CROWDSOURCING: A TOOL FOR ORGANIZATIONAL KNOWLEDGE CREATION

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Abstract

Crowdsourcing is a new, online-based, way of outsourcing that relies on large and undefined networks of people. This process has been used by several successful organizations to solve their internal Innovation challenges with very good results. Assuming that, at a fundamental level, Innovation results from the creation and application of organizational knowledge, this work aims to better understand, from the firm's perspective, how can Crowdsourcing be used to enhance the creation of organizational knowledge. Therefore, we analysed Crowdsourcing through the lenses of the theory of organizational knowledge creation. Based on the main elements of the theory, our analysis raised theoretical assumptions that serve to question some practical aspects of the Crowdsourcing initiatives and may serve as basis for future research and practical experiments. Our analysis shows that Crowdsourcing for Innovation, has all the characteristics of a tool for organizational knowledge creation through the endogenisation of knowledge, ideas and expertise of external individuals. Nevertheless, this theoretical perspective of Crowdsourcing highlights a rather complex process that requires organizational effort and resources throughout all the process. Although a critical part of the work, in a Crowdsourcing initiative is developed outside of the company, the seeker should not neglect its efforts, doing so may result in unsuccessful Crowdsourcing experiences.

Keywords: Theoretical model, Crowdsourcing, Innovation, Organizational Knowledge Creation, Ba, SECI Model.

1   Introduction

Companies are, more than ever, searching new sources of knowledge, ideas and technologies to complement their internal innovation efforts. There are strong examples of successful companies that, despite great investments on internal research and development (R&D), chose to open their innovation processes, by embracing Open Innovation practices, with strong positive results (e.g. Dell, Eli Lilly, P&G, SAP) (Chesbrough, 2003). Crowdsourcing can be seen as a particular way to open up the innovation process, using large networks of individuals to access, capture and explore external knowledge, technologies and competencies.

Crowdsourcing is "the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call" (Howe, 2006). At one end, Crowdsourcing may be used for simple tasks such as data collection and translation of simple texts. At the other extreme, Crowdsourcing can be implemented to achieve complex tasks (e.g. problem solving) within innovation projects. Between these extremes, an intermediate category of Crowdsourcing relates to creative tasks in fields such as photography, artistic design or software applications (Schenk & Guittard, 2011). The focus of our work is on Crowdsourcing for Innovation. In this model, a company (seeker) posts a problem via an open call to an online vast knowledge community typically embedded in a social networking infrastructure (Adams & Ramos, 2010) leaving it open, usually in the form of a challenge, to any individual of the crowd (solver) to participate and present their solution to the problem. During the recent years there has been a growing interest in the Crowdsourcing phenomenon in literature. Majorly, the extant literature on Crowdsourcing has accentuated practical concerns, with less interest being paid to the theoretical support of the phenomenon, apart from a few exceptions (e.g. Burger-Helmchen & Penin, 2010; Schenk & Guittard, 2011). The extant theoretical work helps to understand the general limitations and benefits of Crowdsourcing. However, the lack of a general theoretical framework of the process that may help to further understand how the process works, from the seeker's perspective, motivated the present work.

Thus, assuming that, at a fundamental level, Innovation results from the creation of organizational knowledge (Nonaka, Sasaki, & Ahmed, 2003), this work aims to better understand, from the firm's perspective, how can Crowdsourcing be used in order to enhance the creation of organizational knowledge leading to innovation. Hence, we analysed the Crowdsourcing through the lenses of the theory of organizational knowledge creation (Nonaka, 1994). In order to confirm Crowdsourcing as a tool for creating organizational knowledge one must answer to the following question: How can an organization obtain successful solutions, from unknown external individuals, to innovation problems that have been openly communicated to them?

