

Managing Risks of Crowdsourcing Innovation: an Action Research in Progress

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Abstract: Over the last few years, a number of academics and practitioners have emphasized the value of innovation as a main driver for firms to enhance their business performance and sustain a high profitability. Recent studies of innovation have pointed to the growing relevance of external sources of innovation and the firm's necessity of involving a wide range of internal and external actors and sources to help achieving and sustaining its business strategy. The company can become more innovative by implementing a process of co-creation. It can do this in two ways (1) by internally identifying the business problems and needs for innovation felt by individuals, teams and organizational units (seekers) and furthering the emergence of a community of specialists (within or outside the organization), or employees motivated to provide their knowledge and skills to address innovation problems, increasing their internal visibility and ensuring their empowerment across the company (solvers); (2) by placing its innovation problems and needs to a brokering service that can find the right people to present solutions. These two forms of open innovation is called Crowdsourcing Innovation. Innovation brings risks. Risk of Financial loss or of being unsuccessful. If innovation requires business or organizational change, the risk is even bigger because innovation implies newness and unknown. Any company that innovates must face the inherent risks. Facing the risks requires that the company manages them, understanding in advance their nature and impact, monitoring the relevant indicators to anticipate their occurrence, and being ready to act immediately at the first signs of trouble. The innovating company should consider managing risks as one of its core competences. Without this capability, any innovation project can become an opportunity to dramatically fail the business objectives and sustainability. Steady progress has been made over the last years in understanding open innovation strategy. This paper adds to that effort by focusing a specific form of open innovation – crowdsourcing innovation – and describing an action research in progress to develop a method to identify the risks involved and to manage them in technology-based companies.

Keywords: open innovation; risk management; crowdsourcing innovation; crowdsourcing;

Introduction

This paper presents an action-research in progress aimed at deepening scientific knowledge of managing the risks associated with crowdsourcing innovation and providing a methodological tool to manage risks in technology-based small and medium enterprises (SMEs) or in brokering services specialized in the innovation needs of SMEs. Specifically, we will identify the main risks factors and risk management models that best suit the crowdsourcing innovation strategy. As deliverables of the research we will produce, a methodology to manage risks associated with crowdsourcing innovation and will define the functional and informational requirements of software to support risk management to empower managers preventing and / or mitigating the materialization of risks.

Academics and practitioners have emphasized the value of innovation as a main driver for firms to enhance their business performance and sustain a high profitability (Cobbenhagen, 2000), (Thomke, 2001) (Tidd, et al., 2005), (von Hippel, et al., 2003). Recent studies of innovation have pointed to the growing relevance of external sources of innovation and the firm's necessity to involve a wide range of internal and external actors and sources to help achieving and sustaining its business strategy. However, to innovate brings risks.

Managing risks is crucial to open innovation strategy, but there aren't relevant scientific or empirical studies explaining how to effectively manage the risks of open innovation. Steady progress has been

made over the last years by many authors (Aiello, et al., 2003); (Chesbrough, 2003); (Chesbrough, 2003); (Chesbrough, 2004); (Henkel, 2006); (Kirschbaum, 2005) in establishing an understanding of open innovation strategy. This work has provided overall guidelines to apply the open innovation strategy as well as theoretical frameworks to understand how firms can benefit from accessing external knowledge in order to support internal R&D processes. There are several forms of open innovation. One of them is crowdsourcing innovation, the focus of this work.

The open innovation term was coined by Henry Chesbrough (Chesbrough, 2003), which brings a reflection on experiences of some companies in testing new approaches to achieve greater agility in the generation of technological innovation. Chesbrough's analyses of these experiences lead him to propose a new strategy for generation of innovation, the open innovation strategy. In times of crisis, innovation may be the only way for small and medium businesses keeping in the market, increasing their profitability and ensuring their sustainability. Therefore, the strategy of open innovation seems to emerge as a viable alternative for successfully adapting to changing socio-economic conditions, but there are risks to be avoid.

1. Open innovation background

Open innovation has emerged as a strategy where firms commercialize both external and internal ideas/technologies and use both external and internal intellectual resources. In an open innovation process, projects can be initiated internally or externally and new technology can enter at various stages of the innovation process. This may mean that technology is treated as a tradable good to be bought and sold on the market (Arora, et al., 2001).

