining strategic networks.

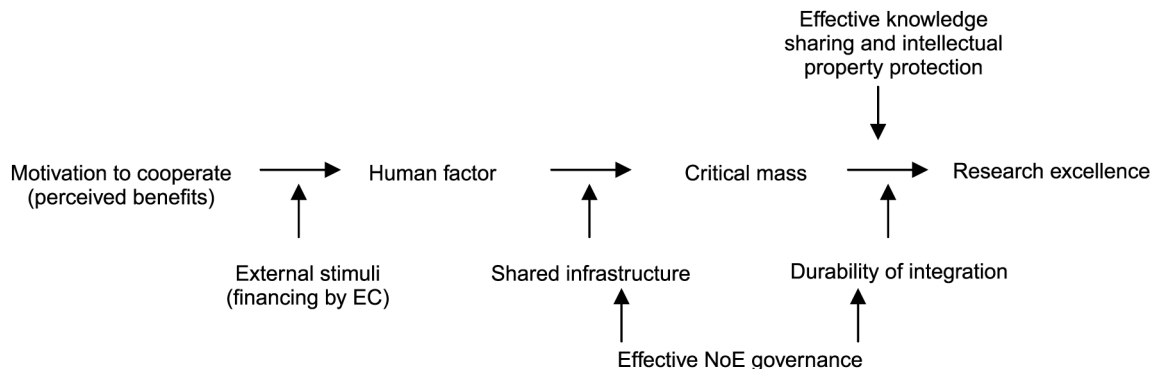
Still, there is a non-profit specificity that seemingly contradicts to the way business networks are functioning. NoEs are designed to freely disseminate their experience and excellence across the ERA, whereas business networks would only share some of this kind of knowledge among the cooperating partners. Naturally, scientific knowledge is a public good, and sharing it is a tradition. Moreover, the European Commission provides financing for joint knowledge dissemination activities, although this financing should eventually come to the end. Probably, NoEs only spread their formal output which is much less valuable for research excellence than tacit knowledge located in NoE internal relationships? Anyway, the practice of completely open knowledge exchange simply does not fit strategic network concepts. Hence, what effects does it have on NoE participants, and can we explain it with any of the concepts explaining b2b networks? Attempting to get answers, we will shortly review NoE implementation patterns.

Implementation

Our case is devoted to PRIME (Policies for Research and Innovation in the Move towards the European Research Area), one of the most successful Networks of Excellence established in 2003 under the FP6, topic “Citizens and governance in a knowledge-based society”. At its launch, PRIME already united substantial critical mass, over 200 researchers from 40+ institutions in 10+ European countries, it was approximately the third of all researchers in Europe in the selected fields of Science, Technology and Innovation Policy studies. What’s more, by 2008 the NoE has grown in numbers twice and included 100+ PhD students. New participants were proposed by established participants and accepted through formal application and approval of the PRIME Governing Board, which included all member organisations (PRIME NoE, 2006a, p. 5). Integration of PRIME participants was supplemented by shared facilities that include e-management platform, databases, common publication of book collection, a shared mail list and a web-portal (PRIME NoE, 2006a, pp. 4-6), and it is claimed to be durable and long-lasting (PRIME NoE, 2006b), although PRIME’s financing period expired in the year 2008. PRIME doesn’t possess shared physical infrastructure.

PRIME’s integrating activities comprised European platform for integrated training (MSc and PhD student exchange programmes, joint professional training, joint

Figure 2 NoE design framework



Source: Authors

conferences and research paper contests, etc.) that resulted in joint research, co-tutoring and courses development. Joint research (reviews, exploratory research and comparative research projects) was organised in research projects (on average, more than 20 ongoing projects altogether). Permanent joint research groups called “workshops” were formed to implement some of the projects. A research project in PRIME had to involve at least three institutional members from three different countries (PRIME NoE, 2007). On average, in 2006 a PRIME institutional member was involved in four to six common projects, maximum number being 18 (PRIME NoE, 2006a, p. 13). Better integration between participating institutions had indeed been reached during PRIME functioning, as measured with formal SNA methods by network density increase between 2004 and 2007 from 0.18 to 0.45 and the development of the core of the network (Luukkonen and Nedeva, 2008), as well as by the evidence that research agendas became closer. The joint research projects provided proposals for uniform indicators for the progress of science and innovation and stimulated harmonisation of nomenclatures and classification, although less than expected, and the European indicator platform for the design of new indicators has been created. Anyway, the PRIME results did not provide evidence of the impact of integration on research excellence of the key members. What is more, the benefits of aligning practices and agendas were not evident for organisations, which faced many administrative impediments.

