Fostering innovations in the SME context: a network perspective

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Innovations differ by their nature and business impact. That is, the ways how they come into existence and reach commercial success vary by the type of innovation. Drawing on prior studies on innovations, SME growth and industrial networks, we establish a framework to identify diverse innovations based on two distinctive dimensions. These dimensions distinguish between radical and incremental innovations, and, autonomous and systemic innovations. This study aims to improve our understanding on the objectives and boundaries relative to the resulting four types of innovation. In particular, we address the actors, relationships and leadership skills that are needed to harness these innovations into successful commercial offerings. Finally, we establish propositions for further research.

Keywords: Innovation, SME, network, leadership skills

Introduction

Innovation orientation is a key driver for the competitive advantage of firms. The recent innovation literature acknowledges the crucial role of small and medium-sized enterprises (SME) in generating new knowledge, innovations, and, in exploring emerging business fields (Ettlie et al., 1984; Acs and Audretsch, 1990). Moreover, network relationships are crucial for these innovators as they are faced by the challenges of resource scarcity (Hannan and Freeman 1977; Stinchcombe 1964). Therefore, SMEs aim at improving their innovation capacity through different kinds of networks and relationships. Without a doubt, networks have major survival and performance implications for SMEs (Premaratne 2001; Hoang and Antonic 2003; Mauer and Ebers 2006; Rickne 2006).

However, the innovation research has not sufficiently addressed the role of networks in the transformation of innovations into successful commercial offerings. To address this research gap, we analyze the actors and relationships in the innovation activity of SMEs. For this purpose, we expand the innovation discussion through the concepts and perspectives derived both from the industrial network approach and the SME literature. Especially, our objective is to explore the networks required in advancing different types of innovations to commercial value propositions. Thus, this study improves our understanding of the *actors and relationships relative to the type of innovation*. We presume that SMEs commercializing and exploiting different kinds of innovations require different sets of network relationships and leadership skills.

After this brief introduction, we continue with a literature review on innovations and SME networks, and develop the theoretical framework of our paper. Finally, we conclude the paper by discussing the implications and further avenues for our study.

Theoretical foundations: SME networks and the innovation activity

Innovations foster the business of both small and large companies. Over the last decades, it has become widely recognized that innovation is an interactive process involving both the innovative firm and its environment (Kline and Rosenberg, 1986; Carlsson et al., 2002). Especially, innovation networks are found to be important for science and technology based SMEs (Yli-Renko and Autio 1998; DePropris 2002; Elfring and Hulsink 2003; Lechner and Dowling 2003; Pitt et al. 2006; Rothaermel and Deeds 2006). According to Hausman (2005), small firms are more than simply smaller versions of major corporations, especially when one talks about family-owned businesses. Not only do they lack the financial and human capital common in large businesses, their governance and reward structure are often entirely different. Thus, it remains doubtful whether theories developed to understand large firms apply to small businesses as such.

Hausman (2005) argues that less bureaucracy and more clannish structures, which are common in small businesses, might in fact improve inter-organizational trust, communication, and cooperative competency that contribute to innovativeness. These are key concepts in the industrial network theory. Hausman (2005) points out that closeness between small business customers and managers can provide impetus for innovation due to the ease with which these managers can identify unmet customer needs. In concordance with this view, Deschamps (2005) identify traits that foster innovation that seem to be applicable in the SME context: (1) openness to external ideas and technologies and willingness to experiment with them, (2) an acceptance of risks and failures, coupled with an urge to make their staff learn from projects that go awry, and (3) an unusual combination of creativity and process discipline in bringing the new offering to market.

Conversely, counteracting the benefits of these internal strengths, SMEs face external weaknesses that are characteristic of small actors (Rothwell, 1992). Innovating in environmental flux is especially challenging for the small and medium-sized enterprises that – due to their resource scarcity – lack the resources necessary in carrying out the innovation completion. In addition, prior studies (Stinchcombe 1965; Hannan and Freeman 1977; Baum and Oliver 1992) point out some constraints on innovation activity that SMEs suffer from:

- The liability of smallness.
- The liability of newness.
- The liability of unconnectedness.

