Role and Challenges of Crowd Sourcing in Management and Technology

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Abstract

Since 2006, as more academic and practitioner research on crowd sourcing have been published, the topic has grown in relevance within the broader area of management and technology. However, no systematic review of the topic has yet appeared in management journals; also, the field suffers from ambiguity in its description, which has resulted in its mainly unstructured evolution. As a result, the authors conduct a thorough analysis of the existing body of knowledge on crowd sourcing, highlighting the strengths and weaknesses of this literature stream before recommending future research directions. The study is based on many peer-reviewed articles published between January 2006 and January 2012. Crowd sourcing is embedded in two mainstream disciplines within the broader subject matter of innovation and management, according to the review: (1) open innovation and (2) co-creation. In addition, the review touches on a number of topics covered by other theoretical streams, including (3) Information systems management, (4) organisational theory and design, (5) marketing, and (6) strategy. The authors take a process-oriented approach to crowd sourcing research, using the „Input–Process–Output' framework to interpret findings along the lines of: (1) Input (Problem/Task) (2) Process (session management; problem management; knowledge management and technology (3) Outcome (solution/completed task; seekers' benefits; solvers' benefits). This framework includes a detailed account of how the topic has changed over time, as well as recommendations for future research directions in the form of research questions that are useful to both academics and managers.

***Keywords**: Crowd sourcing, Knowledge, Management, Technology.*

1. INTRODUCTION

Crowd sourcing is rooted in open innovation and co-creation research, and it asks whether a large number of people – the "crowd" – can participate actively in a company's innovation processes, giving the company access to intelligence and knowledge that would otherwise be dispersed among a large number of users or stakeholders (Chanal and Chui, 2012).

Howe invented the term crowd sourcing in 2006, defining it as "the process of a firm or an organization adopting a job traditionally handled by workers and outsourcing it in the form of an openrequest to an undefined (and generally huge) network of people." This can take the form of peer- production (where a job is done jointly), but it is also frequently done by single people (expert or novices). The adoption of an open call and a vast network of potential workers is a necessary condition" (Howe, 2006).

This definition backs up the claim that crowd sourcing has its roots in co-creation research, arguing that it makes sense to broaden the pool of people who contribute to the value creation process (Chui, Manyika, Bughin, and Dobbs, 2012; Greer and Lei, 2012). Crowd sourcing is, in fact, a type of co- creation activity made possible by the rise of the internet, in which the "community" can assist in validating, altering, and improving a company's value-creating idea or the information it distributes onthe internet. When a corporation allows clients or other outsiders to add their own concepts and designs to the process, the process can also use the idea generation phase (Chui, Manyika, Bughin, and Dobbs, 2012; Poetz and Schreier, 2012). Companies were able to tap into a potentially infinite number of people with very little effort thanks to the internet, which was undoubtedly the key enabling factor for crowd sourcing.

The crowd was co-opted as a major collaborator in the creative processes taking place within enterprises, thanks to the mix of online and co-creation dynamics. Crowd sourcing also aligns with open innovation literature: concept competitions are a key practise in open innovation (Leimeister, Huber, Bretschneider, and Krcmar, 2009) and are also cited in the literature as prospective crowd sourcing efforts (Brabham, 2009; Terwiesch and Xu, 2008). Furthermore, in recent studies, crowd sourcing is frequently referred to as an inbound open

innovation practise in which individuals are invited in to assist in the solution of an issue (e.g. Chanal and Caron-Fasan, 2010; Terwiesch and Xu, 2008).

While this is true, whether crowd sourcing may be included among open innovation approaches is determined by two main factors: I the inherent nature and complexity of the problem that a firm wishes to solve (Vukovic, 2009); and ii) the role assigned to the community (Rouse, 2010). A crowd sourcing request can be for anything that the organisation requires, from simple job execution (as seen on the Amazon Mechanical Turk platform) to far more sophisticated R&D difficulties, such as sourcing new ideas or introducing fresh uses for current concepts (see the InnoCentive platform). Both of these needs are covered by crowd sourcing, however the former involves doing minor repetitive chores without bringing any intrinsically creative features, whilst the latter involves the creation of new information for the organisation. As a result, the crowd might be involved either as an executor of routine duties or as a contributor to the company's innovation process. Crowd sourcing can be viewed as an open innovation practise and support tool, or simply as a new technique to outsource mundane jobs, according to Rouse (2012), depending on the level and type of innovation demanded from the crowd.