Knowledge dissemination occurred as a result of research integration and was supported by PRIME annual meetings, annual Conferences hosted by the member institutions, the PRIME Forum and special networks that were launched to stimulate discussion and involve non-members into knowledge development. The largest among them was the European Network of Indicators Designers (ENID) which stimulates networking in the ERA in this area of science and was transformed in an association in 2009 to succeed PRIME NoE. A special programme designed by PRIME members helped to bring more researchers from EU New Member States to the NoE. Internal information on the projects and activities is not published, but exchanged among all members of the NoE. Much effort was devoted to bring more teams of younger researchers into the network. PRIME launched several joint programmes of training, including European PhDs and European Masters with aim to improve future capabilities by training the next generation of researchers. Dissemination and implementation of results actually benefited reputation of the participating academic bodies. ENID association was to a much extent guided by the PRIME members, and was coordinated in 2007-2008 by one of the key members, Observatoire des Sciences et Techniques in Paris. Besides, networking activities resulted in reciprocal discussion and dissemination efforts from the part of non-members, by their increased participation in the NoE activities, many of them finally joined the NoE. To summarise, the network exchanged technological knowledge with non-members and gained additional membership (resources) in result of such exchange.

PRIME governance structure was rather complicated. Joint activities were managed by the Governing Board (all members), the Executive Committee (12 members elected by the Governing Board), the Management Team, and evaluated by the Scientific Committee (six members), the

Standards & Ethics Group (three members), and the Characterisation Group (three members) (PRIME NoE, 2007). Besides, PRIME adopted a formal multidimensional activity evaluation system with numerous indicators to measure dimensions of integration and excellence such as “Shared data collection principles” or “Developing procedures for sharing of equipment and facilities” (Luukkonen *et al.*, 2005, p. 25). Apart from that, it established a formal procedure for counting voting rights that included involvement of each group (Luukkonen *et al.*, 2005, pp. 35-37). Overall, NoE management systems proved to provide hindrances and complicate interaction, especially as far as intellectual property protection, compliance to EC regulations and reporting are concerned, although they might have fulfilled their main regulative functions (Luukkonen and Nedeva, 2008). In other words, the actual governance had both positive and negative influence on strategic networking in PRIME.

Case 2: NoE made-in-Russia

In this section we outline the case of facilitating a research network in Russia. We structure it in the sections of “Design” and “Implementation”, similar to the first case. Conclusions and propositions follow in the “Discussion” section.

Design

In recent years, the Russian Government recognized the need to advance research and higher education as a priority and initiated policy programme with aim to modernize national educational system labelled “The National Project ‘Education’”. Policy actions were organised into three stages:

- 1 To experiment with new practices in education.
- 2 To induce large scale changes based on the best practices.
- 3 To “crystallize” institutional changes (Russian Government, 2006).

The main goal of the first stage was to apply new education management approaches in selected institutions, to support development of new high-quality education programmes and to promote the “growth poles” and “excellence leaders”. To achieve this, the higher educational establishments were invited to develop Innovative Educational Projects (IEPs) – the plans for modernizing research, developing new teaching courses and experimenting with new management approaches. Competition for funds was launched among IEPs and the best of them were sponsored.

Inspired by the EU’s best practices, several cooperation projects called “Networks of excellence” were financed under the IEP at the State University – Higher School of Economics for the period of two years (2006-2007). In essence, these projects were designed after the EU FP6 NoEs as new forms of organisation in science dedicated to assembling and coordinating resources and expertise internationally on a long-term basis. Similarly to the NoEs in Europe, Russian projects addressed fragmentation of research activities. Still, there were several important differences.

