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Crowdsourcing Innovation: A Risk Management Approach

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CROWDSOURCING INNOVATION: A RISK MANAGEMENT APPROACH

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Abstract

This paper presents a first version of a methodology for risk management in crowdsourcing processes. The methodology comprises three phases. Each phase is interlinked and designed to build support and trust as the collaboration develops. Managing risk is central to open innovation strategy, but there aren´t relevant scientific or empirical studies explaining the relationship between them. Steady progress has been made over the last years by many authors in establishing an understanding of open innovation strategy. There are several forms of open innovation. One of them is crowdsourcing innovation, the focus of this paper. In crowdsourcing strategy, 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 doing so brings, employees of the company can improve their internal visibility and be empowered in decision processes across the company; (2) by placing the company's innovation challenges to a brokering service that can find the right people to present the solutions (solvers). This work provides overall guidelines to managing risks associated with crowdsourcing strategy and to apply open innovation and theoretical frameworks to understand how firms can benefit from accessing external knowledge in order to support their R&D processes.

Keywords: *Crowdsourcing, Risk Management, Open Innovation, Risk Methodology*

1 INTRODUCTION

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. Lots 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 (Cobbenhagen, 2000), (Thomke, 2001) (Tidd, Bessant, & Pavitt, 2005), (von Hippel & Von Krogh, 2003). Innovate brings risks because innovation could require business change or a different strategy.

Any company that innovates must face the inherent risks of innovation. These include lack of cultural change, lack of motivation, the rendering infeasible the implementation of a good idea/technology because the necessary technological resources do not exist. There is also the economic and financial risk of costs becoming bigger than the expected benefits of an innovation. Facing the risks requires that the company manage 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 innovation leadership should include managing risks as a core competence. Without so, any innovation project can become an opportunity to dramatically fail the company's objectives and sustainability.

The term open innovation was coined by Henry Chesbrough (2003), and 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. Therefore, the open innovation strategy seems to emerge, as a viable alternative for successfully adapting to changing socio-economic conditions, but there are risks to be avoid.

Manage risk is central to open innovation strategy, but there aren´t relevant scientific or empirical studies explaining the relationship between them. Steady progress has been made over the last years by many authors (Aiello & Cardamone, 2003); (Chesbrough H. W., The era of open innovation, 2003); (Chesbrough H. W., 2003); (Chesbrough H. , 2004); (Henkel, 2006); (Kirschbaum, 2005) in establishing an understanding of open innovation strategy. This work has provided overall guidelines to apply open innovation and theoretical frameworks to understand how firms can benefit from to access external knowledge in order to support their R&D processes. There are several forms of open innovation. One of them is crowdsourcing innovation, the focus of this paper.

This paper presents a research approach for crowdsourcing innovation, aimed at deepening scientific knowledge of managing the risks associated with crowdsourcing innovation and providing a methodological tool to manage risks in brokering services specialized in the innovation needs of SMEs. Specifically, we will propose a risk management model that best suit the open innovation strategy.

Risk management involves a number of human activities that are based on the way the various stakeholders perceive risk. Personal Value theory claims that risk perception within social groups and structures is predictable according to group and individual worldviews; so it´s important to examine the implications of personal value theory on open innovation risk management as a means for crowdsourcing experts to manage stakeholders, brokers and seekers perceptions.

2 CROWDSOURCING INNOVATION

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 analyzes the impacts of associated risks.

The term crowdsourcing was coined by Jeff Howe and Mark Robinson in 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:

- 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 doing so brings, employees of the company can improve their internal visibility and be empowered in decision processes across the company;

- 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 & Von Krogh, 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 & Lang, 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 added value with the user community. According with them there are key risk factors that should be considered when firms open their innovation process 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. But we think that others kinds of risks could be added at the list, as for example the Intellectual Property Risk (IP Risk).

