

Title

Stretching or stumbling to market – insights from innovation collaboration in the life science firms

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Abstract

Innovation is first of all creating and combining of knowledge, which due to complex nature seldom is available in-house. Access to external innovation knowledge sources and absorption of this knowledge at every stage of innovation process have become crucial factors for firms to develop and commercialise successful innovations in order to stay competitive and grow. Previous studies have shown the importance of collaboration in creating innovation (e.g. Laursen and Salter 2006) and that especially SMEs are extremely dependent on external knowledge in their innovation activities (e.g. van de Vrande et al. 2090), but little is known how these companies utilise external knowledge and know-how in their innovation process. Nevertheless, the current R&D driven innovation policies seem to neglect the most critical phase of innovation process, i.e. commercialisation, which in the context of life science often means implementing new or improved healthcare practices. The present study aims at casting light on this phenomenon by exploring the collaboration patterns in the life science firm innovation process. Moreover, the small firms might encounter several obstacles that prevent them to take full advantage of external relations in innovation; therefore this paper aims at understanding the motives and methods to engage in collaboration in innovative entrepreneurial firms. Special interest will be in the cross-border relations as well as public sector (i.e. university, research organisation) collaboration at the commercialisation phase. Last, this paper focuses to highlight managerial and policy implications for organising innovation collaboration in life science field. On a basis of interview data collected in 11 innovative entrepreneurial firms operating in life science, we can observe that the acknowledgement of the necessity of cooperation exists in the entrepreneurial firms. However, many obstacles (often related to business operations) prevent firms to extend their external cooperation in innovation process, although they have identified partners who would possess knowledge and know-how beneficial for their innovation development and commercialisation.

Keywords

Innovation, collaboration, commercialisation, entrepreneur.

Introduction – innovation in life science

Life science as field is highly technology oriented, innovative and international but at the same time prone to opportunities for local service innovation. Life science comprehends variety of different fields related to health and well-being, from biotechnology to bioinformatics, and requirements for innovation in each distinct field are likely to vary. There are similarities as well, for instance high regulative requirements and public sector customer base that steer the innovation processes.

Constituting a highly knowledge-intensive sector, the life science firms must be close to the global knowledge frontier already in the R&D phase, which turns the firms' ability and capability to adopt the latest scientific results into a key factor for success (McMillan et al. 2000). Even the smallest entrepreneurial life science firms need to source knowledge from the leading universities and to access potential collaboration partners on a worldwide scale constituting major drivers of internationalisation. Global presence is also important for preventing later obstacles and time delays because of different regulatory regimes.

According to Peters and Young (2006), the exposure to external knowledge and international market varies considerably between different phases of innovation in life science. Discovery phase is often purely domestic but involvement of external knowledge increases as the innovation process progresses, i.e. to clinical phases and commercialisation. Given that the life science is relatively young sector, many of the firms in the field are emergent and run by innovators since majority of the new companies spin off research and innovation that originates in universities or institutes of technology. Intense university-private sector cooperation is required because of the strong focus on basic research. For this reason many life science firms are concentrated around the local Science Parks and universities.

Innovation collaboration forms in small businesses

Firms engage in innovation collaboration in order to broaden firm's own activities and resources, as well as maintain or enhance its competitive, often technological, strength (Hagedoorn et al. 2000.) Innovation demands such complementary knowledge that is not usually economically feasible to develop all required know-how in-house (Teece 1986) but at the same time collaboration in innovation also requires ability to integrate and combine various types of knowledge inputs (Cohen and Levinthal 1990).

Given that innovation development process is an interactive process, companies need form various kinds of collaborative arrangements in order to ensure sufficient knowledge transfer (Howells et al. 2003). As opposed to technological knowledge, this study is specifically

interested in external knowledge, which can be utilised in any of the phases in the innovation process from idea to commercialisation (see innovation process definition Kline and Rosenberg 1986). The innovation knowledge may contain technological knowledge as well as market and business knowledge – knowledge that is likewise extremely relevant in bringing innovations to market.