The Theory of Organizational Knowledge Creation was formulated by Nonaka and several co-authors, with the first version being published in 1994 (Nonaka, 1994) and went through several evolutions since then (e.g. Nonaka & Konno 1998; Nonaka et al. 2000; Nonaka & Toyama 2003; von Krogh et al. 2012). The authors see the organization, essentially, as an entity that continuously creates knowledge, and the theory aims to explain the dynamic process through which the organization creates, maintains and exploits knowledge. They propose a model of knowledge creation consisting of three elements: (i) the SECI process, knowledge creation through the conversion of tacit and explicit knowledge; (ii) *ba*, the shared context for knowledge creation; and (iii) knowledge assets, the inputs, outputs and moderators of the knowledge-creating process. The knowledge creation process may be seen as a spiral that grows out of these three elements. In summary, using existing knowledge assets, an organization creates new knowledge through the SECI process that takes place in ba, where new knowledge, once created, becomes part of the basis for a new spiral of knowledge creation.

The theory of organizational knowledge creation defends that tacit and explicit knowledge are complementary and interact with each other in creative activities carried by individuals and groups. There are four modes of knowledge conversion, that constitute the SECI model: (1) socialization (from tacit knowledge to tacit knowledge); (2) externalization (from tacit knowledge to explicit knowledge); (3) combination (from explicit knowledge to explicit knowledge); and (4) internalization (from explicit knowledge to tacit knowledge). Ba, in short, is a "shared space" (Nonaka & Konno, 1998) or "shared context" (Nonaka et al., 2000) for knowledge creation. Space, in this sense, can refer to physical (e.g. office premises), virtual (e.g. online communities), mental space (such as ideas and ideals) or any combination formed from them. The authors also identified knowledge assets as crucial for the creation of organizational knowledge. Nonaka et al. (2000) defined knowledge assets as "firm-specific resources that are indispensable to create values for the firm". These assets are the basis for the knowledge-creating processes. They are the inputs, outputs and moderating factors of the knowledge creating activities. We will analyse the process of crowdsourcing and identify how these elements of the theory, namely: ba, the SECI model and knowledge assets are present.

2 Innovation as a Result of Organizational Knowledge Creation

An Innovation is generally defined as a new way to do something. Innovation is what enables companies to maintain a competitive advantage. Even other modes of competitive advantages, like low-pricing may result from innovations of some type (Bingham & Spradlin, 2011). An important part of the Innovation processes in highly innovative organizations is the constant search for innovation opportunities. In other words, an innovative company needs to proactively create innovation opportunities or problems, in order to build better solutions for them.

Nonaka (1994) argues that the classic approach on the theory of the firm that defines the firm has an information-processing system, cannot explain sufficiently well some organizational processes, such as the innovation process. Accordingly, the innovation process could be better defined as the "process in which the organization creates and defines problems and then actively develops new knowledge to solve them" (Nonaka, 1994). Hence, to have a picture of how organizations innovate, one must analyse it from the point of view of how it creates information and knowledge to create, define and solve these problems.

At a fundamental level, knowledge is always created by individuals. Thus, the creation of organizational knowledge should be seen as a process that amplifies the knowledge created by individuals and makes it part of the organization's knowledge (Nonaka, 1994). The organization's role is to support creative individuals and provide a social context that positively influences the outcome of this process. "When people commit to this context by joining innovation projects, meeting in small networks, or exchanging information in online and offline communities, they may transcend their knowledge as well as the social practices in which they acquired much of their knowledge" (Nonaka & von Krogh, 2009).

3 Crowdsourcing as a Tool for Organizational Knowledge Creation

In a Crowdsourcing process, we may distinguish three different general phases roughly separated by the start and end of the Crowdsourcing challenge. In the pre-challenge phase, the focus is on the problem definition, carried out in the seeker's context. During the challenge, the focus changes to the solvers working to create winning solutions, in virtual environments shared between seeker and solver. After the challenge ends, the focus is on the evaluation, selection and learning of the winning solution(s) carried out in the seeker's context. Looking through the perspective of theory of organizational knowledge creation, the pre-challenge phase or "problem creation" phase starts with the