3 RISK MANAGEMENT AND CROWDSOURCING INNOVATION

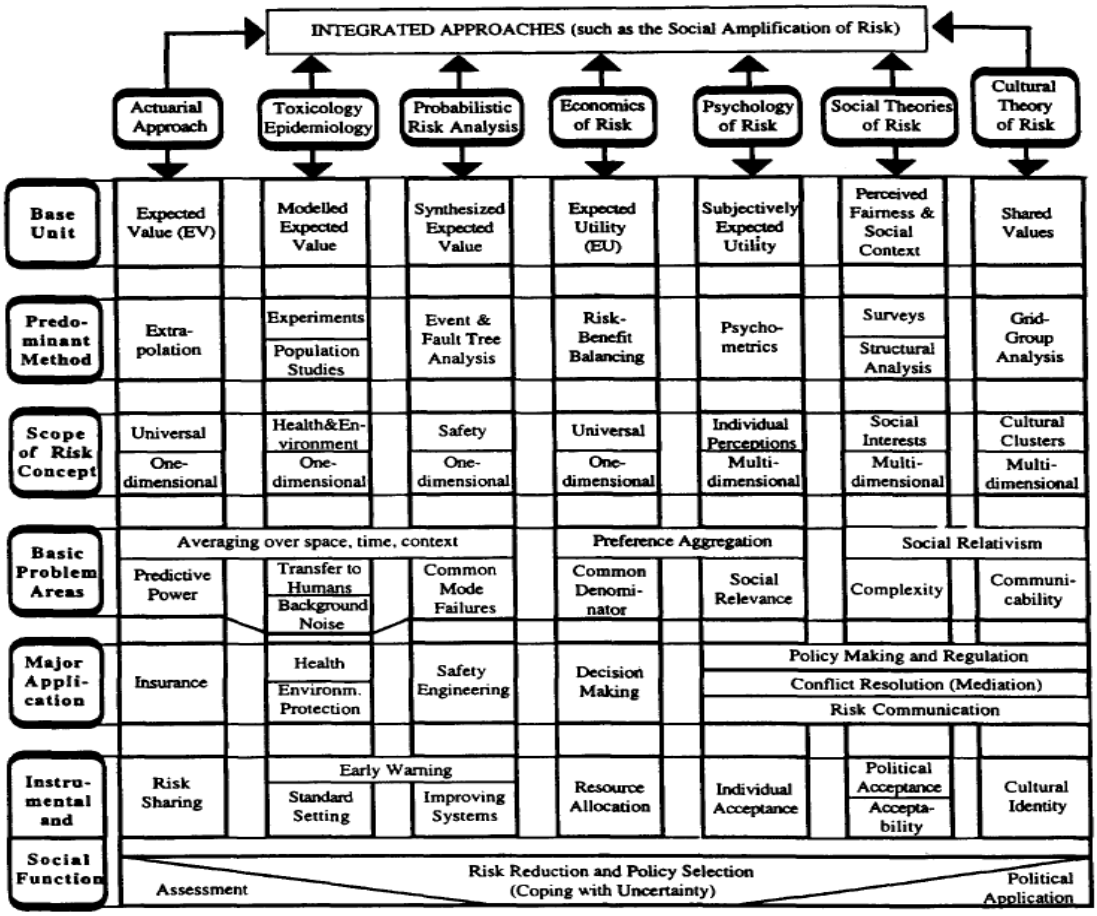
It is very important that managers identify the risks associated with innovation projects and with the integration of project results, new processes or technologies, in the business model of the company or group of companies. Risk and uncertainty are inherent in innovation activities where objectives are connected with path generation, i.e. breaking away from path dependencies to create new markets with pioneering technologies (Ahuja & Lampert, 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 the stages of establishing the context, identifying the risk, analyzing it, evaluating it, treating it, monitoring it and reviewing the risk.

The elements of a management model include strategic planning, decision making, and other strategies, processes and practices for dealing with the risks. 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 (2003), provided a comprehensive approach to innovation. 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 open innovation context, the concept of risk expressed by 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, risk is defined on AS/NZS 4360 Standards- 1999:2004 (Australian/New Zealand , 2004) 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.

Risk can be understood as a set of vulnerabilities that affect the goals of an organization and have impact on its ability to achieve them. The risk can define a threat or an opportunity. In this context, risk has not only negative meaning; not taking advantage of opportunities can be considered a risk as well.