The third inadequacy refers to the lack of network relationships. However, in order to succeed, SMEs are claimed to need networks comprising a variety of relationships (Mauer and Ebers, 2006; Rickne 2006; Powell et al., 1996). These networks compound of diverse actors including suppliers, subcontractors, pilot customers and lead users, as well as competitors, universities, R&D partners, distributors, business service providers (e.g. lawyers, consultants, accountants, advertising agencies), and investment partners (Pittaway et al., 2004; Powell et al. 1996; Biemans 1992, 152). In sum, according to Pittaway et al. (2004), Lipparini and Sobero (1994) and Biemans (1992, 162), the actors provide the SMEs with a variety of benefits including:

- Sharing the economic risk of an innovation development.
- Realizing cost-efficiency in operation.
- Achieving reduced time-to-market.
- Pooling complementary skills.
- Offering access to financial resources.
- Enabling access to new markets, technologies and knowledge.

In other words, diverse types of network relationships are crucial for innovators (Elfring and Hulsink, 2003; Lechner and Dowling, 2003; Rogers 2004; Neergaard, 2005; Rickne 2006). Moreover, Cooper (1993) argues that these relationships are crucial to put new value into the market, and especially for SMEs, as a mean to leverage capacities between them and also as collaborative innovation with large companies. Grandori and Soda (1995) distinguish network forms according to their characteristic mix of co-ordination mechanisms. They identify three types of network, which may be more or less symmetric or parity-based, or asymmetric or centralized (existence of a central coordinating firm). These are: (1) *social networks*, such as parity-based personal networks, certain forms of industrial districts and centralized arrangements such as sub-contracting; (2) *bureaucratic networks* such as trade associations and consortia, which are formalized in exchange or associational contractual agreements; and (3) *proprietary networks* such as joint ventures and capital ventures, which include inter-firm cross-holding of equities and property rights.

Research framework

Not all innovations are similar. Prior studies (e.g. Ettlie et al., 1984; Anderson and Tushman, 1990; Teece, 1996; Deschamps, 2005) recognize that the innovations reflect both the strategic objectives pursued and the way innovation occurs, i.e. their nature and their business impact. These are dissimilar and heterogeneous thus suggesting the identification of distinct types of innovations. Moreover, the extant innovation research literature calls for an analysis of the objectives, boundaries and leadership capabilities (c.f. Deschamps, 2005) relative to the types of innovations.

In one direction, Teece (1996) distinguishes between two types of innovation: autonomous (or "stand-alone") and systemic innovations. An autonomous innovation is one which can be introduced without modifying other components, items of equipment or parts of the infrastructure. The innovation in that sense "stands alone". A systemic innovation requires significant readjustment to other parts of the system. According to Teece (*ibid.*), the major distinction to autonomous and systemic innovations relates to the amount of design coordination which development and commercialization are likely to require. Systemic innovations refer to value propositions that require adaptations or changes in their infrastructure that is often related but not limited to technological elements. Thus, systemic innovations are what Clark and Henderson (1990) called architectural innovations. Integration makes systemic innovations possible by facilitating information flows, and the coordination of investment plans. It removes institutional barriers to innovation where the innovation in question requires allocating costs and benefits, or placing specialized

investments into several parts of an industry (Teece, 1996). Thus, it can include social, political or legal aspects. Autonomous innovations, in turn, are modular value propositions that are highly compatible with the current infrastructure.

In the other direction, Anderson and Tushman (1990) and DePropris (2002) refer to radical and incremental innovations. According to Anderson and Tushman (*ibid.*), radical innovations emerge in the era of ferment, and may come into existence on the frontier of technical performance. They suggest that radical innovations may be caused by competence-enhancing or competence-destroying discontinuities. Moreover, they propose that innovations or dominant designs may evolve during an era of incremental change where variations take the form of elaborating the retained dominant design, not challenging the industry standard with new, rival architectures. Incremental innovations include gradual developments and value-added improvements in the existing products and technologies. Conversely, radical innovations are revolutionary value propositions that have a major impact on their environment. Biemans (1992, 11) suggests that the degree of radicality of an innovation can be viewed from the perspective of the end-customer, manufacturer, or both. We adopt the perspective of the end-user, i.e. we examine the overall value that the innovation produces to the customer. That is, radical innovations have a significant impact and cause remarkable change in perceived value as compared to the existing solutions.