According to Hagedoorn (1993), cooperative alliances to develop and sustain technological competitiveness include university and research institute research agreements, collaborative R&D agreements and limited partnerships with private actors. Collaboration may also be realized through client-sponsored research in order to acquire funding to develop and sustain core technology in-house (Forrest 1990). Formation of research joint venture as well as M&A of research-intensive companies (Hagedoorn et al. 2000) are suitable partnerships for innovation co-development. Many of these collaboration forms are targeted at strengthening the technological expertise in company's research function, and are important particularly to science-based companies. However, innovation collaboration is not concentrated only on innovation development, but also alliances in marketing and distribution, as well as manufacturing, are formed to complement firm's own capabilities, for example, in the commercialisation phase (Forrest 1990; Jones 2001). Moreover, the formation of joint ventures with R&D and marketing functions as well as outward licensing are valid choices in market access (Lichtenthaler 2009).

To sum up, the innovation cooperation can hence be approached roughly from three different practices and motives: setting up formal organisational modes, forming contractual agreements, and informal cooperative arrangements.

Innovation collaboration has not been widely examined in the SME context, and even less from innovation process perspective. Still, some studies of collaboration in innovate SMEs are found which indicate that SMEs extensively engage in open innovation practices but utilise less the investment intensive practices compared to larger companies (van de Vrande et al. 2009), and that SMEs engage in technology purchasing instead of building strategic alliances except with universities (Lee et al. 2010). Furthermore it has been shown that although most of the collaboration partners are in close proximity, the higher R&D expenditure increases the likelihood to collaborate with partners in more distant locations (De Jong and Freel 2010).

We could argue that firms operating in internationally dispersed markets, like many small life science firms tend to, have more opportunities to source innovation knowledge (Tether and Tajar 2008) but at the same time they face many challenges in managing external knowledge (Rilla and Squicciarini 2011; Howells et al. 2003). According a study of small businesses in traditional sectors (Spithoven et. 2011), the lack of absorptive capacity prohibits firms to

develop their innovative capabilities through engaging in collaboration in the technology intermediaries. Understanding is also limited in which phases of innovation process certain innovation collaboration models are utilised as the practices are likely to change when process progresses from idea generation to commercialisation phase (Vanhaverbeke and Cloudt 2006).

Data and methodology

In this study we are interested in analysing the innovative entrepreneurial firms. These are defined as firms which have developed and commercialised at least one identifiable innovation and are led by an innovator- entrepreneur, or the team of innovators and entrepreneurs.

The data consist of eleven semi-structured interviews in innovative entrepreneurial firms in life science between 2005 and 2011. The interviewees were innovator-entrepreneurs and interview themes in data gathering in 2005 related mainly to describing different phases of innovation process, whereas interviews performed in 2011 dealt with innovation sourcing and internationalisation. Each interview was transcribed, which allowed the reutilisation of existing material in this study.

Expected results

Many small entrepreneurial firms lack practical means and resources to engage in innovation collaboration. The main challenges these firms encounter relate to lack of manpower which affects the absorptive capacity of the firm. The innovation processes progresses in stages, and what this often means to a small entrepreneurial firm is that only one stage, like commercialisation, can be approached at a time. Although it would be beneficial to perform application development simultaneously with commercialisation, it might be impossible as CEO who holds many positions from R&D to Sales Manager is already occupied with training and educating the potential customers (like medical doctors). The data confirms that the expectations of life science sector customer base (such as public healthcare) are demanding for a small entrepreneurial firm to attain regardless of their novel innovation with high international potential. For instance gaining the first reference may be severely prolonged because of lack of proof of large scale delivery.

To sum up, the innovation development is not the stumbling stone in the entrepreneurial life science firms but selling and marketing of the innovations. The policy initiatives should target this area. One area to start is to improve the reputation of small firms as appealing workplace for sales and marketing graduates.