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, such 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 opportunities, at the strategic or operational level (Australian/New Zealand , 2004). Renn (1998) defines risk as the possibility that human actions or events lead to consequences that have an impact on what people value. This definition implies, according to Renn, that humans can and will make causal connections between actions (or events). These connections can be altered either by modifying the initiating activity or event, or by mitigating the impacts. Figure 1 adopted from Renn (1998) provides different concepts and perspectives of risk.



Source: R**enn, Ortwin. 1998.** The role of risk perception for risk management. *RELIABILITY ENGINEERING AND SYSTEMS SAFETY.* 1998, Vol. 59, pp. 49-62.

Figure 46. Risk Perspectives, adopted from Renn, 1998.

For the scope of this study we will consider an integrated strategic risk approach and its associated risk analysis methods (statistical analysis, risk maps, utility functions, game theory and other traditional decision tools). At this stage of our research, we envisage that existing methods and techniques can be adjusted to allow for risk management associated with open innovation strategy, and more specifically, crowdsourcing innovation.

O'Connor et al. (2008), investigate three such practices, and their relationship to radical innovation success. These practices are a) options thinking, b) experimental learning and c) an early harvesting strategy. The authors conclude that the development of dynamic capabilities for managing highly uncertain phenomena such as radical innovation includes a risk management by learning capability.

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. The personal values understanding are 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 & Naumes, 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, personal values should be considered.

4 RISK PERCEPTION APPROACH

Risk perception came to be seen as an obstacle to rational decision making, because people tended to see risks where there were none, according to the experts. Researchers (Gerber & von Solms, 2005) (Pfleeger, 2000) have pointed out that the risk management process can be improved, if certain social factors that influence the process and the outcome of risk management are taken into account. When social and behavioral researchers started to investigate perceived risk it was probably because they believed that risk was relevant for understanding technology and policy attitudes (Sjoberg, af Wahlberg, & Kvist, 1998; Sjoberg, 2000; Sjoberg, 1998). One research (Sjoberg, 2002) shows that perceived risk and attitudes toward technology are considered in a wide contextual perspective. It seems eminently reasonable to make that assumption, since so much of current discourse about policy and technology is about risk. However, couldn´t be true to say that the risk is the only important variable in attitudes towards the adoption of technologies, and is not even self clear that is the most important factor. In his studies, Sjoberg (2000) (2002) have been studied several alternatives to risk and compared them in importance to risk, and he alerts to the fact that risk in itself has been further differentiated in activity or consequence related aspects. It was found that when there is possibility to replace a technology with something else was an important attitude determinant in about half of the cases. An unknown effect of a technology is still another example of a factor that is immediately given. But everybody agree risk perception is hard to understand.

How is the meaning of risk in the life of the individual influenced by prevailing cultural value priorities? To answer this question requires a theory of the value dimensions on which national cultures can be compared. It also requires reliable methods to measure them statistically.

Schwartz (1992) started by describing values and their structure, but as Mark Schwartz (Schwartz M. S., 2005) noted, others have theorized the extent to and at what point values influence moral behavior. Schwartz (Schwartz S. H., Universals in the Content and Structure of Values: Theoretical Advances and empirical tests in 20 countries, 1992) positioned values as an expression of and motivation for the fulfillment of basic human needs to sustain an individual's biological and social well-being and functioning. Schwartz's theory of basic human values identifies fifty six values that cluster into 10 motivationally distinct value types. He incorporated features earlier theorized by Rokeach (1973) into his definition: values ''(1) are concepts or beliefs, (2) pertain to desirable end states or behaviors, (3) transcend specific situations, (4) guide selection or evaluation of behavior and events, and (5) are ordered by relative importance'' (Schwartz S. H., 1992)

Sjoberg have conducted a major study of risk perception of household waste in which he included Schwartz's complete scale, with a representative sample of the Swedish population, on the basis of a review of the literature on household waste and human behavior carried out by our co-workers. Results reported in his study show that the Schwartz dimensions are only weakly related to risk perception.