acknowledgement of an existing problem (generally of tacit nature) and ends with a written explanation of the problem at hand (of explicit nature). The challenge, or the "solution creation" phase, starts with the written description of the problem and ends with an explicit description of possible solutions to this problem. The post challenge or "solution learning" phase starts with explicit descriptions of solution for the problem and ends when the selected solution(s) is (are) incorporated into the seeker's knowledge base. Abstracting from the complexity of these phases, each of them represents, basically, a knowledge conversion mode, namely: the "problem creation" phase converts tacit to explicit knowledge and therefore is essentially an externalization phase, the "solution creation" phase is, in the seeker perspective, a combination phase, since explicit knowledge is converted into new explicit knowledge and the "solution learning" phase is basically an internalization phase, since new tacit knowledge is created from explicit knowledge. The generic view of the Crowdsourcing process as a sequence of knowledge conversion modes is illustrated in Figure 1.
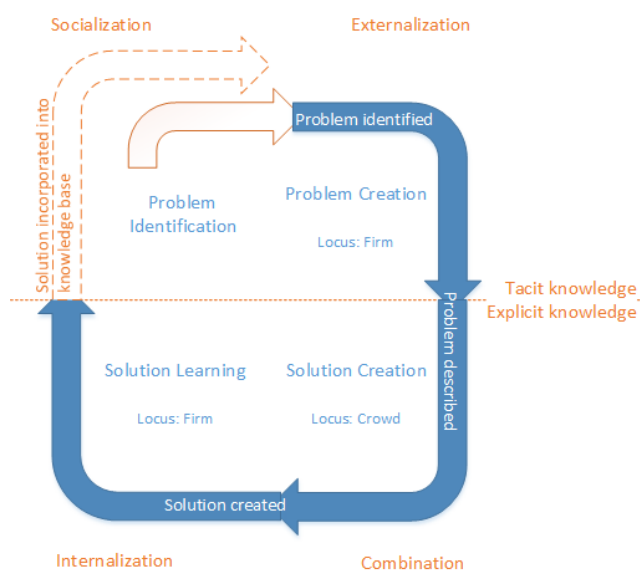

Figure 1.   Crowdsourcing process as a sequence of knowledge conversion modes

This generic conceptualization of the crowdsourcing process clearly illustrates that the tasks preceding and preceded by the Crowdsourcing challenge are of vital importance for the success of the Crowdsourcing initiative. Nevertheless, the novelty in Crowdsourcing is the ability to explore solutions for organizational problems, developed by unknown external knowledge, during the Crowdsourcing challenge. In order to understand more profoundly the Crowdsourcing process, Figure 2 illustrates a detailed conceptualization of Crowdsourcing seen through the lenses of the theory of organizational knowledge creation. This conceptualization results from a deductive exercise based on the theory and on the description of several Crowdsourcing Innovation initiatives presented on the literature.

From this analysis we have identified the following steps in the Crowdsourcing process, as shown in Figure 2:

1. Once a problem is identified within the organizational context and the firm decides to use Crowdsourcing to solve it, the seeker must assign a team to manage the process, creating a *ba* ("Team context" in Figure 2), within the context of the organization, to manage the process.

2. The team must create a thorough and clear description of the problem.

3. The problem description is posted via an open call, disclosing the details of the problem to the crowd, inviting the participation of everyone who deems themselves qualified to solve the problem.

4. Solvers acknowledge the existence of the problem and its details.

5. Solvers self-select to attempt to create a solution.

6. The solver communicates his or hers decision to create a solution to the seeker.

7. The seeker and the solver have a shared context and, therefore, a *ba* was built.

8. A "private" virtual workspace is created within the internet platform.

9. The Solver will create a solution. In other words, the Solver's spiral of knowledge will lead to the creation of a solution.

10. Once the solver has achieved the desired output of this spiral of knowledge, he or she submits the solution to the seeker.

