Crowdsourcing for Open Innovations

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Abstract: Under very complex environment, innovation-oriented crowdsourcing is becoming critical because it is not only the result of cumulative dynamic interaction involving many stakeholders, but also is a social, spatially embedded, and interactive learning process that cannot be understood independently of its institutional and cultural context. Bringing together different crowdsoursing phenomena, this paper firstly converges on classification model which highlights four main modes of crowdsoursing. Then this paper discusses possible management mechanisms to support prevalent crowdsourcing for open innovation. Several references for developing countries to initiate innovation oriented crowdsourcing are also provided in this paper.

Keywords: Crowdsourcing; Crowdsourcing modes; Open innovation; Collaborative innovation

1. Introduction

The rise of the 'networked' or 'information' economies (Castells, 2000; Nonaka et al, 2001; Roos, Draonetti & Edvinsson, 1997; Volberda, 1998) signified by terms such as 'innovative' and 'flexible' suggest that firm performance is increasingly predicated on the efficient and effective use of knowledge (Grant, 1996)[1]. Open innovation is becoming critical not only because that is generally the result of cumulative dynamic interaction and learning processes involving many stakeholders, but also is seen as a social, spatially embedded, interactive learning process that cannot be understood independently of its institutional and cultural context (Lundvall, 1992; Fornaciari & Dean, 1998). Since Roberts'(1999) Definition of innovation maintains that an innovation can only be seen as innovation if it has implementation and commercial value, it is important to measure the impact of innovation. While innovation concerns the processes of implementation, relying mainly on organizational communication and power, in the domains of production, adoption, implementation, diffusion, or commercialization of creations (Spence, 1994), creativity is connected to cognitive and emotional processes taking place at the individual level (Sousa, Monteiro, & Pellissier, 2008). Participation of animating individuals in or outside the firms to make a contribution to the

innovation process for free or for significantly less than that contribution is worth. Crowdsourcing has been made individual participants possible on a large scale by the emergence of "Web 2.0," a shorthand term for new internet applications that make two-way communication easier to innovation. Voluntary participation in crowdsourcing tasks is more and more popular among internet users.

Crowdsourcing, which was coined by Jeff Howe (2006)[2] in the computer magazine Wired, 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 over the internet" (Howe, 2007). Crowdsourcing, as argued in this article, takes place when an innovation oriented firm outsources specific tasks in the form of an open call, while tasks of crowdsourcing include product design, advertising, quality monitoring, and the solution of specific technical problems. This article firstly examines the wider context of change in complexity environment which play an important role for contributing to the increasing prevalence of innovation-oriented crowdsourcing, secondly proposes a classification of crowdsourcing based on phenomena in the internet. Thirdly, discusses machanisms driving individual participation and other factors that

explain the rising prevalence of crowdsourcing; by way of conclusion, highlight the reference meaning for developing countries to initiate innovation oriented crowdsourcing.

2. Complexity of Innovation-oriented Environment

There is no denying that the future world of innovation will be different due to the changes in complexity environment. Politics as a long term factor will affect innovation environment constantly; economic factors caused by globalization and de-regulated markets and new technology increase innovation turbulence; technology factor permeate every corner of the world, better or worse, global warming and sustainability push people to innovation than even before. In the knowledge economy primary resources have become far more intangible and difficult to contain. Knowledge and information have no value until it is used for a specific purpose. Increasing global instability and competitiveness of innovation environment impose the compelling need to identify new paradigms, methods, applications and technologies to support renewal and creativity. This paper highlights three environment factors for detail discuss below.

Emergency of the working consumer. A functional differentiation of society into two dichotomous spheres of "producer" and "consumer" is an artifact of early industrial society, while consumers passively buy and use products. The new kind of dependency emerging from changes in customer relations is not a one-way street. Corporations now depend on working consumers to carry out their "jobs" reliably, and consumers have become more like co-workers, who take over specific parts of a production process that ultimately remains under the control of a commercial enterprise. Voß and Rieder (2005) interpret this development as the emergence of a new consumer type: the "working consumer", which encompasses a more complete range of relationships and conventions that define and regulate the firm's dealings with outside individuals. Thus, the rise of working consumer entails dangers and risks for both individuals and firms, but makes innovation-oriented crowdsourcing possible on the other hand.