Loewenstein, et al, (2001) proposed a risk-as-feelings hypothesis, which highlights the affect experiences at the moment of decision making. This implies that people base their judgments of an activity or a technology not only on what they think about it but also on what they feel about it. So, if they like an activity, they are moved toward judging the risks as low and the benefits as high; if they dislike it, they tend to judge high risk and low benefit (Slovic, Finucane, Peters, & MacGregor, 2004). The authors showed that the emotional reactions to risky situations often diverge from cognitive assessments of those risks. "The risk-as-feelings hypothesis postulates that responses to risky situations (including decision making) result in part form direct emotional influences, including feelings such as worry, fear, dread, or anxiety" (Loewenstein, Weber, Hsee, & Welch, 2001).

McDaniels et al. (1997) found the psychometric paradigm to be an approach for identifying the characteristics influencing people's perception of risk. The approach assumes that risk is inherently multidimensional, with many characteristics other than the probability of harm affecting individual judgments. The Psychometric Model uses explanatory variables which are semantically close to the risk

dimensions which it tries to explain. The model uses aspects or characteristics of the hazards to account for its perceived level or risk, and for risk acceptability.

Sjoberg et al., (2004) developed a research to evaluate the relevance of the psychometric paradigm in risk perception research. In their report empirical tests of the theory´s capability of predicting perceived risk was presented and discussed. The report concludes that the majority of results reached in the paradigm are not sufficiently well based on empirical data and appropriate analysis. Social scientists, many of them psychologists, have conducted studies of technology risk perception and attitudes for about 25 years, but as of yet, there is no consensus on what is driving these attitudes, or how conflict resolution can be achieved. Conflict resolution is called for since there is a dramatic gap between experts' and managers' risk perceptions and those of the public, and of many – but not all – politicians. (Sjoberg, 2008) .

McDaniels (1998) provide 10 propositions intended to be common sense perspectives on the interpretation of risk perception studies, (1) Psychometric risk perception research is not, nor was ever intended to be, a comprehensive social science description of the basis for attitudes toward technological risk; (2) Risk perception studies are not intended to describe the quality of public understanding of risk management issues, nor to represent public preferences about risk management priorities; (3) Risk perception studies are intended to describe (characterize) widely held superficial views about risks; (4) Risk perception studies on their own have no direct prescriptive weight whatsoever. They have no direct relevance for setting risk management priorities; (5) Descriptive risk perception findings are enormous indirect prescriptive value in several aspects of the risk management process where learning about commonly-held views is important; (6) There is no such thing as an objective characterization of risk. All risk characterizations and all analysis are subjective and value-laden, including lay and expert views; (7) the aggregate nature of psychometric risk perception data analysis has both advantages and disadvantages with descriptive and prescriptive implications; (8) Observations that a gulf exists between expert and lay judgments about risk management priorities, and assertions that the values of one group or another should dominate, are missing key prescriptive insights; (9) Descriptive risk perception studies can be of help in understanding the social construction of important risk management issues, but they are only part of the picture; and (10) Direct prescriptive insight for setting risk management priorities requires more thoughtful, informed judgments, within more specifically structured frameworks, than is desirable or possible in risk perception studies.

McDaniels (1998) conclude that "prescriptions for risk management strategies should be informed by judgments providing information about objectives, value tradeoffs and the impacts of alternative. Equally necessary is an analytical framework within which to use this information in order to compare alternatives." (McDaniels T. L., 1998) . For reasons outlined by the author, this level of detail and specificity, to say nothing about the kind of judgment involved, simply are not appropriate for risk perception studies. Risk perception research provides descriptive insight about the view of the average person.

5 MANAGING RISKS OF CROWDSOURCING INNOVATION: A METHODOLOGY

For better understanding the scope of our research we present in **Figure 2**, a model of crowdsourcing innovation process within the SME and in **Figure 3**, the crowdsourcing innovation brokering model including the risk management perspective.