References

Cohen, Wesley M. - Levinthal, Daniel A. (1990) Absorptive Capacity: A New Perspective On Learning And Innovation. *Administrative Science Quarterly*, Vol. 35, Iss. 1, 128-152.

de Jong, Jeroen P.J. – Freel, Mark (2010) Absorptive capacity and the reach of collaboration in high technology small firms. *Research Policy*, Vol. 39, Iss. 1, 47-54.

Forrest, Janet E. (1990) Strategic Alliances and the Small Technology-Based Firm. *Journal of Small Business Management*, Vol. 28, Iss. 3, 37-45.

Hagedoorn, John (1993) Understanding the rationale of strategic technology partnering: Interorganizational modes of cooperation and sectoral differences. *Strategic Management Journal*, Vol. 14, Iss.5, 371-385.

Hagedoorn , John - Link, Albert N. - Vonortas, Nicholas S. (2000) Research partnerships. *Research Policy*, Vol. 29, 567–586.

Howells, Jeremy - James, Andrew – Malik, Khaleel (2003) The sourcing of technological knowledge: distributed innovation processes and dynamic change. *R&D Management*, Vol. 33, Iss. 4, 395-409.

Jones, Marian V. (2001) First steps in internationalisation: Concepts and evidence from a sample of small high-technology firms. *Journal of International Management*, Vol. 7, Iss. 3, 191-210.

Kline, Stephen – Rosenberg, Nathan (1986) An overview of Innovation. In: *The Positive Sum Strategy*, Ed. by Ralph Landau - Nathan Rosenberg, 275-305. Washington: National Academy Press.

Laursen, Keld – Salter, Ammon (2006) Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*, Vol. 27, 131–150.

Lee, Sungjoo - Park, Gwangman - Yoon, Byungun – Park, Jinwoo (2010) Open innovation in SMEs—An intermediated network model. *Research Policy*, Vol. 39, Iss. 2, 290–300.

Lichtenthaler, Ulrich (2009) Outbound open innovation and its effect on firm performance: examining environmental influences. *R&D Management*, Vol. 39, Iss. 4, 317–330.

McMillan, G., Hamilton, S., Ill, R.D. and Deeds, D.L. (2000) ‘Firm management of scientific information: an empirical update’, *R&D Management*, 30(2), 177–182.

Peters, E. and Young, S. (2006) ‘Emerging business models for biotechnology firms and clusters: Policy responses in peripheral regions of the EU’, in Tavares, A.T., Teixeira, A.C.

(eds.) *Multinationals, clusters and innovation: Does public policy matter?* London: Palgrave, 120–144.

Rilla, Nina - Squicciarini, Mariagrazia (2011) R&D (re)location and offshore outsourcing: a management perspective. *International Journal of Management Reviews*, Vol. 13, Iss. 4, 393–413.

Spithoven, André - Clarysse, Bart - Knockaert, Mirjam (2011) Building absorptive capacity to organise inbound open innovation in traditional industries. *Technovation*, Vol. 31, Iss. 1, 10-21.

Teece, David J. (1986) Profiting from technological innovation. *Research Policy*, Vol. 15, No. 6, 21-45.

Tether, Bruce S. - Tajar, Abdelouahid (2008) Beyond industry-university links: Sourcing knowledge for innovation from consultants, private research organisations and the public science-base. *Research Policy*, Vol. 37, Iss. 6/7, 1079–1095.

van de Vrande, Vareska - de Jong, Jeroen P J - Vanhaverbeke, Wim - de Rochemont, Maurice (2009) Open innovation in SMEs: Trends, motives and management challenges. *Technovation*, Vol. 29, Iss. 6/7, 423-437.

Vanhaverbeke, Wim - Cloudt, M. (2006) Open innovation in value networks. In: Chesbrough, H., Vanhaverbeke, W., West, J. (Eds.), *Open Innovation: Researching a New Paradigm*. Oxford University Press, NY.