First, no funds were provided for research activities in Russian NoEs, which were only regarded as means to induce collaboration, and not to conduct joint research projects. Financial support was only available for creating collaboration infrastructure and organising knowledge dissemination activities. Members were empowered to propose any kind of projects and to seek for research funds independently.

Second, whereas European programmes aimed at fostering research, Russian projects aimed at modernization of educational system, which is even more challenging. The “excellence leaders” had to face the divide between science and higher education caused by strong organisational isolation. The research institutes concentrated on R&D, while universities pursued their primary educational objectives; no one was eager to cooperate. Thus, the scientific excellence was hard to reveal and to spread. Moreover, it was important to promote partnerships between business and academia to ensure that knowledge dissemination would have a long lasting impact on business practice, since the interaction between business, education and science was far from being well-established. The turbulent transition environment and inadequate enforcement of contracts forced all kinds of organisations as well as ordinary people to pursue short-term objectives and rely on their own, although notice was given of certain trends in favour of a longer-term orientation in the economy as a whole (Yakovlev, 2006). Economic resurge at the start of the 2000s brought new cooperation practices such as joint “enterprise chairs” in universities established by the leading corporations, joint corporate training programmes, joint course development by academics and business leaders, creation of steering committees at universities, individual faculties and even departments, as well as the idea to introduce NoEs.

Hence, it was conceived that under these circumstances the primary NoE purpose should be to spread excellence by establishing strong thematic partnerships between business, science and education. Specifically, the NoEs in Russia aimed to promote a new research agenda and to breed a new generation of young scientists.

Another important difference that influenced NoE design in Russia was low personal mobility that catalysed organisational and regional isolation for decades. The tradition to stay in the same institution after graduation caused strong social ties between researchers that are probably stronger than those in Europe or Canada. Thus, contrary to European NoEs and Canadian NCEs, the Russian projects were designed as primarily interpersonal networks based on social interactions, not the Collaboration agreements. Members were free to join the network on the basis of common interest, and were in fact actively invited to do so in the absence of funds. This actually caused the network to resemble a research association in many respects. For comparison purposes, we cross-tabulate four network arrangements in Table I.

Besides, several specific factors related to the network in question should also be mentioned.

First, specific barriers related to how marketing science and relationship studies evolved in Russia. In marketing theory and practice the gap between Russia and the most developed economies is great. While since 1960s the marketing management concept as an all-encompassing customer-driven way of management has been widely accepted by businesses across Europe, the USA, Canada and Japan, in the 1990s Russia the simplistic approach to marketing as a selling tool and a synonym to promotion became very widespread, and this inevitably led to adoption of an abridged version of functional approach to marketing for research purposes. By the early 2000s the level of understanding of the marketing concept in different regions and different universities was quite uneven. And the shifts in theoretical foundations of

marketing science (see Dixon, 1989; Grönroos, 1997; Vargo and Lush, 2004) made the situation in Russian marketing studies even more critical. The fast development pace and the changing paradigms of the marketing science required the new understanding of marketing in Russia, and customer loyalty campaigns in services sector and modern practices of the Western companies entering Russian market provided important practical examples. To use this leverage it was decided to involve businesses to participate in the network.

Second, when designing the network, European NoEs’ and virtual communities’ management practices were used. Hence, similar to what was considered a best practice of management the proposed governance structure of Russian NoE consisted of a number of committees and boards that were to be created after there are enough members in the network.

It was conceived to develop a common vision and a research agenda according with the needs of Russian business reality, and to promote new knowledge in marketing via networking.