THE CROWD: Customers, Consumers, Competitors, Partners, Researchers, Individuals
MARKET: current, expanded and/or new

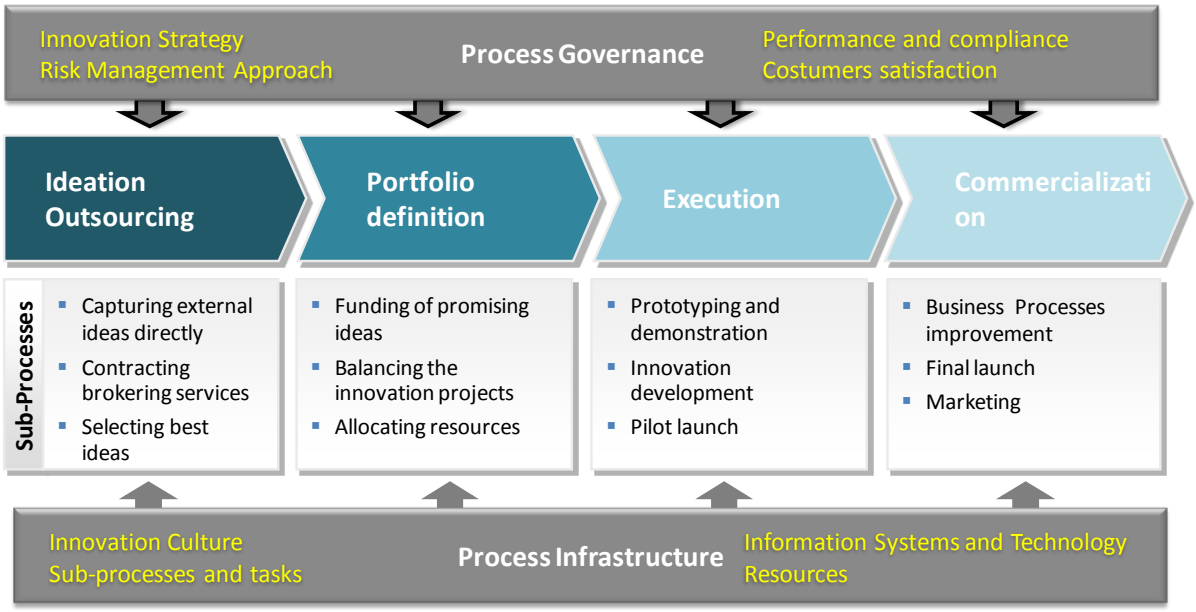


Figure 2. Crowdsourcing Innovation: the process model within the SME.

It is important to identify the interrelationships of risks factors with processes and structures of crowdsourcing model. Risk factor is an event or condition that, if encountered, cause impact in crowdsourcing objectives.

When the SME decides to open its innovation process to the crowd, it incurs in several risks, namely, the disclosure of its innovation strategy, the lack of control over the quality of solutions provided by the crowd, the weak contractual ties with the solvers, and the risk of intellectual property loss.

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. These stages face the uncertainties associated with developing external ideas and technologies in addition to usual risks of closed innovation.

Figure 3 displays our conceptualization of a crowdsourcing innovation brokering service focusing the innovation needs of SMEs, the specific focus of our research. SMEs are the pillar of the world economy and often considered the drivers of innovation worldwide. Nevertheless, they can also face many challenges to the implementation of innovation strategies: unclear business strategy, lack of an organizational memory that supports the learning with the experience, inadequacy of management and marketing practices, focus on short term objectives and survival, lack of resources, inability to cope with government regulations, poor access to external information and knowledge, and strong risk aversion.