Projects can also go to market in many ways, such as out-licensing or in spin-off ventures in addition to traditional sales channels (Chesbrough, 2003). The challenge of generating technological innovations constantly brings with it the need of scientific research, and a set of measures to move from ideas to their successful implementation.

Papers on open innovation tend to end up by stating that leadership needs to support people striving to be innovative. Yet very few articles actually analyze the role of leadership in open innovation and none analyze the risk impacts associated with this strategy.

One of the best studied open innovation models is the integration of customers in the innovation process. There are not only advantages, but also negative aspects of this model. Gassmann and Enkel (Gassman, et al., 2004) identified *three archetypes* of core processes in companies following an open innovation approach: the outside-in process, inside-out process and coupled process. Enkel et al., studied the risks associated with these processes and the strategies that companies can apply to avoid these risks (Enkel, et al., 2005). A survey (141 companies) and in-depth case studies of nine companies that were invited to participate in a workshop series was performed. The main risks identified were: a) Loss of knowhow, b) Dependence on customers' views, c) Dependence on customers' demands or personality, d) Limitations to mere incremental innovation, e) Serving a niche market only and f) Misunderstandings between customers and employees. The authors concluded that, in the process of co-creation, new ways of working need to be combined with existing systems and structures, and many risks emerge from this situation. Traditional risk analysis perceives risks as an inevitable phenomenon that is characteristic of all future events but has not yet materialized.

2. Crowdsourcing innovation

The term crowdsourcing was coined by Jeff Howe and Mark Robinson in the June 2006 issue of Wired magazine (Howe, 2006); it describes a new web-based business model that harnesses the creative solutions of a distributed network of individuals through what amounts to an open call for proposals. In other words, a company posts a problem by an open call and a vast number of individuals offer solutions to the problem. The winning ideas are awarded some form of a bounty and the company mass produces the idea for its own gain. This strategy can be applied in two ways: (1) by internally identifying business problems and needs for innovation felt by individuals, teams and organizational units (seekers) that are then made available to a community of internal and external specialists motivated to provide their knowledge and skills to address those problems. In this way, employees of the company can improve their internal visibility and be empowered in decision processes across the company; and (2) by placing the company's innovation challenges to a brokering service that can find the right people to present the solutions (solvers). Von Hippel and Krogh (von Hippel, et al., 2003) introduced a hybrid private collective innovation model that combines

and balances elements from both proprietary and commons based approaches. Innovation is seen as a function that is democratized and partially outsourced to the user community while final adoption and product development decisions are still coordinated within the organization. The success of this model depends on the effectiveness of incentive mechanisms and the participation of lead users as well as the arrangements for value sharing and ownership of the innovations and ideations. Araki and Lang (Arakji, et al., 2007) identified two kinds of hybrid models: (a) Hybrids that favor proprietary ownership by appropriating most of the value that is generated by the user network and (b) Hybrids that favor collective ownership by sharing most of the benefit with the user community. According with them there are key factors that determine when firms should consider opening their business to user collaboration: (1) Investment Risk; (2). Development Risk; (3). Coordination Risk; (4). Motivation Risk; (5). Control Risk; (6). Security Risk; (7). Governance Risk and (8).Culture Risk. However, we think that other kinds of risks could be added at the list, as for example the Intellectual Property Risk (IP Risk).

3. Risk management and crowdsourcing innovation

It is very important that managers identify the risks associated with projects and integration of project results, of new processes or of technologies, in the business model of the company or group of companies. Risk and uncertainty are inherent in innovation activities where objectives are path generation, e.g. breaking away from path dependencies to create new markets with pioneering technologies (Ahuja, et al., 2001). The risk management process includes the stages of defining management policies, procedures, monitoring practices of the risk life cycle and of the tasks required to mitigate the risk. The monitoring of the risk's life cycle includes establishing the context, identifying, analyzing, evaluating, treating, monitoring and reviewing the risk.

The learning associated with the risk management approach is implicitly addressed in the innovation literature, but riskiness in decision-making has an explicit and lengthy scholarly history. Byrd and Brown (Byrd, et al., 2003), in their book, provided a comprehensive approach to innovation risk management. Their premise is based on the relationship between creativity and risk taking, which are combined in the following formula: innovation = creativity x risk taking.