Technical prerequisites for crowdsourcing innovation. "Web 2.0" make possible new forms of interactive communication with a wide variety of content and purposes including audio, reviews, bookmarks, communities, files, films, photos, graphics, instant messaging, jobs, personal contacting, art, music, news, podcasts, programming, travel, shopping, games, sports, search engines, tagging, texts, tools, video, weblogs, wiki, and knowledge. The initial impetus for Web 2.0 programming came from the "open-source" movement, but the corporate world has since discovered it as a platform for its own goals, of which are engaging in forms of "open innovation" (Hippel 2005[3]; Chesbrough, Vanhaverbeke & West 2007[4]). Crowdsourcing as represented Web 2.0 activity is the clearest example of how firms can mobilize internet users to make a direct contribution to its processes of value creation and innovation.

Challenge of open innovation model. A brief comeback to the literature on open innovation can help in the following interpretation of collaborative innovation crowdsourcing. Chesbrough (2003) describes how organizations have shifted from closed innovation processes towards a more open way of innovating. Traditionally, new business development processes and the marketing of new products have taken place within the firm's boundaries. Open innovation can be described as: combining internal and external ideas develop new technologies. Several factors have led to the erosion of closed innovation. First of all, the number of highly educated people has increased over the years. As a result, large amounts of knowledge exist outside the research laboratories of large organizations. Secondly, the possibilities to further develop ideas and technologies outside the organization are growing. Finally, active user and suppliers, even competitors, play an increasingly important role in the innovation process. As a result, organizations have started to look for other ways to increase the efficiency and effectiveness of their innovation processes. Hence the open innovation model implies that organizations have to become aware of the increasing importance of open models and practices of innovation dynamics. Crowdsourcing, attempting to integrate internet users into specific internal innovation processes becomes an innovative solution for innovation..

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3. Types of Crowdsourcing

Crowdsouring application itself is currently in a phase of experiment and innovation. Practically, the structure of the call and of the reward varies according to the firm and the activity, hence different types of crowd-sourcing are in use.

Helmchen & Penin（2010）[5] identifies three types of innovation based three different cases of crowdsourcing: Crowdsourcing of inventive activities, crowdsourcing of routine activities and crowdsourcing of content (information most of the time). Panchal （2011） [6] recognizes that two models of open innovation involving communities can be defined: one that is based on competition and another that is based on collaboration. This paper based on two dimensions, which are task content and synergy level, highlights four forms of crowdsourcing (refer with: Fig. 1)
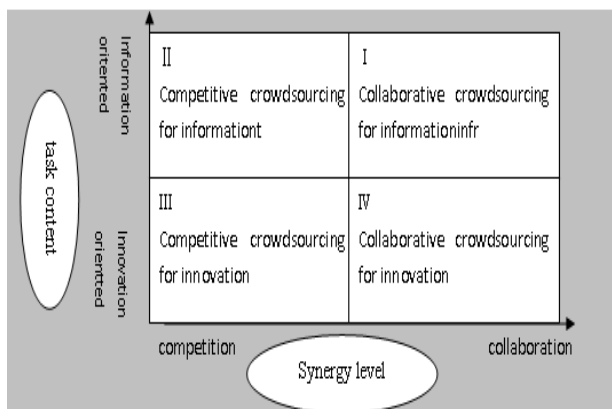

Figure 1: Crowdsourcing modes

Crowdsourcing for information based on collaboration. Crowdsourcing of content, deals with tasks concerning information processing or simple activities. Helmchen & Penin (2010) studied a peculiar example of crowdsourcing of routine activities is internet eyes, a system of security video watch through the internet (www. interneteyes.co.uk)[7], which allows the crowd to watch video camera owned by security firms and set up at various geographic locations (houses, firms, etc.). After having registered on the website, each individual can watch, on his/her own computer, several security cameras, and as soon as he/she identifies an offence, alerts the website, which in turn immediately alerts the security firm in charge of the camera. Individuals are then rewarded according to the number of confirmed offences that he/she has signaled. Other examples: like Ebird[8] platform allows the crowd to take part in bird research over the world, Istockphoto[9] platform attract the crowd for collecting photos, et al.