Figure 1 Characteristics of innovation (Modified from Deschamps 2005)

	Autonomous innovation	**Systemic innovation**
Radical innovation	**Type I – radical, autonomous innovation** • Objective: new value proposition • Boundaries: relationships with mentors, "corporate sponsors", and financiers. Value realization may include unknown actors. • Leadership skills: courage to invest and take risks	**Type II – radical, systemic innovation** • Objective: new whole product concept requiring new business model • Boundaries: open, unformed network comprising of numerous new actors • Leadership skills: vision to imagine and conceive, influencing actors that are not under the leader's direct control
Incremental innovation	**Type III – incremental, autonomous innovation** • Objective: Improved value proposition / offering • Boundaries: existing network relationships with known actors • Leadership skills: ability to build a team and manage it to high speed, stamina for continuous improvement	**Type IV – incremental, systemic innovation** • Objective: improved process or solution • Boundaries: multi-tier network relationships with suppliers and complementary component providers • Leadership skills: implementation rigor, deep understanding of unmet market needs and orchestration skills

Our framework is based on the above discussed dimensions: the nature of innovation (a dichotomy of systemic vs. autonomous innovation) and its business impact (radical vs. incremental innovation). The resulting 2*2 matrix produces a typology of four ideal types of innovation that differ from each other by their central aspects (c.f. Figure 1)

Type I describes an innovation that is both radical and autonomous by nature. Microwave oven provides a classic example in the large-scale consumer business. By the time of its market entry, microwave oven had a radical effect on everyday cooking practices among consumers. Despite of its novelty, it was easy to install into consumers' kitchens with no needs to break the traditional infrastructure thus being autonomous innovation. In the SME context, fibre reinforced composites make an example of a popularized radical and autonomous innovation. Increasingly used in e.g. dentistry, they offer outstanding advantages and provide an easy and economic option to conventional treatments. However, based on glass fibre technology, these composites can be used with the existing infrastructure and do not require any additional start up investments in dental clinics.

Type II illustrates radical and systemic innovation such as the hydrogen car, which is expected to revolutionize the automotive and transportation industries. This large-scale innovation addresses the energy crisis and climate change by providing lower pollution levels and cost-efficient and sustainable energy-consumption. In addition, it changes the fuel distribution and political infrastructures, including national taxation programs. Conversely, the electronic invoicing concept makes a good example of radical, systemic innovation in the SME context. The concept is radical by nature, as it enables an unconventional way of delivering invoices in completely electronic form between organizations. The innovation requires system-wide changes as it reveals its full potential along with a sufficient number of users. Moreover, the realization of the concept demands diverse types of actors, including service operators, software suppliers, consultants, and registry services providers. Furthermore, it requires considerable adaptations of users' information infrastructures as well as changes in legislation and auditing practices.

Type III depicts an innovation characterized as autonomous and incremental. A large-scale example of innovations in this category is the wireless Internet base transceiver station developed for both home and office premises. This innovation is accepted widely by broadband Internet users, as it does not require systemic chances to the Internet connection, but can be plugged into the existing routers and PCs. A small-scale example of incremental innovations is an infrared mobile accessory, a pocketsize wireless device, which enables digital slide presentations from personal mobile handsets. Thus, the cordless solution avoids cable mess in the meeting rooms. This is a typical incremental innovation realized by a single SME in the ICT sector.

Type IV represents innovations that are both systemic and incremental by nature. For example, third generation of telecommunications networks (3G) provide a large-scale example of incremental innovation that enhance services in mobile communication. The effects of this innovation are visible to both mobile telecommunication providers and users through increased interactivity and functionality of services. The development and realization of this innovation engages several actors such as ICT standardization bodies, device manufacturers, network operators, and service providers. Online stores and electronic storefronts for existing merchants are familiar

examples of incremental, systemic innovations in the SME context. They allow distributing, selling, marketing and providing of products or services over the Internet. Typically, the implementation of such improved services requires integration with backbone systems such as inventory management solutions, payment systems, and web servers. Moreover, they involve various actors such as telecommunication operators, e-commerce software providers, and payment transactions providers.