The term risk and uncertainty are usually applied interchangeably. In the crowdsourcing innovation context, the concept of risk expressed by Darlington et al (Darlington, et al., 2001) can be adopted "Risk is the threat that an event or action will adversely affect an organization ability to maximize stakeholder value and achieve its business objectives and business strategy. Risk arises as much from opportunities as it does from possible threats". Corroborating with this concept, the AS/NZS 4360 Standards- 1999:2004 (Australian/New Zealand , 2004) defines risk as "the chance of something happening that will have an impact upon objectives and it is measured in terms of consequences and likelihood of an incident happening". The above definition works well for crowdsourcing innovation because it contains the key elements that are of interest for management, namely, business strategy and business objectives.

Therefore, risk may have a positive or negative impact on goals definition and the ability to achieve them. An organization is subject to risks that are identifiable within its strategic and operational context. Once identified, the risks are assessed, measured and monitored in order to control, mitigate and eliminate its effects. The application of a risk management approach should be done in any situation where there is possibility of loss, or the possibility of taking advantage of opportunities, at the strategic or operational level (Australian/New Zealand , 2004).

Furthermore, it is important for risk management professionals to understand the difference between perceived risk and actual risk. Some studies have been carried out which provide some insights into the factors affecting perceptions of risk. Judgment plays a central role in decision-making, particularly when making complex strategic decisions. Understanding personal values is essential because they include the beliefs that the individual has on a subject, a course of action or the desirability of a future situation. The personal values are responsible for most of the unconscious choices. Values are a fundamental, all encompassing concept. They differ from person to person, and form the basis for most personal actions (Naumes, et al., 1994).

Therefore, personal values are deeply entangled in judgment associated with risk perception and risk management. Thus, we think that in developing a systemic and holistic approach for risk management

in crowdsourcing innovation, personal values should be considered. Risk management involves a number of human activities, which are based on the way the various stakeholders perceive risk.

For the scope of this study, we will consider the integrated strategic risk approach and its associated risk analysis methods. At this stage of our research, we envisage that existing methods and techniques can be adjusted to allow for risk management associated with crowdsourcing innovation.

4. How to manage the risks of crowdsourcing innovation in technology-based SMEs

Our research appears to a qualitative approach, aimed at deepening scientific knowledge of managing the risks associated with crowdsourcing innovation and at providing a methodological tool to manage risks in brokering services specialized in the innovation needs of SMEs.

Research Question

The goal of the research and the final thesis is to answer the key question of “How to manage risks of crowdsourcing innovation for technology-based SMEs?” The research question will concentrate on each of the following items:

- What risks are associated with crowdsourcing innovation enabled by brokering services, both internal to an organization or externally available by brokering businesses.
- What should be risk management model for crowdsourcing innovation
- What human aspects should be considered and what management style should be adopted
- What kind of information system should be defined to effectively support crowdsourcing innovation

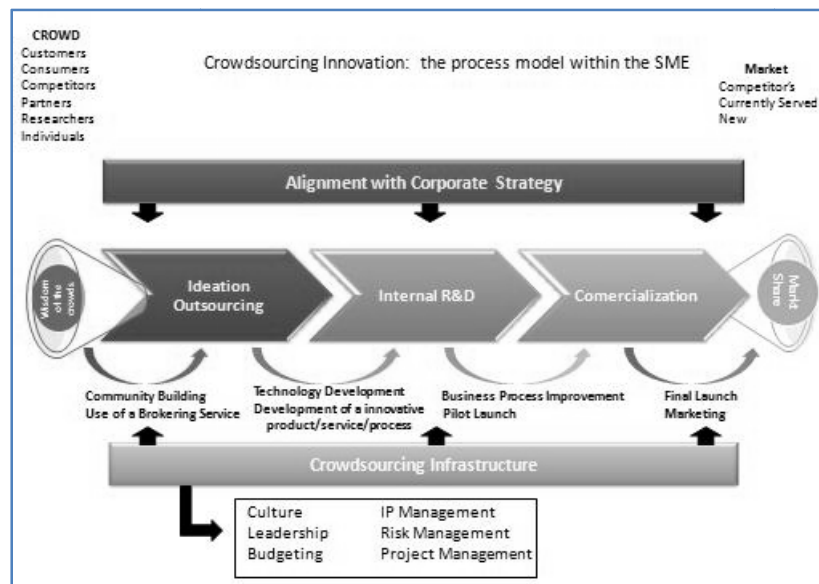
Delimitation

This study is focused on producing a methodology to manage risks associated with crowdsourcing innovation delivered by internal or external brokers and on defining the functional and informational requirements of an information system to support risk management to empower managers preventing and / or mitigating the materialization of risks in brokering services specialized in the innovation needs of SMEs.