Crowdsourcing for information based on competition. Moviebakery[10], which uses this form of crowdsourcing, is an internet-based agency that mobilizes amateur film directors and producers to accept commissions for internet advertising. Companies who want an ad turn to the site's owners, who post a call for submissions that fit the needs and wishes of the commissioning company. Persons can respond by sending in their videos. Moviebakery selects the ten "best" and pays at least €500 for each film. The commissioning company pays Moviebakery €10,000 and receives all ten videos plus distribution and promotion in the WWW by Moviebakery.

Crowdsourcing for innovation based on competition. In the competition-based approach to open innovation, a design problem is made known to a community of participants. Members of the community then offer solutions to the problem and one or more solutions are selected. In this model, there is no collaboration between the members of the community. Competition is based on the offer of a reward to solutions that are selected. A prominent example is Proctor & Gamble's innocentive.com[11] , Unsolved research questions are posted on http://www.innocentive.com, where they are read by thousands of people who can choose to try their hand at a solution. Over 150,000 potential "solvers" are already registered. Individuals who solve posted problems receive financial remuneration that varies with the difficulty of the problem and can be as high as $1,000,000. All those who work on a problem un-successfully receive no compensation. InnoCentive utilizes the competition-based model to solve complex science and engineering problems. The key assumption in Innocentive's operating model is that it is very likely that someone outside the company knows the solution to the problems faced inside the company.

Crowdsourcing for innovation based on collaboration. In the collaboration-based approach to open innovation, when a design problem is made known to a community, solutions are offered and amended openly by the community. The collaboration-based approach is characterized by self organization where the evolution of the artifact to be designed is determined by the action of the community rather than a single entity. Both of these approaches collectively have been referred to as crowdsourcing. Crowdsourcing is the act of taking a task traditionally performed by an employee or contractor, and outsourcing it to an unidentified, generally large group of people, in the form of an open call. (Wikipedia, 2011)[12]. Calls by established firms for participation in the design or

configuration of new products represent one of the most prevalent forms of crowdsourcing being used currently. These vary in intensity from simple opinion polls to elaborate schemes for the collaborative development of actual products by users. Voß and Rieder (2008)[13] studied one example of product development in collaboration with consumers is the call announced by the auto manufacturer Fiat for its new Fiat 500[14]. In just a few months, the call generated ten million clicks, 170,000 designs from (potential) consumers, and 20,000 specific comments on things like particular exhaust pipe forms, chrome bumpers, or Italian flags under the rear view mirror. Additionally, consumers created a mascot and almost 1,000 accessories. The campaign was also a complete success from a marketing point of view. Of course, participating consumers were not compensated for their contributions. Their only wages were feeling their opinion mattered, the opportunity to apply their creativity, and the chance that their design ideas might be realized in the final design of the car. Mass collaborative innovation don't like traditional collaborative product realization, the participants in the mass collaborative innovation process are not necessarily organized in a hierarchical manner, and are free to work on designed problems or sub-problems. Moreover crowdsourcing for innovation based on collaboration, unlike traditional collaborative product realization where a sub-problem is assigned to a single company, which allows for the participants to be involved in the problem solving process, to offer solutions, amend solutions and offer comments on solutions at various levels; also unlike crowdsourcing for innovation based on competition where a problem usually be solved by single one, which allows for the participants learning among each other leading to a synergy effect.