To fully understand the innovation activity of SMEs, we need to consider the network relationships, including social ties, relationships with stakeholders of innovation, and links with different institutions. We approach these network relationships through the concepts established in the prior literature:

- Identification of actors, relationships and activities (Håkansson and Johanson 1992; Håkansson and Snehota, 1995, Ford et al., 2002)
- Classification of innovation networks of SMEs build up of diverse categories: social networks, proprietary networks and bureaucratic networks (Grandori and Soda, 1995).

We do not focus solely on the network relationships that are essential in the creation of innovations, but also those that are of importance in transforming the innovation into a commercial value proposition. Thus, we take into consideration the innovator's network relationships with other actors such as suppliers, customers, competitors, universities, R&D partners, service providers, distributors, and subcontractors (Powell et al., 1996; Pittaway et al., 2004; Mauer & Ebers 2006). This spectrum enables us to analyze the overall relationship portfolio that has strategic importance in exploiting innovations and turning them into viable business concepts.

Propositions for further research

Our classification of innovations has several impacts on further research. We suggest that successful transformation of innovations into value propositions require the analysis of the objectives, respective network relationships, and their boundaries.

Drawing on the above discussion, *we propose that innovative SMEs require different sets of network relationships depending on the type of innovation*. Our framework identifies four diverse types of innovations. According to our understanding, each of these types embodies social networks, proprietary networks and bureaucratic networks, but the relative emphases of these networks vary respectively. Elfring and Hulsink (2003) address different combinations of network relationships by analyzing strong and weak ties that firms create to recognize new business opportunities. Their study is highly beneficial in this pursue as they categorize SMEs into radical and incremental innovators and suggest that incremental innovators utilizing weak ties are likely to find new business opportunities. Conversely, Rolfo and Calabrese (2003) argue that radical innovators are impelled to exploit both strong and weak ties in order to boost their business opportunities. Considering the networks within the diverse types of innovations, *we propose that it is essential to evaluate the relative importance of diverse types of actors and relationships with them.*

Moreover, Lipparini and Sobero (1994) identify that innovation and networking activities of SMEs are influenced by the leadership skills and capabilities. In

concordance with this view, Deschamps (2005) argues that these skills vary systematically between the types of innovations. *We propose that leadership skills and managerial capabilities make or break the harnessing of innovations into commercial offerings.* This is consistent with the views of Deschamps (2005) and Neergaard (2005), who argue that the management of an SME should be capable of building these relationships yet be able to prioritize the relationships that are important for the particular type of innovation activity. Thus, we see that it is of importance to analyze the diversity and emphasis of leadership skills in distinct types of innovation.

References

Acs, Z. & Audretsch, D. (1990). *Innovation and Small Firms*, Cambridge: MIT Press.

Anderson, P. & Tushman, M.L. (1990). "Technological Discontinuities and Dominant Designs: A Cyclical Model of Technological Change." *Administrative Science Quarterly*, 35, 604-633.

Baum, Joel A. C. & Oliver, Christine (1992). "Institutional embeddedness and the dynamics of organizational populations." *American Sociology Review* 57, 4, 540-559

Biemans, W.G. (1992)."*Managing innovation within networks*". Routledge, London.

Clark, K. & Henderson R. (1990). "Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms", *Administrative Science Quarterly*, Vol. 35.

Carlsson, B., Jacobsson, S., Holmén, M. and Rickne, A. (2002): Innovation systems: analytical and methodological issues, Research Policy, 31, pp. 233-245.

Cooper, R. (1993), Winning at New Products – Accelerating the Process from Idea to Launch. Canada: Addison–Wesley.

DePropris, L. (2002) Types of innovation and inter-firm co-operation Entrepreneurship & Regional Development, 14, pp. 337 – 353

Deschamps, J. P. (2005) "Different leadership skills for different innovation strategies", *Strategy & Leadership*; 2005; Vol. 33, Iss. 5; pp. 31-39.

Elfring, T. & W. Hulsink (2003). "Networks in entrepreneurship: The Case of High-Technology Firms," *Small Business Economics*, 21, 409-422.

