

Innovation Networks in Small and Medium Enterprises Sector

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Abstract: With the development of innovation processes it is evident the growing role of innovation activities also in small and medium enterprises. Many examples confirm, that small and medium enterprises (SME) create a large space for innovation, because they have more flexibility and less organizational restrictions in comparison to large-scale enterprises. In spite of these advantages SME have also some handicaps; many of them don't own research capacities (tangible, as well as have lack of special personal capabilities) and face many financial problems. To overcome this barrier could help networking. The aim of the article is to present the role of innovation's network formation in SME's sector. Special attention is given to various types of innovation networks in SME's sector and to the benefits they can deliver. The paper was elaborated as a part of VEGA project 1/0654/11 „Innovative small and medium enterprises as a part of knowledge-based economy in the SR“.

Key words: Innovation, network, small and medium enterprises, innovation networks in SME's sector.

1 Introduction

With the development of innovation processes in all types of organizations, it is evident the growing role of innovation also in small and medium enterprises (SMEs). Many examples confirm, that SMEs create a large space for innovation, because they are much more flexible in comparison to large-scale enterprises. These enterprises are seen quicker than large ones due to structural simplicity, streamlined operations, faster decision-making processes and targeted innovation. The result is a quicker response to the dynamic of industrial environment. In spite of all above mentioned advantages, SMEs have also some handicaps – many of them don't own research capacities, have lack of special personal capabilities and face many financial problems (Lesáková, L., 2009b, p. 10).

It seems that an answer how to overcome this barrier is networking. Small firms have always recognized the importance of linkages and connections – getting close to customers to understand their needs, working with suppliers to deliver

innovative solutions, linking up with collaborators, research centres, even competitors to build and operate innovation system. In the era of global operations and high – speed technological infrastructures, building and managing networks becomes key requirement for innovation in SMEs.

The aim of the article is to present the role of innovation's network formation in SME's sector and to explain the basic characteristics of innovation networks; special attention is given to various types of innovation networks in SME's sector and to the benefits they can deliver. The paper was elaborated as a part of VEGA project 1/0654/11 „Small and medium enterprises as a part of knowledge-based economy in the SR“.

2 Characteristics of innovation network formation

Networks can be described as a number of organizations with different interests that depend one on another for the achievement of their goals (Berchicci, 2009, p. 52). According to Powell (1990) a network is a form of coordinating social activities, defined as a third form of cooperation beyond market and organization. It suggests some kind of special organization form at an aggregate level above that of individual companies. Bessant and Tidd (2009, p. 84) define a network as a complex, interconnected group or system, and networking involves using that arrangement to accomplish particular tasks. Other authors focus on a firm's strategic decision to become part of a network, because the potential profit from cooperation exceeds individual strategies in maximizing benefit.

It can be seen, that the definitions of network are various and have been used for different kind of relationships and for different purposes. Two main approaches deal with networks in the innovation process: *the sociological and the economic approach* (Berchicci, 2009, p. 53 - 54).

The sociological approach is focusing on the interactions between actors within and between various organizations. The emphasis is on the informal network between individuals, on the exchange of tacit knowledge, on the nature of the linkages and the process of their creation and development between individual actors, users, buyers, suppliers, regulatory authorities and potentially competing firms. The establishment and maintenance of linkages are essential for the success of innovation. In this view incomplete networks or weak linkages are associated with failure.

One of the main theories in this field is the social network theory, which tries to apply the sociological approach to network formation. This approach suggests that a firm's strategic actions are affected by the social context, in which the firm is embedded and focuses on the network properties rather than on simply individual links within the network.

In this context the ties among actors are emphasized. For example Uzzi (1997) introduced the concept of embeddedness. This concept defines two kinds of ties: arm's-length (weak) and embedded (strong) ties. The first one refers to sporadic interactions and/or economic transactions; the second refers to established relationships between actors. Although weak ties provide greater information flow than strong ones, they increase the risk of opportunistic behaviour. On the contrary, embedded ties generate trust, discourage opportunism and facilitate the creation of knowledge.