4. Management Mechanisms for Open Innovation–oriented Crowdsourcing

As previously mentioned, interest for these crowdsourcing for innovation based on collaboration platforms is driven by the idea that they try to invent new norms of cooperation and exchange which combine cooperative work in innovation communities and market commercialization. A dynamic perspective is necessary to find their way through new common rules, which are different from the dichotomous ideal types, either firm and market in economics or community and market in sociology. Recent debates in economy and sociology suggest an alternative third way that surmises that the interplay between the different natures of exchange-relationships can take a variety of market and/or relational forms (Bruce & Jordan 2007; Dufy & Weber 2007; Zelizer 2004). The authors suggest "that theorizing needs to be accompanied by empirical work that takes a more grounded approach, provides a rich picture of the ways which exchange. Zelizer (2004)[15] opposes a longstanding tradition in sociology which consider the incompatibility between community and market (Zelizer 2004). This paper is an attempt to advance towards the description of specific incentive, coordination and control configurations for collaborative crowdsourcing innovation

Coordination mechanisms. The rise of computer-supported cooperative work has generated research interest in the way in which the "bazaar" governance (Raymond 1999) was structured and opened to specific coordination mechanisms and rules of co-working. On-line community work organization, which based on self-government, presents similarities elements to the "collegial form" of organization in comparison to their opposite bureaucratic organization (Lazega 2005). Crowdsourcing has key characteristics of the direct coordination by mutual adjustment, formal equality and autonomous members. Openness to the crowd has potentially essential properties: it's a means to "force serendipity" by the integration of heterogeneous resources (laymen as experts, users as producers, etc.) (Ebner, et al. 2008), mutual learning lead to more unintended innovation effects. In this perspective crowdsourcing based on collaboration has higher synergy than based on competitive one due to better mutual learning among crowds.

Another question is what coordination mechanism is suitable for crowdsourcing for innovation. Openness has to allow for, not only a profusion of propositions, but also a fast and massive concept test. Empirical studies on the functioning of collaborative projects have shown the progressive emergence of a set of coordination mechanisms in these crowdsourcing platforms: upstream selection of contributors, division of work, qualitative selection of contributions, recruitment driving forces, delegation of responsibility, etc. (Conein 2003)[16]. So, who to filter many types of invention to identify opportunities for innovation (Ebner, et al. 2008), should be the key point of coordination mechanism. Qualitative innovation

relies on active and permanent contributors which foster the innovative activity with helpful interactions, resources exchanges, co-operation. The collaborative work is as much a process of co-evaluation (classification, filter) as a process of co-creation (knowledge sharing and production). A minimal base of social similarity with partnership following common goals (Conein 2003) might act as a solution for collaborative crowdsourcing innovation.

Control mechanisms. The issue of control in crowdsourcing platforms is how to leader the participants. Nambissan & Sawhney(2007)[17] coined it as network leadership. Nambissan and Sawhney (2007) provide a framework of four forms of network-centric innovation, based on two dimensions: the structure of the innovation space (either well defined or emergent) and the network leadership (either centralized by a dominant player or diffused within a community). This dimension captures the governance aspect of the network organization. Again, the authors make the distinction between two situations. The first is similar to the open innovation paradigm, where a dominant firm makes the decisions that affect the innovation process and define the nature and membership of the network. The second is assimilated to the open source paradigm where the leadership tends to be distributed amongst the members of the network. In the case of crowdsourcing, we will have to take into account possible tensions in the network leadership, in other words, who will define the rules of membership and participation and make decisions about the creation process. Trompette, Chanal& Pelissier(2009)[18] studied the solution adopted by CrowdSpirit, consists in giving the project leader of a given community the responsibility of sharing value among the members of his team. Reciprocally, team members are supposed to give a note to their manager. In doing this, the founder of Crowdspirit is assuming that reputation effects will regulate economic transactions. This will have to be validated by observations of the functioning of the new version of the platform.

Incentive mechanisms. Crowdsourcing is part of a broad and historically significant trend, but two important incentive questions regarding crowdsourcing for innovation remain largely unanswered. What motivates companies to crowdsource? What motivates crowds to respond and participate? The following theoretical reflections on these questions serve as a preliminary basis for future empirical study.