Theoretical Model

To better understand the scope of this research, we will represent in the Figure 1 the models of crowdsourcing innovation process within the SME (internal broker) and in the Figure 2 the crowdsourcing-innovation brokering model (business) that are at the core of the risk management methodology that will be developed.

Figure 1 Crowdsourcing Innovation: crowdsourcing the ideation stage

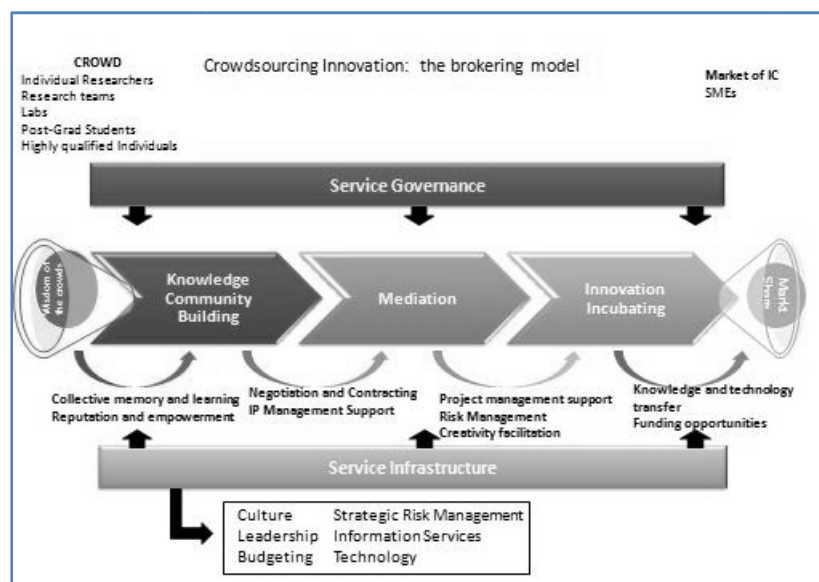


In this model, Crowdsourcing innovation is restricted to the ideation stage of the innovation process of the firm. Companies reach out their boundaries in search of ideas and technologies. In doing so, they incur in many risks. Some of them are:

- Disclosure of the innovation strategy;
- Weakened control of Intellectual Property Rights;
- Lack of motivation of the crowd;
- Poor quality of the ideas/technology delivered by the crowd;
- Loose or gain core competences...

Once the ideas enter the process they must flow through the usual steps of the innovation process, namely, portfolio definition and execution, and implementation/commercialization of innovations.

Figure 2 Crowdsourcing Innovation: the brokering model



This model represents the main value creation processes as well as the support processes of Crowdsourcing Innovation Brokers. Knowledge Community Building process is devoted to keep the

crowd motivated, creative and participative. This includes providing the required contexts for effective learning and idea generation. The main risks facing this process are:

- Lack of stakeholder consensus on key design, implementation or other issues.
- Be impossible to recruit staff with the skills required
- Requirements are only partly known at project start.
- Customers may not allocate sufficient resources to exploring requirements.
- Communication problems in ideation team. They are dispersed among several sites, and have not worked together before.
- Changes to requirements that require major design rework are proposed by seeker
- Time required to develop the project be underestimated.
- Seeker expects low cost solver will be selected
- Number of solvers candidates
- Design relies on immature technologies or exotic materials to achieve Selection process documentation
- Product implications not considered during concept exploration
- Motivation, manpower, training and skills profiles.

The mediation process aims at bridging the crowd (solvers) and SMEs outsourcing part of their innovation process (seekers). This process deals with the issues of supporting the formulation of innovation problems and solutions, identification the right people and/or right solutions, mediating the negotiation of Intellectual Property Rights and contracts between solvers and seekers, and enforcing compliance. The main risks of this process are:

- Failure to establish clear and practical guidelines and legal consequences in Brokering System Rules.
- Internal and external fraud in IP
- Contract offers no incentive to modernize facilities or reduce cost
- Employees resistance
- Copyright or privacy dispute regarding ownership of information contained in a workspace.
- Failure to plan for and accommodate or regulate permissible roles for intermediaries (eg. Licensed Service Providers or aggregator subscribers acting for other subscribers or aggregator subscribers acting for other subscribers or 'host' intermediaries).
- Staff turn over
- A competitive product is marketed before the system is completed
- Management change.