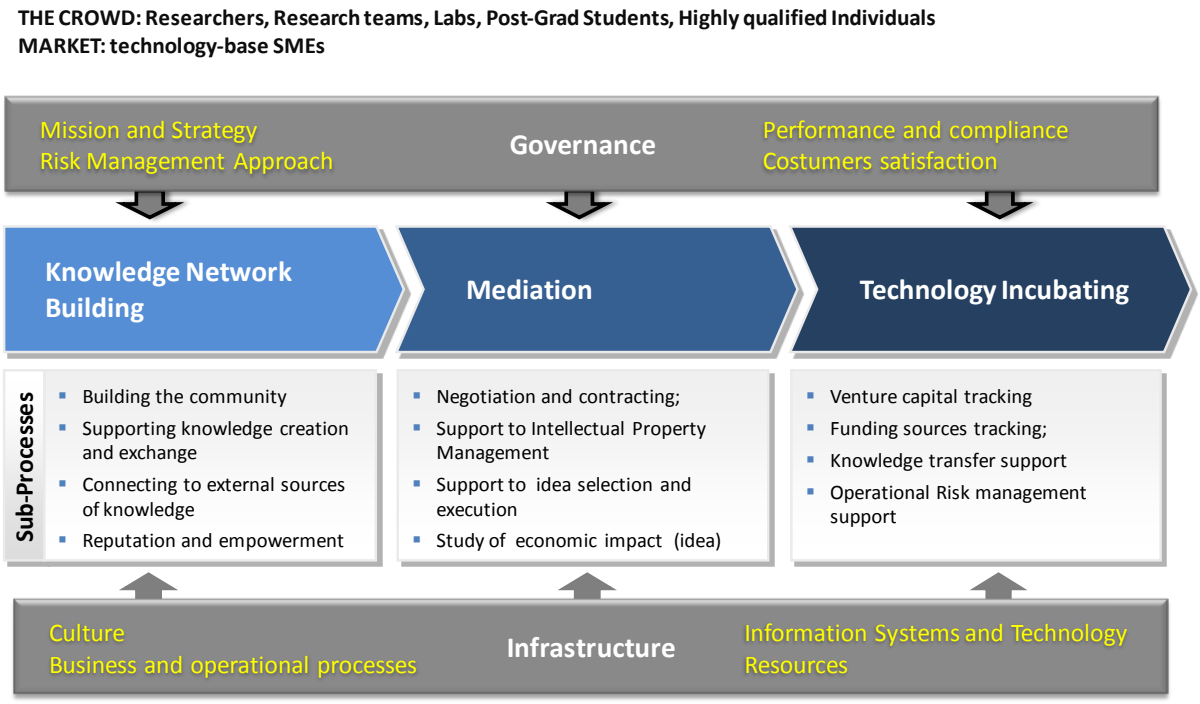


Figure 3. Crowdsourcing Innovation: the brokering model.

As depicted in the figure, the brokering service accesses the knowledge of the crowd to facilitate the innovation for the seekers. In this way, many risks of the open strategy adopted by the seekers are transferred to the service.

Risks arising from a negative perception on the part of customers, counterparties, shareholders, investors or regulators can adversely affect a brokering's ability to maintain existing, or establish new, business relationships and continued access to sources of knowledge and sources of funding. Therefore, keeping a high reputation is of utmost importance to mitigate these risks, and reputation is a result of adequate management of risks associated the crowdsourcing innovation business.

Some of these risks include:

- Not being able to find the necessary knowledge and skills in the crowd.
- Loss of most creative members of the crowd.
- Lack of clarity of innovation challenges and solutions.
- Lack of control over the quality of solutions provided by the crowd.
- Weak contractual ties with the solvers.
- Risk of intellectual property loss.
- Inability to determine the complexity of the required solution.
- Seeker expects low cost solver will be selected
- Too much delay in delivering a solution.
- Inability of the seeker to successfully develop the technology and successfully commercialize the innovation

To mitigate risks like these we propose the following Risk Management Methodology draft proposal (Figure 4) to increase the success rate of crowdsourcing that consists of three phases. Each process is interlinked and designed to build support and trust as the collaboration develops.

The first phase is the **Risk Assessment**. This phase consists of identification and evaluation of risks and risk impacts, and recommendation of risk-reducing measures. Risks must be identified before they can be managed. The traditional techniques of brain storming like mind mapping, fish diagrams and cause and effect diagrams can be used to identify risks and opportunities. This phase consists mainly of identifying what, why and how problems can arise as the basis for further analysis. In this phasecontrols will be identified and risks will be analyzed in terms of the consequences and likelihood in the context of those controls. Consequence and likelihood may be combined to produce an estimated the level of risk. The determination of the risk level will permit to separate the risks that the decision maker decides to accept with no plan to mitigate them from de major risks that require careful control and mitigation plans. Then a plan to minimize the effects of the risk event should fallow. This consists of comparing the estimated level of risk against the pre-established criteria. This enables risks to be ranked to identify management priorities and recommend a risk mitigation plan.