- Firms' motivations for innovation-oriented crowdsourcing

Crowdsourcing. Technological improvements make it easy and inexpensive to integrate crowds into work processes. Reichwald and Piller (2004)[19] name four additional benefits for firms arising from the mobilization of consumers in the value creation process. These are the reduction of the time it takes to develop new products ("time-to-market"), the reduction of the costs of innovation ("cost-to-market"), the increase of market acceptance of new products and consumers' willingness to buy them ("fit-to-market"), and the increase of consumers' subjective perception of the actual newness of a new product ("new-to-market"). A company successful in doing so can reap a variety of benefits (Grün & Brunner 2002): cost reduction through reducing complexity, productivity gains through more efficient use of resources, increase of turnover, quality improvement using outside knowledge, etc. Above all, the orientation to openness culture is probably strongest among crowdsourcing projects. Firms often closely emulate the aesthetics and rhetoric of the open culture in order to motivate users to participate in crowdsourcing projects.

- Respondents' motivations for innovation-oriented crowdsourcing

The first and foremost question is regarding why individuals respond to crowdsourcing initiatives? A theoretically oriented answer differentiates between extrinsic and intrinsic motivations. An extrinsically motivated person performs an activity in order to obtain some kind of external reward. Rewards for participant could be benefits for one's career, recognition for work done, or the satisfaction of pursuing common goals (Kleemann, Voß & Rieder,2008). An intrinsically motivated person, on the other hand, takes up an activity for its own sake or for fun's sake (Ryan & Deci 2000)[20]. Moreover Ryan and Deci (2000) identify clearly intrinsic and extrinsic motivations as well as mixed forms. Similar considerations on intrinsic motivation emerge from the job characteristics model (JCM) used in work psychology (Hackman & Oldham 1980). The model addresses itself to varieties of job tasks and identifies particular characteristics that would appear to increase the intrinsic motivation of workers. Empirical studies of open source and open

content projects strongly suggest that even when contributions are unpaid, extrinsic motivators are nevertheless often present. These include career related benefits (Robles et al. 2001) and the desire to acquire new knowledge, to share expertise with others, and to reach common goals (Gosh et al. 2002). Yet intrinsic motivation ("fun") appears to be the deciding reason for getting involved (Luthiger Stoll 2006). Schroer and Hertel (2007)[21] surveyed task characteristics associated with persons who work on the internet encyclopaedia Wikipedia. In their findings, readiness to participate was most closely associated with autonomy, task significance, and the newness of the challenge or "skill variety". The primary motivations of participating innovation-oriented crowdsourcing are intrinsic ("for the fun of it"), but also of central importance are characteristics that make tasks fun (autonomy, creativity, importance of the task). Extrinsic motivations such as the satisfaction of pursuing common goals or time savings are also relevant but appear to be less critical. Hence collaboration-based crowdsourcing is suitable to participants' motivations in a long time viewpoint.

5. Conclusions

Crowdsourcing is currently one of the most important ways to activate and leverage the integration of heterogeneous resources in a structured flow of work (Thrift 2006)[22]. Within this wave of this new web actor, crowdsourcing has been recognized as an interesting object for scholars in innovation field, which was not previously studied as such. In order to explain the crowdsourcing phenomena clearly, this paper based on two dimensions (task content and synergy level) highlighted four forms of crowdsourcing, discussed the characteristics of each mode. Through further analysis we found that collaborative allowing for the participants to be involved in the problem solving process, to offer solutions, amend solutions and offer comments on solutions at various levels, can reach a better synergy effect due to learning during the innovation processed, unlike competition modes where a problem is assigned to a single one. Finally, we discussed management mechanisms to find some valuable coordination mechanisms from three aspects to support prevalence innovation oriented crowdsourcing based on collaboration. This paper might provide several references for innovators in developing countries to initiate innovation oriented crowdsourcing in far more complex environment by means of understanding the important of open innovation based on internet crowdsourcing in 'information' economies environment, also by means of finding out the crowdsourcing modes and management experiences in developed countries for leaning.

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