The technology incubating process supports the transfer of knowledge and technology to the SME in order to enable the company to successfully implement/commercialize the innovation. This effort includes assisting in the full development of the invention into an innovation, training employees, helping adapting the business model of the SME, changing internal processes and culture. The main risks of this process are:

- The development team might not be able to estimate the work time, preventing customers from deciding priorities effectively.
- Data Loss from Workspace (e.g. where system goes down and data cannot be recovered).
- Community dissatisfaction at the lack of practitioners able to offer e-conveyance services.
- A competitive product is marketed before the system is completed

In addition to the risks associated with the brokering business, there are also risks associated to the two supporting processes: governance and infrastructure management. The main risks are:

- Funds are transferred to the wrong account as a result of incorrect instructions from Client or User.
- Documents and information entered into Workspace are incorrect.
- Business rules not implemented or followed (i.e. document incorrectly rejected or accepted)
- Business Disruption and System Failures.

Table 1 lists some categories of risks of crowdsourcing innovation.

Table 1 – List of Risks of Crowdsourcing Innovation

	People	Process	Legal	Technology
Knowledge Community Building	<p>Training</p> <p>Compatibility of business philosophies</p> <p>Voluntary participation</p> <p>Rewards and awards</p> <p>Motivating Factors</p>	<p>Collection and documentation of ideas</p> <p>Experimentation/Piloting</p> <p>Assessment of Ideas</p> <p>Communication</p> <p>Design relies on immature technologies or exotic materials to achieve</p> <p>Design/technology approach</p> <p>Design not cost Effective</p> <p>Project Size/Scope</p> <p>Threat</p> <p>Cost Estimation (Operating and Supporting Costs) - Budget</p>	<p>IP</p> <p>Toleration of failure</p> <p>Likelihood of dissemination of core technology or processes (IP)</p>	<p>Team technology expertise</p> <p>Security</p> <p>Architecture</p> <p>Scalability</p> <p>Program depends on unproved technology for success – there are no alternatives</p> <p>Program success depends on achieving advances in state-of the art technology system or make systems component obsolete</p>
Mediation	<p>Relationship with others</p> <p>Employees Resistance</p> <p>Compatibility of business philosophies</p> <p>Core Competences</p> <p>Expatriation of employees with value knowledge</p>	<p>Insufficient time to test thoroughly</p> <p>Same risks as contained in the Significant Risks for Idea Test and Evaluation</p> <p>Program lacks proper tools and modeling and simulation capability to assesses alternatives</p> <p>Project Size/Scope</p> <p>Threat</p> <p>Cost Estimation (Operating and Supporting Costs) - Requirements are too constrictive – identify specific solutions that force high cost</p> <p>Time/Schedule</p> <p>Environmental impact</p> <p>Test planning not initiated early in program</p> <p>Test does not address the ultimate operating environment</p> <p>Project Size/Scope</p> <p>Threat</p> <p>Cost Estimation (Operating and Supporting Costs) - Budget</p> <p>Business Disruption and System Failures</p>	<p>Fines or suspensions for breaches of rules or laws</p> <p>Poorly written agreement or contract</p> <p>Agreement penalties</p> <p>Internal and External</p> <p>Fraud on IP</p> <p>Enforceability of contracts</p>	<p>Technology has not been demonstrated in required operating environment</p> <p>Technology relies on complex hardware, software or integration design</p>
Technology incubating	<p>Relationships</p> <p>Decision Makers/Authorities</p> <p>Talent/Skill level/Education</p> <p>Experience</p> <p>Motivation</p> <p>Morale</p> <p>Availability</p>	<p>Time/Schedule</p> <p>Requirements do not address logistics and suitability</p> <p>Budget</p> <p>Business Disruption and System failures</p> <p>Modeling and</p>	<p>Enforceability of contracts</p>	<p>Systems failures</p>

	Capability of developer Manpower, Training and Skills Profiles	simulating Requirements are not stable Operational requirements not properly established or vaguely stated Required operating environment not described Requirements do not address logistics and suitability Inadequate supportability late in development or after fielding, resulting in need for engineering changes, increased costs and/or schedule delays Life-cycle costs not accurate because of poor logistics supportability		
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5. Conclusion

Based on an extensive literature review, this study adds to that effort by focusing crowdsourcing innovation and describing an action research in progress to develop a methodology to identify the risks involved in crowdsourcing innovation brokering and to manage them.