The economic approach focuses on the firm itself and the role of the firm as a central institution through which the innovation is commercialized. The formal network is therefore the main concern: formal collaborative agreement involving legal contracts between firms. From the economic perspective two different theoretical approaches are discussed.

The first, known as transaction cost economics theory, is concerned with the nature of the transaction and the cost incurred in managing the transaction. Transaction cost economics theory suggests, that networks are preferable and more efficient than market or hierarchy cooperation, if they minimize the firm's costs in the transaction. In other words, when transaction costs are high, firms will tend to carry out technology development activities inhouse, rather than partner with external firms.

The second approach is resource-based view theory. This theory suggests that the establishment of networks derives from the resource needs of a firm. Managing these resources can provide a competitive advantage over its rivals. Thus, firms form networks to obtain access to needed assets, learn new skills, manage their dependence on other firms, or maintain parity with competitors.

The literature mentioned above suggests two different ways to define networks. They differ in their level of analysis: transaction cost economics theory views firms from an outside-in perspective and tend to explain and predict transactions among firms. On the contrary, resource-based view theory views firms from an inside-out perspective and focuses on firms' resources allocation and acquisition. Some important concepts emerge for the innovation process, such as weak/strong ties. To gain new information and new resources, the firm needs to have a great number of heterogeneous, weak ties. The firm will essentially benefit from such networks to the extent, that the firm is seeking to pursue exploration of new knowledge or radical innovations. On the other hand, commitments, trust and experience, being expressions of a networks with strong ties, may facilitate the innovation process in exploiting existing knowledge and pursuing incremental innovation.

In practice we can see a growing number of ways in which such networking takes place. Simplest networking happens in an informal way when people get together and share ideas and knowledges, but more often are created formal networks,

which are set up to help to create a new product or service, or learning to apply some new processes more effectively within firms.

Innovation networks are more than ways of assembling and deploying knowledge in a complex world. They can also have what is termed as „emergent properties“ (Tidd – Bessant – Pavitt, 2007, p. 84) – that means, the potential of the whole is greater than the sum of its parts. Innovation network can deliver a wide range of benefits beyond the collective knowledge. These benefits include access to different and complementary knowledge sets, reducing risks by sharing them, accessing new markets and technologies and pooling complementary skills and assets. Without such networks it would be nearly impossible for the lone inventor to bring his idea successfully to market. And it's one of the main reasons why established businesses are increasingly turning to cooperation and networks – to extend their access to these key innovation resources (Lesáková, 2009a, p. 219). For example, participating in innovation networks can help companies to win new ideas and creative combinations. It is well known, that the process involves making various associations. Studies of networks indicate, that getting together can help open up new and productive territory.

Another way in which networking can help innovation is providing support for shared learning. A lot of process innovation is about configuring and adapting what has been developed elsewhere and applying it to own processes. Increasing number of companies are seeing the value of networks in giving them extra traction on the learning process (Frappalo, 2006, p. 76).

Another way in which networking can help is by helping to spread the risk and extending the range of things which might be tried. This is particularly useful in small businesses, where resources are scarce and it is one of the key features behind the success of many industrial clusters.

Though popular, networks often fail. Factors such as goal divergence, partner opportunism, improper partner selection and cultural differences, may contribute to alliance failure. Moreover, selecting partners with different or conflicting expectations may lead to opportunistic behaviour or to networks failure. For example, opportunistic behaviour may take the form of a learning race, that means, when a firm's primary motive is to quickly learn (acquire) a partner's skills and then underinvest in the network after achieving its learning objectives.

There are at least two types of network risks – relational and performance risks (Berchicci, 2009, p. 55). Relational risk is concerned with the probability of a partner, who does not appropriately commit to an network and fails to behave as expected. Performance risk refers to factors that may impede achieving network objectives. Thus, performance risk is common to all strategic decisions, while relational risk is concern to the behaviour of individuals. Operating within an innovation network is not easy. Ensuring cooperation, avoiding competition and developing trust between partners are the major challenges in building networks.

