
Introduction

Timo Pihkala* and Vesa Harmaakorpi

Lappeenranta University of Technology,
Lahti School of Innovation,
Saimaankatu 11, FIN-15140 Lahti, Finland
E-mail: timo.pihkala@lut.fi
E-mail: vesa.harmaakorpi@lut.fi
*Corresponding author

Biographical notes: Timo Pihkala is a Professor of Management and Organisation, specialising on entrepreneurship and small business management. He received his Doctorate at the University of Vaasa, Finland. Since 2001, he works at the Lappeenranta University of Technology (LUT) School of Business and he is the Director of the LUT Lahti School of Innovation. His research interests include entrepreneurship, innovativeness, strategic management and inter-firm networking. Recently, he has published on the ownership issues within family business management and regional inter-firm networks.

Vesa Harmaakorpi is a Professor of Innovation Systems at Lappeenranta University of Technology, Lahti School of Innovation, Lahti, Finland. He has his background in business life. The last 11 years he has worked within the university community, e.g., as a Deputy Director and Director at Helsinki University of Technology, Lahti Centre. His research interests are innovation systems and processes as well as innovation environments linked to regional development.

The patterns of innovation are undergoing a major change. Earlier, different innovation models, whether they are linear or non-linear, have been mostly closed in their nature. The most recent models have begun to stress the need to open up the earlier often very sheltered innovation processes. It is no longer possible for one company alone to innovate effectively in a world characterised by complexity and an increasing variety of customer demands. The open innovation paradigm highlights the more open exchange of knowledge and sees the benefits of external economies of knowledge in open and communicative innovation processes.

Exploiting the philosophy of open innovation, corporate entrepreneurship is likely to play a key role in organisations. Corporate entrepreneurship could be defined as a process in which an individual or a group of individuals, in association with an existing organisation, create a new organisation or instigate renewal or innovation within that organisation [Sharma and Chrisman, (1999), p.18]. The current understanding on corporate entrepreneurship and innovativeness suggests the importance of the weak links and personal initiatives in promoting intra-organisational innovations. Thus, the practice-based innovation processes reflect the characteristics of self-organising systems. The relationship between front-end innovations and organisational capabilities to carry out the innovative applications in practice is however largely unknown.

According to Chesbrough (2006, p.1), open innovation is 'Use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for

external use of innovation, respectively'. However, we claim that there are also many differences in the openness of the innovation processes inside the companies setting special needs for corporate culture. There is much empirical as well as theoretical evidence that R&D departments are often closed units inside the companies 'trapped' within their own world views (cf. Grabher, 1993). Under the shift from a closed innovation to emerging open innovation paradigm the R&D departments in a company may even be opening up to the outside world, but still remain closed in relation to other parts of the company, there can be several different worlds inside a company. Therefore, we claim that four kinds of companies in terms of their innovation practices can basically be found:

- 1 closed inside and outside
- 2 closed inside but open outside
- 3 open inside but closed outside
- 4 open inside and outside.

Attention should be paid to all these categories when asking about corporate culture and entrepreneurship.

The open philosophy (inside or outside) in the front-end innovation creates challenges in innovation networks. Social structure, especially in the form of social networks, affects economical outcomes, since the networks affect the flow and quality of the information (Granovetter, 2005). Granovetter (1973) defines the concepts of strong ties and weak ties in social networks. Strong ties are characterised by common norms and high network density. These strong ties are easier for closed innovation, since they normally include a relatively high amount of trust, common aims and the same kind of language to communicate. However, the weak ties are reported to be more fruitful for innovation (especially open innovation front-end), because more novel information flows to the individuals through weak ties than through strong ties (Granovetter, 2005). Burt (2004) has developed the 'strength of weak ties' argument further by arguing that innovations are most likely found in the structural holes between the dense network structures (see also Burt, 1992; Walker et al., 1997; Zaheer and Bell, 2005).

The weak links or structural holes enabling the biggest innovation potential are somewhat problematic in the open innovation front-end. In order to be able to utilise the innovation potential in these structural holes, information should often be transferred between different partners, as well as partners of completely different horizontal knowledge interest (interdisciplinarity). The partners on the opposite sides of the structural hole have information of different quality and for their own purposes. A highly important factor in spanning the structural holes and overcoming the information asymmetries is the absorptive capacity of its actors, its networks and the entire system (see e.g., Cohen and Levinthal, 1990; Zahra and George, 2002).