11. The seeker receives and evaluates the submitted solution(s).

12. The company engages in the selection of the winner solution(s).

13. The seeker rewards successful solver(s).

14. Learning and adaptation of the selected solutions to the organizational context occurs in order to be used in future knowledge creation processes.
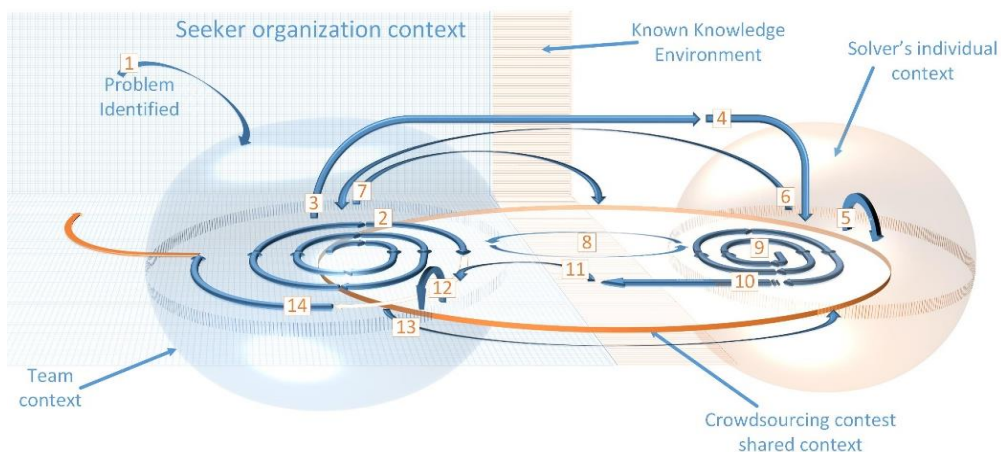

Figure 2.   Crowdsourcing process

Hence, in a pre-challenge stage, the seeker must form a team that will manage the whole process and this team must compose a thorough description of the problem at hand. As explained earlier, the redaction of the problem's description, is crucial for the success of the initiative. This description should be understood by anyone outside the firm capable of giving a successful solution to the problem, but it should not include any elements that could jeopardize core knowledge assets of the company. The description of the problem, output of this activity, will later be part of the shared context (ba) built purposefully to create solutions. This description should contain information about the problem, the company and the environment to potential solvers. This information will help to create a shared context between the seeker and the solver, and according to Nonaka (1994) the shared information will enable and facilitate the dialogue between them, as it helps the intervenients to enter each other's context. The posting of the problem marks the beginning of the Crowdsourcing challenge.

During the challenge, the focus of the process changes to the crowd. After the posting of the problem, hopefully, several solvers will learn about the problem and self-select to develop a solution. The self-selection is the realization that the solver may have what is needed to answer the problem, or in other words, it's the "spark" that triggers an individual spiral of knowledge. Besides, if the solver self-selects to develop a solution this means that he or she is motivated by a conjunction of extrinsic (immediate payoffs, delayed payoffs, social motivation) and intrinsic factors (Task Autonomy, Skill Variety, Task Identity) that lead her or him to commit to present her or his own perspective. At this point, both the solver and the seeker company share some of the details of the problem and are both actively seeking the solution to this problem. Therefore, we may argue that a shared context exists, in other words, a *ba* was built and initially energized by the seeker intention of solving the problem and the solver's set of motivating factors to propose a solution. Usually at this stage, a "private" – allowing only interactions between the seeker and a solver - virtual workspace is created within the internet platform, enabling a dedicated communication channel. Besides promoting open dialogue between seeker and solver, this workspace –sometimes called "project room"- may be a useful tool to better define and constrain the *ba*, creating a clear place exclusively dedicated to the creation of the solution and abstracting the solver and seeker from unwanted outside interventions. It is important to note that during the crowdsourcing challenge, the organization will have multiple solvers attempting to develop successful solutions for the problem. This means that the seeker will have several active virtual *ba* transcending the organizational boundaries that need to be managed and maintain energized, in other words, to maintain every participant in that context active and motivated. All the activities signalled from 4 to 11 in Figure 2 will repeat for every solver willing to create a solution to the problem.