Three methods of control should be considered: avoidance, mitigation and acceptance. Possible actions to downgrade the risk include eliminating the root cause of the risk event, reducing the exposure to the risk by passing it on to another area, or assigning a project team member to actively reduce the characteristics of the risk event. Alternatively the consequences of the risk event can be accepted by developing and implementing a specific management contingency plan. For instance where the risk event does occur the manager should consider getting a fund to face the consequences.

The second phase is the **Risk Mitigation**. This phase consists in prioritizing, implementing, and maintaining the appropriate risk reducing measures recommended from the risk assessment process.

The last step in managing risks is **Continual Evaluation Assessment** phase. This last phase consists in implementing a risk management program and getting feedback to improve the methodology. The risk manager throughout the crowdsourcing life cycle should monitor each identified potential risk event. Actions should be taken to eliminate the risk or to down grade the risk. This is, to monitor and to review the performance of the risk management system and make the necessary changes.

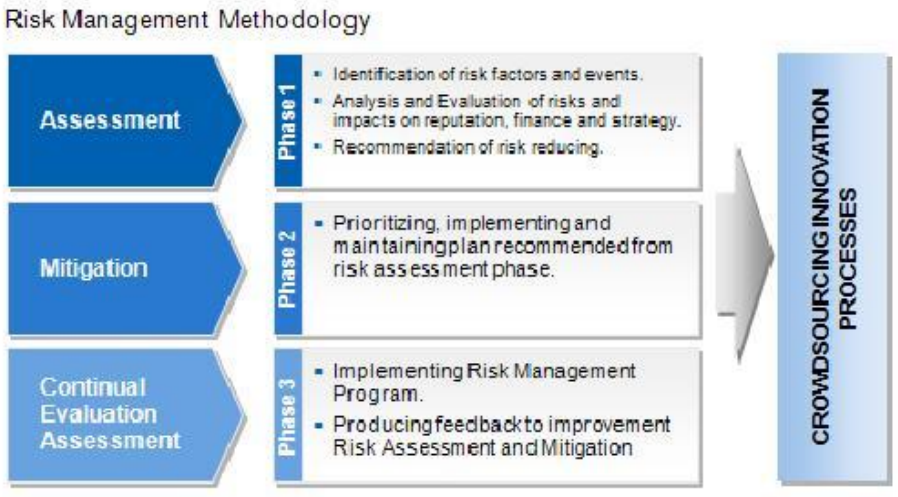


Figure 4. Risk Management Methodology for Crowdsourcing Innovation.

At the present stage of our research, we have produced a list of risk factors from the literature review we have performed. In the next steps of our research, we will develop a first draft of a Risk

Management Methodology to manage the risks of crowdsourcing innovation brokering specialized in the innovation needs of SMEs.

We have already validated our list of risk factors in several focus group sessions with innovation managers of SMEs. These sessions enabled us to consolidate the list in order to group the risks by the main activities of the brokering service. In order to validate the methodology, we will perform action research in a brokering service and will also specify de functional and informational requirements of a software tool to support the risk management methodology for crowdsourcing innovation.

6 CONCLUSIONS

This paper presented a first version of a methodology for risk management in crowdsourcing processes. The methodology comprises three phases. Each phase is interlinked and designed to build support and trust as the collaboration develops. Managing risk is central to crowdsourcing innovation strategy, but there aren´t relevant scientific or empirical studies explaining the relationship between them.

The crowdsourcing brokering services can become in the future years essential mechanisms to boost the innovation capability of companies, SMEs in particular. These services can provide a significant aid to speed up innovation, invention and knowledge construction. In a world facing so many economic, social and environmental, developed societies cannot underuse the creativity and knowledge of their highly qualified citizens and knowledge centers. Delivered through internet, these services can reach underdeveloped economies and contribute to their development by enabling a way for them to access important knowledge resources and competencies.

For a better understanding the scope of this research, we presented a model of crowdsourcing innovation process within the SME and a model for a crowdsourcing innovation broker. We also briefly presented a first approach to risk management.

We are developing this first draft into a mature risk management methodology that will be validated in an action research performed at a brokering service. The last step of our research will be the specification of functional and informational requirements of a software tool to support our methodology.

The scientific contribution of this research work is a better understanding of the crowdsourcing innovation strategy and the risks associated with it.

The professional contribution of the work 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 associated risks.

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