Open innovation also places new demands for collective knowledge production. Gibbons et al. (1994) define two classes of knowledge used in the innovation processes. Mode 1 is hierarchical and tends to preserve its form. Mode 2 is more heterarchical and transient in nature. Mode 1, traditional knowledge production based on single disciplines, is homogeneous and primarily cognitive knowledge generation context sets within largely academic paradigms. Mode 2, knowledge production, by contrast, is created in broader, heterogeneous interdisciplinary social and economic contexts within an applied setting.

Gibbons et al. (1994) report an epoch change in knowledge activity in innovation networks with a shift from Mode 1 to Mode 2 knowledge creation (Howells, 2000). In this study, Mode 2 knowledge production is seen as the 'business' of open innovation front-end.

Open innovation challenges forms of expertise in the innovation front-end. This expertise is defined here as 'ability to build possible worlds in structural holes' (Harmaakorpi and Mutanen, 2008). Corporate entrepreneurship could be a reasonable framework for promoting this expertise fuelling front-end innovation. In open innovation front-end, corporate entrepreneurship actually concerns both individual activities, as well as creativity management in structural holes. The key notions in this management process are tolerance, uncertainty, interrogation and interpretation. Corporate entrepreneurship in this case is enhancing interpretable innovation processes rather than problem-solving innovation processes (see Lester and Piore, 2004). Amabile (1997) paves the way for essential questions of corporate entrepreneurial behaviour by dividing creativity into three different components: expertise, creative-thinking skills and motivation. Promoting expertise refers to intrapreneurial abilities to make possible worlds visible for the innovating partners; promoting creative-thinking skills refers to intrapreneurial abilities to span the structural holes and promoting motivation refers to intrapreneurial abilities to motivate people with very different backgrounds to focus on the same innovation context. Therefore, the individual level emergent activities are quite likely to be based on actions of leadership, not management (cf. Bennis, 1989).

The articles in this special issue shed light on the questions regarding corporate entrepreneurship and front-end innovation from many points of view. In his article 'Linking innovation and entrepreneurship – literature overview and the introduction of a process-oriented framework', Alexander Brem gives a thorough picture of often fuzzily used concepts and clarifies their connection. He presents a framework combining the entrepreneurial and innovation processes and suggests that they complement and overlap each other. These processes can, however, be identified as separate issues with their distinct focus and level of analysis.

Edward Malecki's article 'Connecting local entrepreneurial ecosystems to global innovation networks: open innovation, double networks and knowledge integration' suggests a simultaneous need for local and global, as well as internal and external, knowledge creation. He combines different streams of literature and concludes that the research on large corporation internal networks and the research on open innovation should be better bridged. The concept of double networks operates as the link between these distinct phenomena. It also leads to the question of managing such double-layered networks.

A.J. Berkhout, Dap Hartmann and Paul Trott argue in their article 'The role of entrepreneurship in innovation' that existing models of innovation place too much emphasis on technology and science, overlooking organisational factors and customer needs. They introduce a model combining entrepreneurship and innovation into a cyclic and dynamic system that illustrates both well-functioning systems and typical system errors in the innovation process. The model places the entrepreneur in the heart of the innovation process and as the authors suggest demystifies the entrepreneur.

In her article 'Transforming lead user innovations into new corporate ventures: a matter of information asymmetry?', Barbara Fuchs suggests that information asymmetries exist because of interdisciplinary project teams, latency of needs and early prototyping

efforts by lead users. She illustrates her approach with a careful case study and points out that ‘the integration of lead users can cause serious friction between organisational units and managerial hierarchies due to increasing knowledge gaps between the fuzzy front end and other organisational units determining product development.’ Fuchs’ contribution challenges the study of open innovation, because it is apparent that opening up the organisation in one direction may in fact lead to difficulties within the organisation.

The article ‘Front end innovation and stakeholder involvement in the machine tools sector’ written by Daniel Pittino, Francesca Visintin and Cristiana Compagno argues that incremental and radical innovation processes being different, the organisational approach adopted in the front-end to realise the full potential of open innovation is also different. The results of the empirical analysis suggest that the emphasis on the shop-floor level employees is not futile. By including shop floor employees in the front-end of the innovation process, it is possible to promote the use of external knowledge and transform it in the company innovation process.

In their article ‘Dynamics of intellectual capital and managerial perspectives in software development process’, Carmen Cabello-Medina and Tauno Kekäle divide intellectual capital in three components: organisational capital, social capital and human capital and assess software development from three perspectives: production perspective, social perspective and individual perspective. They show that while these components of intellectual capital are closely linked to each other, their implication for the management of intellectual capital seem clearly distinct. Finally, Cabello-Medina and Kekäle suggest that the emphasis and importance of each element of the intellectual capital changes during the life cycle of the company projects.

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