3 Different types of innovation networks in SME's sector

Developing innovation depends more and more on working with many different actors. This raises questions about bringing the different actors together inside a firm, but increasingly it's about links between firms. There are **different ways in which innovation networks can be configured** to help with the innovation process (Bessant – Tidd, 2009, p. 95).

Entrepreneur-base – bring different complementary resources together to help take an opportunity forward. Often a combination of formal and informal connections depends a lot on the entrepreneur's energy and enthusiasm in getting interested people to join and to stay in the network.

Internal project teams – are formal and informal networks of knowledge and key skills which can be brought together to help some opportunity to be taken forward (essentially like entrepreneur networks, but inside of established firms). Teams may run into difficulties because of having to cross internal organizational boundaries.

Communities of practice – these are networks which involve players inside and across different firms; what binds them together is a shared concern with a particular aspect or area of knowledge. Famous are:

Spatial clusters – networks in which players are close each to other – for example, in the same geographical region. A good example of a spatial cluster is Silicon Valley, which is based on proximity – knowledge flows among and across the members of the network. Special feature of this cluster is geographical closeness and the ability of key players to meet and talk together.

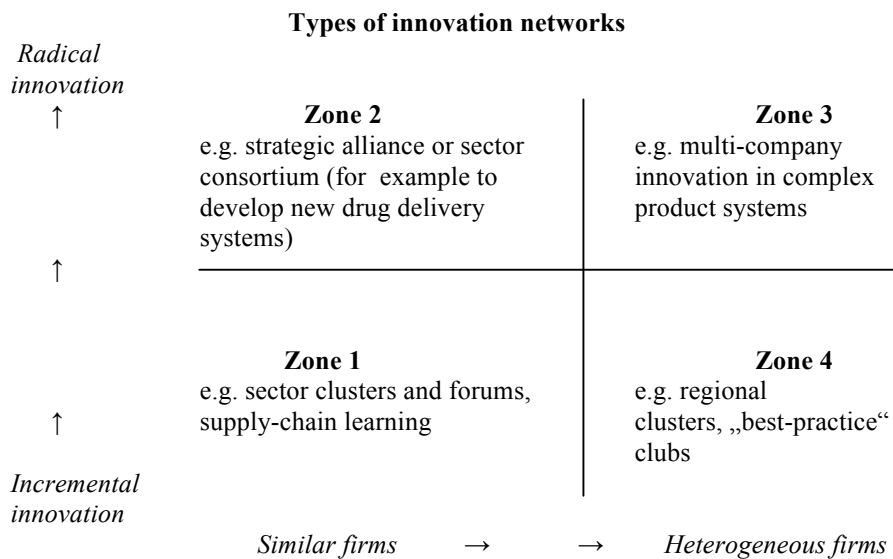
Sectoral networks – networks which bring different players together, because they share a common sector. The purpose of shared innovation is to preserve competitiveness. They are often organized by sector or business associations on behalf of their members.

New product or process development consortium – network, where shared knowledge and perspectives are developed with the aim to create and market a new product or process.

New technology development consortium – network, where sharing and learning around newly emerging technologies is developed.

Supply-chain learning – network based on developing and sharing innovative good practice across a value chain.

Operating within an innovation network is not easy – it needs a new set of managerial skills and it depends on the type of innovation network. We can map various types of innovation networks by design (Bessant – Tidd, 2009, p. 95), which differentiate in terms of: a) how radical is the innovation with respect to current innovative activity and b) the similarity of the participating firms.



In *Zone 1* there are firms with a similar orientation working on tactical innovation issues. Typically, this might be a cluster or sector forum concerned with adopting and configuring „good practice“ manufacturing. Participating in such a network enables to share experiences, develop trust and transparency and build a sense of shared purpose around innovation.

Zone 2 activities might involve players from very narrow sectors working together to create new product or process concepts (for example biotechnology/pharmaceutical networking) and the need to look for interesting connections and synthesis between these sectors. Here, the concern is exploratory. Challenges rely on information-sharing and sharing risk-taking, often in the form of formal joint ventures and strategic alliances.