Ettlie, J. E. & Bridges, W. P. & O'Keefe, R. P. (1984). "Organization Strategy and Structural Differences for Radical versus Incremental Innovation" *Management Science*, Vol. 30, No. 6., pp. 682-695

Ford, D., Berthop, P., Brown, S., Gadde, L.-E., Håkansson, H., Naude, P., Ritter, T. and Snehota I. (2002), *The Business Marketing Course - Managing in Complex Networks*, John Wiley & Sons, England.

Grandori, A. & Soda, G. (1995). "Inter-firm Networks: Antecedents, Mechanisms and Forms." *Organization Studies*, 16, No. 2, 183-214.

Hannan, M. T. & Freeman, J. (1984). "Structural Inertia and Organizational Change" *American Sociological Review*, Vol. 49, No. 2., pp. 149-164.

Hausman, Angela (2005). "Innovativeness among small business: theory and propositions for future research". *Industrial Marketing Management*, 34, 773-782.

Hoang, H. & Antonic, B. (2003). "Network-based research in entrepreneurship – a critical review" *Journal of Business Venturing*, 18, 165-187.

Håkansson, H. and Johanson, J. (1992), "A model of industrial networks", in Ford, D. (ed), *Understanding Business Markets*, 2nd edition, Dryden Press, London, UK.

Håkansson, H. and Snehota, I. (1995), "*Developing Relationships in Business Networks*", Routledge, London.

Kline, S.J. and Rosenberg, N. (1986): An Overview of Innovation, in R. Landau and N. Rosenberg (eds.), The Positive Sum Strategy. Washington: National Academy Press.

Lechner, C. & M. Dowling (2003). "Firm networks: external relationships as sources for the growth and competitiveness of entrepreneurial firms," *Entrepreneurship & Regional Development*, 15, 1-26.

Lipparini, A. & Sobero, M. (1994) "The glue and the pieces: Entrepreneurship and innovation in small-firm networks." *Journal of Business Venturing*, 9(2), 125-140.

Mauer, I. & Ebers, M. (2006). "Dynamics of social capital and their performance implications: lessions from biotechnology start-ups." *Administrative Science Quarterly*, June, 262-293.

Neergaard, H. (2005). "Networking activities in technology-based entrepreneurial teams" *International Small Business Journal*, 23, 3, 257-278.

Pitt, L. & van der Merwe, R. & Berthon, P. Salehi-Sangari, E. & Caruana, A. (2006). "Global alliance networks: a comparison of biotech SMEs in Sweden and Australia" *Industrial Marketing Management*, 25, 600-610.

Pittaway, L. & Robertson , M. & Munir, K. & Denyer, D. & Neely, A. (2004). "Networking and innovation: a systemic review of the evidence" *International Journal of Management Reviews*, 5/6, 3/4, 137-168.

Powell, W. W. & Koput, K. W. & Smith-Doerr, L. (1996). "Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology" *Administrative Science Quarterly*, 41, 1, 116-145.

Premaratne, S. P. (2001). "Networks, resouces, and small business growth: the experience in Sri Lanka." *Journal of Small Business Management*, 39, 4, 363-371.

Rickne, A. (2006). "Connectivity and performance of science-based firms" *Small Business Economics*, 26, 393-407.

Rogers, E.M. (2004). "Networks, Firm Size and Innovation," *Small Business Economics*, 22, 143-153.

Rolfo, Secondo & Calabrese, Giuseppe (2003). "Traditional SMEs and innovation: the role of the industrial policy in Italy" *Entrepreneurship & Regional Development*, 15, 3.

Rothaermel, F.T. & Deeds, D.L. (2006). "Alliance type, alliance experience and alliance management capability in high-technology ventures." *Journal of Business Venturing*, 21, 429-460.

Rothwell, R. (1992). "Successful Industrial Innovation: Critical Factors for the 1990s," R&D Management, 22 (3), 221-239.

Stinchcombe, A.L. (1965). "Social Structure and Organizations". In: March, J.G. (ed.), *Handbook of Organizations*. Chicago: Rand McNally & Company, 142-193.

Teece, D.J. (1996). "Firm organization, industrial structure, and technological innovation." *Journal of Economic Behavior & Organization*, 31, 193-224

Yli-Renko, H. & Autio, E. (1998). "The network embeddedness of new technology-based firms: developing a systemic evolution model." *Small Business Economics*, 11, 253-267.