Case network

The case network called “Development of interfirm cooperation forms: networks and relationships” was launched in 2006. The group of researchers at the SU-HSE formed Administration Team that took on responsibility to disseminate knowledge on the contemporary state of research in marketing science and to promote marketing as a modern concept of management. The virtual community formation was initiated by inviting members based on previous personal contacts, launching a web site, a common library of studies on networks and relationships, hosting conferences and seminars, creating new teaching courses. The network dedicated itself to spreading excellence by organising academic events and exchanges, and more researchers joined the network after each conference. The communication barriers caused by geographical dispersion of members proved to be great, since Russian teachers are generally not used to real-time virtual communication. To foster networking and to achieve larger scale, employer organisations (universities and businesses) were also invited to join the network. Negotiations on collaboration have resulted in several bilateral collaboration agreements between SU-HSE and other organisations for the year 2007. Thanks to these efforts, by the end of 2007 the network turned into a wide association of people and organisations.

The NoE funding ceased in 2007, but collaboration infrastructure was in place to support further cooperation. By the year 2009 network united 80 + members from six countries, mainly professors of management and marketing from various Russian universities. Similarly to some European examples (CE-net and ECOLEAD), the Russian NoE was embedded in a virtual community of researchers called Virtass (an abbreviation from Virtual Association), but this community was fewer in numbers than the NoE. Interaction and communication was taking place between the Administration Team members and the other individual members, hence, the centrality of the network remained very high. The Administration Team remained fully responsible for development of common infrastructure, coordination of activities and organisation of common events (conferences and meetings). The governing bodies were not created since no one expressed such need.

Table I NoEs, NCEs, research associations and Russian NoE project: a comparison

	NoE (EU)	NCE (Canada)	Research association	Russian NoE
Challenge to respond at the emergence stage	Fragmentation of the research community	Separation between research and business community	New theoretical and scientific developments	Separation between science and education, and business
Primary purpose	To achieve scientific excellence	To improve technology commercialization	To advance research	To modernize educational system
Prevailing stakeholders	Academic bodies or businesses	Businesses	Individual researchers	Individual researchers
Prevailing dimension	Integration, spreading excellence or both	Integration	Integration	Spreading excellence
Who participates	Academic bodies	Academic bodies and businesses	Individual researchers and business people	Individuals and organizations from academia and business
Inclusion/exclusion criteria	Strong criterion of excellence	Strong criterion of excellence or funding	Weak criterion of excellence	Weak criterion of excellence
Funding mechanism	Governments of European countries (50 per cent)	Canadian Government (50 per cent)	Occasional funding opportunities	Russian Government (infrastructure grant), member organisations (research funds)
Who gets money	Member organisations	Member organisations	Groups of researchers	Administration and groups of researchers
Distribution mechanism	Competition through a call	Competition through a call	Personal network	Hierarchical distribution

Source: Authors, partially adapted from Luukkonen *et al.* (2006, p. 244)

During 2008 some of the Administration Team members became national coordinators in an international research of interfirm relationships. Based on initial positive experiences it was decided to involve NoE members and to use this opportunity to start a pilot joint research project. On invitation, seven members agreed to become regional project coordinators and to build up research teams in their respective organisations. The research plan and general regulations were developed, and a modest funding to distribute among all project members was secured by the Administration Team. At the beginning of 2009 the whole team comprised 35 researchers and the project was under way in seven cities across Russia. The project participants agreed to share research facilities and tools, to produce a number of joint publications and to continue with a new project.

Discussion

To summarise, the two cases support that some current practices in non-profit academic networks can be considered exceptional in business network settings and contradict to concepts of b2b networks we reviewed.

First, both cases validate that open exchange of technological knowledge, not just the “product samples” as mentioned by Peter and Olson (1983), actually took place in both cases, and that this practice ultimately benefited to both networks. There is evidence of some progress in research excellence of PRIME members, although it is unclear if all members in fact gained the kind of benefits which would otherwise be unattained. But the results associated with open knowledge exchange, such as means of such exchange, e.g. ENID, were supposed by PRIME members to be the most valuable outcome of joint activities, since this provided the feeling of self-accomplishment.

Second, both case networks grew in numbers very fast, which is not a rule for b2b networks. Whereas the Russian

NoE aimed at fast growth from the beginning, PRIME grew in numbers contrary to recommendation set by the European Commission, and actively engaged non-members into cooperation. It seems that open knowledge exchange was conducive to growth of both networks. However, this suggestion needs further investigation.