In *Zone 3*, the players are highly differentiated and bring different knowledge to the network. Their risks in disclosing can be high; to ensure careful intellectual property management and establishing ground rules is crucial. This kind of innovation involves considerable risk. These types of multi-company innovation network act for example in a complex product system development.

Zone 4 - high value innovation network is characterized by these success features:

- a. highly diverse: network partners come from a wide range of disciplines and backgrounds; this enables exchange of ideas across systems (regional clusters, best-practice clubs);
- b. third-party gatekeepers: as the players in this type of network come into evidence the science partners, universities, but also consultants and trade associations, who provide access to expertise;
- c. financial leverage: typical is access to investors via business angels, venture capitalist firms and corporate venturing which spreads the risk of innovation;
- d. proactively managed: participants in the network are managed proactively as a valuable asset with the aim to gain the innovation benefits.

In era, when innovation processes become more complex and knowledge-intensive and networks enable much more rapid flow of knowledge across the firms, innovation becomes much more open-ended. The logic of open innovation is that firms need to open up their innovation processes, searching widely outside their boundaries and working together managing a rich set of network connections and relationships right across the board. Their challenge becomes one of improving the knowledge flows in and out the firm.

Special type of networks represent **learning networks**. Learning networks are formally set up for the primary purpose of increasing knowledge. In principle firms have a number of opportunities to enable them innovation learning – through experiment (R&D), through transfer of ideas from outside, through working with different players (suppliers, partners, customers), through reflecting and reviewing previous projects and even from failure (Frappaolo, 2006, p. 96). Studies or organizational learning experiences suggest that it can be supported by procedures facilitating the learning (for example through reflection, facilitated sharing of experiences or planned experimentation).

Shared learning can help individual firm to deal with some of the barriers to learning. For example: in shared learning there is the potential for challenge and critical reflection from different perspectives. Different perspectives can bring new concepts, shared experimentation can reduce actual costs risks in trying new things (Beerel, 2009, p. 87).

A key element in shared learning is the active participation of others in the process of challenge and support. Its potential as an aid to firms trying to cope with a challenging and continuing learning agenda has led to a number of attempts to establish formal arrangements for inter-organizational learning. For example, famous are experiences of regional clusters of small firms, which have shared knowledge about product and process technology and extended the capabilities of the sector as a whole. This was recognized as central to their abilities to achieve export competitiveness (Pitra, 2006, pp. 183 – 184).

Learning is often involved as a „by-product“ of network activities – for example through exchange of views or through shared attempts in problem-solving. But the primary concept is a network formally set up for the purpose of increasing knowledge. Such networks share a number of characteristics: they are formally established and defined; they have a primary target – some specific learning/knowledge which the network is going to enable. They have a structure for operation with boundaries defining participation processes which can be mapped in to the learning cycle.

Examples include „best practice“ clubs (whose members have formed together to try to understand and to share experiences about new production concepts), „co-laboratories“ (shared R&D projects), supplier associations and sectoral research organizations (where the aim is to difuse knowledge across a system of firms). Learning may involve „horizontal“ collaboration (between firms), or „vertical“ cooperation (as in supply chain learning programmes), or a combination of both.

Conclusions

Networking is an increasingly powerful mechanism for enabling innovation and entrepreneurship. The theory of networks talks about „emergent properties“ – essentially where the whole is greater than the sum of the parts. In innovation networks there are plenty of ways such emergent properties might help: bringing together different knowledge sets to solve a particular complex problem; maximizing problem-solving capabilities by getting more (and different) minds on the job; sharing the risks around exploring and exploiting new ideas; transmitting learning across a group of players increasing their market power, entering into new markets or enhancing their capabilities.

Given the scale of many of today’s innovation challenges it is unlikely that any single enterprise – and certainly no single individual – will be able to deal with them all. But networking offers the chance to leverage other kinds of resources – knowledge, skills, finance, distribution – to help make things happen. It’s particularly an opportunity for small firms competing in a turbulent global marketplace.

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