Results of this study have both scientific and professional implications. The scientific contribution of this research is a better understanding of the crowdsourcing innovation strategy and the risks that are associated with it. The professional contribution of the research is the development of a methodological tool and a technological tool to guide and support innovation leaders in preventing and / or mitigating the materialization of risks associated with crowdsourcing innovation.

The paper presents the concepts and models supporting the development of the methodology. At the current stage, the research has already started and the risk categories presented in table 1 were already validated through a workshop with a company starting its own effort in implementing an internal innovation process that integrates the crowdsourcing of parts of this process.

The next steps of this research include the definition of the first draft of the methodology that will be then improved in an action research performed at a crowdsourcing innovation brokering service.

6. References

- Ahuja, G., & Lampert, C. M. (2001). Entrepreneurship in the large corporation: a longitudinal study of how established firms create breakthrough inventions. *Strategic Management Journal*, 22, pp. 521-543.
- Aiello, F., & Cardamone, P. (2003). R & D Spillovers and Productivity Growth: evidence from Italian Manufacturing Microdata. *Applied Economic Letters*, 12, pp. 625-631.
- Arakji, R. Y., & Lang, K. R. (2007, Nov). The virtual cathedral and the virtual bazaar. *The Data Base for Advances in Information Systems*, 38, pp. 33-39.

- Arora, A., Fosfuri, A., & Gambardella, A. (2001). *Markets for Technology*. Cambridge, MA: MIT Press.
- Australian/New Zealand . (2004). *AS/NZS Standards - 4.360:1999(2004)*. Strathfield: Risk Managements Standards Association of Australia.
- Byrd, J., & Brown, L. (2003). *The innovation equation: Building creativity and risk taking in your organization*. San Francisco: Jossey-Bass/Pfeiffer.
- Chesbrough, H. (2004, JAN-FEB). Managing open innovation. *Research-Technology Management* , 47, pp. 23-26.
- Chesbrough, H. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Cambridge-MA: Harvard Business School Press.
- Chesbrough, H. W. (2003, SPR). The era of open innovation. *MIT Sloan Management Review* , 44, pp. 35-41.
- Chesbrough, H. W. (2003, SPR). The logic of open innovation: Managing intellectual property. *California Management Review* , 45, pp. 33-+.
- Cobbenhagen, J. (2000). *Successful Innovation: towards a new theory for management of small and medium-sized enterprises*. Cheltenham: Edward Elgar Publishing.
- Darlington, A., Simon, G., & Withworth, J. (2001). *How safe is enough? An introduction to risk management*. UK: The Stample Inn Acturial Society.
- Enkel, E., Kausch, C., & Gassmann, O. (2005). Managin the risk of customer integration. *European Management Journal* , 23, pp. 203-213.
- Gassman, O., & Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes.
- Henkel, J. (2006, SEP). Selective revealing in oppen innovation processes: the case of embedded Linux. *Research Policy* , 35, pp. 953-969.
- Howe, J. (2006, jun). The Rise of Crowdsourcing. *Wired* , 14.
- Kirschbaum, R. (2005, JUL-AGO). Open innovation in practice. *Research-Technology Management* , 48, pp. 24-28.
- Naumes, W., & Naumes, M. J. (1994). A comparison of values and attitudes. Toward risk of greek and american entrepreneurs. *International Journal of Value Based Management* , pp. 3-12.
- Thomke, S. (2001, Feb). Englightened Experimentation: The New Imperative for Innovation. *Harvard Business Review* , 79 (1), pp. 66-75.
- Tidd, J., Bessant, J., & Pavitt, K. (2005). *Managing Innovation. Integrating technological, market and organisational change*. New York: Wiley and Sons.
- von Hippel, E., & Von Krogh, G. (2003). Open Source Software and the "Private-collective" Model: Issues for Organization Science. *Organizational Science* , 2 (1).