Open knowledge exchange seems to be a “negative case” in the sense that it contradicts to practices of b2b networks. It is not a “unique NoE effect”, since organised knowledge and skills exchange via rotation of personnel, joint training programmes and regular knowledge dissemination activities improved reputation of NCE members (Fisher *et al.*, 2001). Neither it is an exclusive effect of scientific networks: open knowledge exchange is supposed to characterise customer communities (see von Hippel, 2006) and communities of creation like Open Source Movement (see Sawhney and Prandelli, 2000), which are normally interpersonal not-for-profit networks. Moreover, large corporations have come to nurture and merge their customer communities and developer communities (such as IBM Alphaworks, Linux and Microsoft.NET), with opening knowledge exchange to capitalise on community innovation potential and reap additional benefits from innovations developed internally. Finally, it seems that the practices of exposing privately developed knowledge to the general public can be applied by strategic networks of the future (see Miles *et al.*, 2005).

From relationship marketing perspective, open knowledge exchange and protected knowledge access are alternative norms of firm behaviour. Under certain conditions, these norms turn into industry standards. The prevailing norm in most industries and in most settings is protected knowledge access, however switching is possible. The case helps to identify three sources of benefits from sharing for those who switch: reputation gains, reciprocation of exchange and recipients’ positive actions on the knowledge absorbed. Efforts to introduce the open knowledge exchange standard

require mobilising industry players to abandon old practices of retaining valuable knowledge and to accept new practices of free dissemination. This task is challenging, and obviously requires a number of initial conditions to be met.

Costs and risks of exposing knowledge to public depend on its character. The focus of our discussion is on technological knowledge and know-how that can be productively used to deliver value; we assume uniformity in the ways all other kinds of knowledge are exchanged between organisations. For example, neither tacit insights, nor defence technologies can be shared at all, but everybody advertises its products and services, or personal strengths; the science is no exception (Peter and Olson, 1983). Sharing all other knowledge is potentially valuable unless it can be used against its originators. Non-profit orientation of such knowledge or its originator, as well as the originator's absolute advantage in producing new knowledge can counterbalance this risk. Originator's advantage can be caused by its excellence in technology or by its position in the value chain (Sun and IBM are relevant examples from business); we are more concerned with its non-profit orientation.

We defined non-profit orientation of an organisation as the extent to which its actions, including actions of its members, are guided by non-profit goals. In relation to strategic network this comprises common and individual members' goals, the goals of employees as well as non-profit motivation to cooperate. We suggest that the employee having non-profit goals well suits the accepted definition of a volunteer (see US Department of Labor, 2009). We assume that strategic network theories can apply to non-profits, subject to their extension with concepts of non-profit orientation of a strategic network. Our cases of non-profit networks support that and open exchange of technological knowledge was taking place. Thus, we derive a proposition regarding strategic network of any kind:

P1. The extent of volunteering in common activities of strategic network members, the extent of non-profit motives in motivation of individual actions of strategic network members, and the extent of non-profit motives in motivation of strategic network members to cooperate with each other positively influence their propensity to introduce the practice of openly exchanging technological knowledge.

In some respect, non-profits emerge "in response" to some public demand or need, motivated to spread their best practice in order to fulfil this need. For the non-profits, public needs are what business opportunities are for the for-profits. Non-profits spread it in hope that somebody would act on it and produce something that would contribute to their own mission. It is natural to assume that the recipients (the public in need), or in marketing terms, the end customers will be first to act on the knowledge they get, and to some extent, they are the only group that ultimately creates value from the experiences exchanged (Vargo and Lush, 2004). Next, customers may not only consume, but actively innovate and advertise their achievements (von Hippel, 2006). To summarise, apart from being volunteers, the customers usually are first to act on the knowledge that is valuable for them. Thus, the more the customers are involved in value creation, both in for-profit and in non-profit settings, the more beneficial the practice of open exchange of technological

knowledge can be to knowledge originators. We hypothesise, that:

P2. The extent of customer involvement in common activities of strategic network members positively influences their propensity to introduce the practice of openly exchanging technological knowledge.