After the end of the challenge, the company must evaluate the solutions and decide from this multi perspective panorama that or those that may enhance the central knowledge creation process and direct the company to the best solution to its problem. For the seeker this stage is, essentially, a stage of organizational learning. The seeker will gain the right to exploit the chosen solution(s), but it will also develop an improved understanding of both the problem and solution space derived from the nature of the chosen solution, and the nature of the other proposed solutions (and also from the process of problem articulation) (Feller, Finnegan, Hayes, & O'Reilly, 2012). Hence, all the submitted ideas of a crowdsourcing challenge may be considered knowledge assets for the seeker organization as they are outputs of knowledge creating processes promoted by the seeker. After selecting the winner solution(s), the seeker earns the intellectual rights over the codified knowledge in exchange of the previously announced reward. It is generally accepted that knowledge is context sensitive, thus, we can argue that, as the solution was created in an external context (despite having shared elements with the organization), the solution has to be learnt and fully adapted to the organizational context in order to be used in future knowledge creation processes. This process of adapting external knowledge to a new context, is about experimenting, testing, discussing and diffusing the new knowledge asset within the organizational context. In other words, the goal is to create tacit knowledge based on the newly acquired solutions through internalization, and integrate this new knowledge into the seeker's knowledge base through socialization.

4   Theoretical Assumptions

The description of the Crowdsourcing process from the organizational knowledge creation theory perspective raises some theoretical assumptions that may have implications in practice and in future research.

The view of the Crowdsourcing process as a practical example of a SECI model easily shows the importance of stages before and after the crowdsourcing challenge. This perspective shows that these stages are essential for the successful application of a crowdsourcing initiative. Without a thoughtful and attractive (to the crowd) description of the problem, or without the correct evaluation, selection and learning of the solutions, the crowdsourcing efforts will be fruitless.

From the theoretical approach, one can perceive that the final description of the problem is an intersubjective construction, since it starts from a shared perception of an organizational problem and results in a negotiated externalised artefact which should, somehow, satisfy the several individual perceptions of the problem. Extant literature is not clear about this process. Besides, the literature does not explores the mechanisms used to ensure the thoughtful, understandable and attractive description of the problem to the crowd. From this perspective, it seems that the problem definition, articulation and redaction are organizational skills needed for a successful crowdsourcing initiative.

Nonaka (1994) argues that, up to a certain degree, the amount of redundant information shared between the actors in knowledge creation fosters the process. Redundant information refers to the existence of information more than the specific information required immediately by each individual (Nonaka, 1994). Based on this, we may argue that the amount of information shared by the seeker to the crowd may be related to the success of the initiative (i.e. number of participations, average quality of participation). Likewise, considering this, we may also assume that the anonymity that characterizes some of Crowdsourcing initiatives may impair its results.

The concept of *ba* clearly illustrates that the seeker has an active part in the development of the knowledge. It is based on information from the seeker's problem that the correct context, needed for the knowledge creation, is built. Besides, the seeker or a third-party on its behalf has to energize, maintain and manage the *ba* in order to achieve the desired goals. Also, the seeker has to maintain the dialogues with active solvers that request any clarification or explanation. Thus, the seeker takes an important role on the Crowdsourcing process, even during the challenge when the focus is on the crowd.

The work of the solver in developing a solution to an organizational problem is carried out in *ba*. This concept may consequently be useful to define the best characteristics, tools and environment for knowledge creation. Extant literature on crowdsourcing pays little attention the characteristics and tools of the knowledge creation environment. From empirical observation and industry papers it is easy to understand the benefits of a virtual workspace, usually referred to as "project rooms", however, there is, to the best of our knowledge, a gap in what concerns the online mechanisms best suited to promote creativity and knowledge co-creation that will result in optimal quality solutions. Regarding this topic one may consider the work of Nonaka et al. (2000) that presented four types of *ba* (originating *ba,* dialoguing *ba,* systemizing *ba,* and exercising *ba*) better suited for each type of knowledge conversion. The correct adaptation of knowledge creation context, shared between solver and seeker, according to the stage of knowledge conversion/creation experienced by the solver, may lead to more successful outputs.