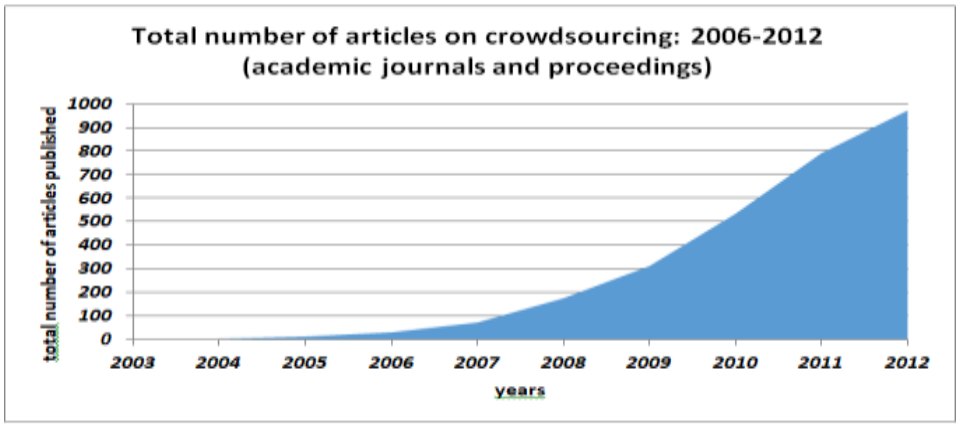
2. SETTING THE SCENE FOR THE REVIEW

Since 2006, when Howe coined the term, research on crowd sourcing has exploded (see Figure 1). Crowd sourcing has been researched by researchers and practitioners in numerous management and information systems disciplines due to the many possible interpretations and implementations, as well as the concept's attractiveness in some places as a management catchphrase or slogan (Whitla, 2012).

Over the last ten years, there has been an exponential increase in the number of conceptual and empirical studies on crowd sourcing. While a blanket search in Google Scholar yielded about 74,400 results, a filtered search in the SciVerse Scopus database yielded 972 articles in the field of Social Sciences & Humanities published in academic journals or conference proceedings from 2006 onwards with "crowd sourcing" in their title, abstract, or keywords (of these, 798 were published very recently, in 2012).

A decade after crowd sourcing entered the management lexicon, it is clear that the research stream has taken a number of different directions (Geiger, Seedorf, Schulze, Nickerson, and Schader, 2011; Whitla, 2012), crossing over the boundaries of innovation and technology theory where the concept was first conceived.

Figure 1 – Academic articles and proceedings on "crowdsourcing" in Scopus – Social Sciences & Humanities - cumulative



Source: SciVerse Scopus database (accessed: 01 Oct, 2012)

3. A FRAMEWORK TO MAP THE LITERATURE

There is no unifying paradigm that can broadly encompass the various streams dealing with crowd sourcing literature because to its relative novelty. We opted to take a process approach to this topic in order to frame all of the numerous multi-faceted contributions on crowd sourcing in a holistic

manner and avoid fragmentation. Our proposal is based on innovation management (the theoretical discipline that underpins crowd sourcing), and innovation is widely recognised as a process (Keupp, Palmiè, and Gassmann, 2012). The same process method is frequently utilised when studying open innovation (e.g., Chesbrough, 2006) and co-creation (e.g., Greer and Lei, 2012), both of which are widely considered to be at the root of crowd sourcing.

The process viewpoint has been included into an innovative framework in this review, with a focus on the Input-Process-Output (I-P-O) model (McGrath, 1964).