Summary and conclusions

Comparisons and policy implications

Networks of Excellence are new innovative forms of research community integration and academy-industry partnership building. They are means and ends of the bottom-up science and technology policy put into action in the unified Europe with aim to coordinate research priorities and activities and achieve durable integration of the European Research Area. Akin to best practices of business networking, successful NoEs are characterised by strong self-management mechanisms, active project groups and governing bodies that coordinate common activities, set priorities, enforce standards, monitor and evaluate activities. NoEs created value in a way that was not feasible for their isolated members.

One can argue that science as a whole once benefited from introducing open knowledge exchange standard, while the alternative norm prevailed, for example, in the Ancient Egypt many years ago. In our days, this standard becomes more and more popular in non-profit settings, and even in the for-profit settings, and this is a surprising issue for business network concepts to some extent. We build several propositions on the factors that potentially influence the mobilizer's propensity to introduce open knowledge exchange standard. We come to question if motivation for spreading knowledge can have impact on network dynamics.

The NoE's initial design seems important for its subsequent evolution. However, we can neither deliver a successful design recipe, nor suppose a contingency between alternative designs and evolution paths.

Networks that create and freely spread knowledge in science and education start from interpersonal networking and respond to some common need. The case of NoE in Russia shows there is some space for interpersonal networks in science and education that differ sharply from a "normal" research association while on maturing they have potential to provide to participants some of the benefits that heavily financed interorganisational networks in Europe had. Similar examples of such "active" networks (e.g. VE forum) "responding" to fragmentation of research can be found in Europe.

The NoE instrument for the ERA can be criticized on the grounds that it requires from social research networks to establish formal unions with artificial organisational boundaries and rigidities, associated red tape and limited access to new participants. Thus, NoEs may have limited the space for volunteering and open knowledge exchange instead of capitalising on both. Furthermore, policy-implanted formal networks mostly benefited existing informal networks, and hence, were more supportive of those research communities that already achieved tight integration. The experience of NoEs in Europe is probably too limited to make far-reaching conclusions about them, since they have six to eight years long history and a funding period of three to seven years (European Commission, 2003) whereas NoE experts

assume that achieving durable integration on a European scale would require 10 to 15 years (Luukkonen *et al.*, 2006, p. 249). But if interpersonal research and business networks succeed, wouldn't stimulating them be a feasible amendment, if not an alternative to the current policy in Europe?

Limitations of this study and avenues of further research

We used analytic induction method to extend b2b network concepts to non-profit context. Attempting to explain our deviant cases with concepts of b2b networks, we have found that theories may be helpful to reveal positive effects of networks to their members, as well as patterns of their formation. Still, we encountered difficulties with explaining knowledge exchange practices and concluded that the concepts cannot directly apply and should therefore be extended to incorporate the issues of non-profit orientation and open knowledge sharing.

Although we formulate propositions to extend b2b network concepts, we do not test their validity, thus we cannot generalise our findings and cannot derive a set of concepts for non-profit networks. Further research is needed, including theory building, testing it with other cases and validating/falsifying hypotheses with quantitative methods.

Besides, we see several important perspectives for explorative research. Why not studying deviant cases in other industries, e.g. healthcare, military, charity, etc.? Which factors bring success to non-profit networks? Do they usually grow faster than b2b networks? If so, what factors stimulate this growth? What is the balance between informal personal networks and formal interorganisational networks in non-profit settings? What are successful network designs? What factors distinguish non-profit networks from b2b networks? To what extent can b2b network theories be generalised? Can they explain interactions in more complex networks, those that involve relations between businesses, non-profits, and government agencies?

To conclude, we go over to say that both managers and members of non-profit organisations could learn from concepts of network management in b2b settings, while marketing scientists can improve their theory of relationship orchestration by recognising the practices of non-profits.

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Corresponding author

Olga A. Tretyak can be contacted at: o_tretyak@inbox.ru