Nonaka and Toyama (2003) state that all *ba* must remain energized. The fact that the energy applies to *ba* and not to the actors involved notes that, in Crowdsourcing, it is not only the solvers that need to remain motivated but also special attention should be paid, by who is managing the initiative, to the energy and motivation of the seeker's assigned internal team. In extant literature the motivation of the crowd members is often discussed, but less attention is paid to the levels of commitment, motivation and energy of the seeker throughout the process.

As the Crowdsourcing takes place in a virtual environment the output obtained by the seeker from the crowd is essentially explicit. However, dialogue and communication mechanisms, are powerful tools to externalize solver's tacit knowledge and incorporate it in the output of the process. Therefore, these should be present and considered as a central functionalities in a Crowdsourcing initiative Also, we may argue that bidirectional open dialogue during crowdsourcing initiatives between solver and seeker should lead to increased output validity, as the solver may get extra information about the problem, better understand the seeker problem and express his or her solution better.

In the definition of knowledge assets it is said that they are also moderating factors of the knowledge creation process. Nonaka and his colleagues (Nonaka et al., 2000) give the example that trust which

may emerge as an output of a knowledge creation process may also moderate how *ba* functions. Considering that such knowledge assets, such as trust, care and sense of belonging, may emerge from participation and living the experience of a given crowdsourcing challenge and that these assets last over time, we may argue that the maturity of the crowdsourcing initiatives and the crowd influence the outcome of future challenges.

If we consider that knowledge is context-dependent or context sensitive, it can be assumed the "distance" between the solver and seeker's context (e.g. being from disperse scientific fields, different cultures) will affect negatively the adaptation of the solution to the actual organizational context.

5   Conclusion

In this paper we have conceptualized and analysed the Crowdsourcing as a tool for organizational knowledge creation, exploring the ideas and knowledge of unknown external individuals. A seeker firm may engage in Crowdsourcing if it does not have the necessary internal resources to solve a problem or achieve a goal. But also it may be a thoughtful strategy to improve the traditional knowledge creating processes. By engaging in Crowdsourcing and thus creating several *ba* outside the organization, the processes of knowledge creation inside the organization become more permeable, inducing environmental fluctuation and creative chaos that should result in enhanced outputs.

Our analysis shows that the Crowdsourcing can, generally, be seen as a tool to create organizational knowledge. Also, this theoretical perspective of Crowdsourcing shows a rather complex process that requires organizational effort and resources throughout all the process. It shows that the stages preceding and preceded by the Crowdsourcing challenge are of crucial importance for the seeker to be able to generate and use solutions developed by the crowd. This is in line with previous theoretical work on Crowdsourcing, although from different perspectives (e.g. Burger-Helmchen & Penin, 2010). Our work also shows that the seeker should manage effectively the knowledge creation contexts, dialogues with solvers and maintain the motivation levels during the challenge. Despite part of the work is done outside of the company, the seeker has to dedicate resources and should not neglect its efforts through all the process, doing so may result in unsuccessful Crowdsourcing experiences.

Our analysis is partially in line with previous work that indicates that Crowdsourcing is best suited for highly codified knowledge. The inability of sharing direct experiences with other participants of a virtual *ba* (Nonaka & Toyama, 2003) seems to indicate that it is not possible to convert tacit knowledge into new tacit knowledge, via socialization, in crowdsourcing. Nevertheless, through externalization supported by dialogue, part of the solution (of explicit nature) may be created from the solver's tacit knowledge.

The concept of *ba* gives the indication that, because the solver is working towards the benefits of the seeker firm, it should have the right work environment. Future research should further explore the concept of ba in the Crowdsourcing context, shedding some light in the characteristics, environment and tools to create optimal conditions for knowledge creation in virtual environments. More specifically the use of different communication technologies and the adaptation of the workspace to the stage of development of the solution seem interesting topics to explore.

Our future work will analyse empirically the theoretical assumptions raised above. Our empirical work should be based on case studies in seeker firms and also on intermediary Crowdsourcing services, responsible for the creation and management of several crowdsourcing initiatives on the behalf of various seekers.

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