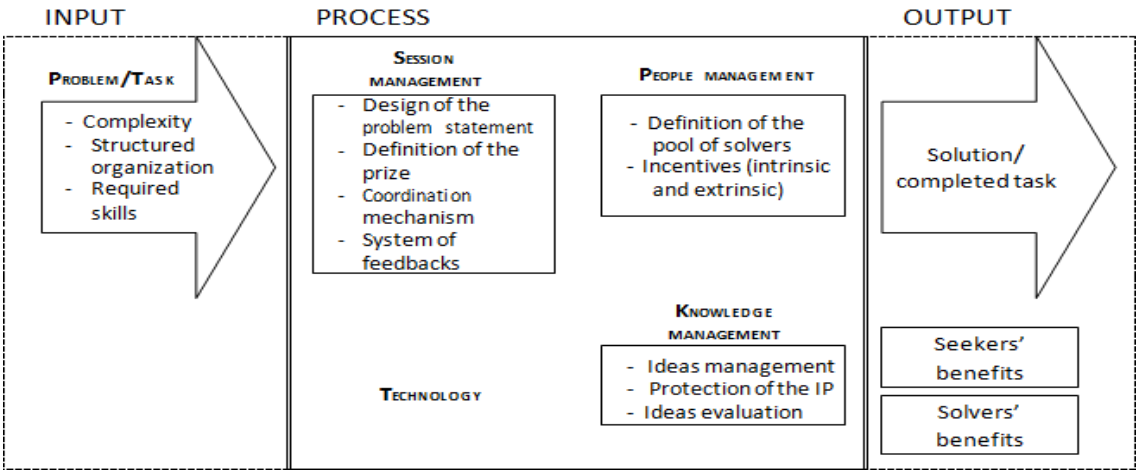
Because it may assist distinguish the primary antecedents, components, and consequences of the process under investigation, the I-P-O framework has lately been employed as the foundation for various research in the field of management (e.g. Simsek, 2009).

The components of our I-P-O crowd sourcing framework (Figure 2) were derived from process model studies (e.g. Burgelman, 1983; Van de Ven, 2007; Van Oorschot), and the framework was then utilised to examine and understand the existing research.

The following sections outline the main components of our framework. The problem or task that has to be solved by the crowd is the main input to crowd sourcing systems (e.g. Geiger and Schader, 2012). The crowd sourcing context will take on different aspects and include different processes depending on the typology and structure of the request set by the seeker (i.e. the organisation with a specific problem or task) and the abilities sought from the community.

Essentially, there are two types of requests (Boudreau and Lakhani, 2012): I innovation-type challenges, which are well-structured and typically demand solvers (i.e., a crowd of active participants) with well-defined talents.

Figure 2. (Input-Process-Output) framework for crowdsourcing



The seeker selects a single solution or a subset of the same (e.g. InnoCentive issues); and (ii) micro-jobs, which are short tasks that do not require solvers to have specific talents. Micro-tasks can be well-structured or unstructured, and they might emerge when a large challenge is split down into smaller pieces. After that, the macro-problem can be solved by combining all of the contributions made by the many solvers (e.g. Google Image Labeler).

When it comes to the processes involved in crowd sourcing applications, the following primary aspects can be identified:

1. Session management, which covers the actions carried out by the seeker or intermediary to manage the crowd sourcing session;
2. People management, which covers the techniques used by session managers to attract and

inspire individual participants;

3. Knowledge management, which includes the organising and collection of the results of crowd sourcing processes both during and after the session;
4. Crowd sourcing technologies, which mostly entails research on information and communication technologies (ICT) as well as software tools used by crowd sourcing providers to handle crowd sourcing processes.

There are two types of solutions and/or completed tasks in the process Output: I a solution reviewed and selected by the seeker; (ii) a microtask that is frequently integrated with other microtasks to address a larger problem (Boudreau & Lakhani, 2012). We can additionally distinguish the searchers' advantages (where the seeker can be an organisation or an individual) and the solvers' benefits, which are considered as extra significant themes within the output domain, in addition to the solutions/completed tasks. It's worth emphasising that each paper's contribution, in terms of the discussion it generates and the conclusions it reaches, can be used to more than one block in the I-P-O framework at the same time.

4. FUTURE RESEARCH ON CROWD SOURCING

The I-P-O framework was used to review the considerable literature on crowd sourcing in the previous section. While there is a large body of knowledge about crowd sourcing, there are still unanswered challenges
that need to be addressed in order to improve our understanding of the phenomena.Investigating the dynamics and mechanisms underpinning crowd sourcing can also yield practical contributions, boosting the effectiveness of this strategy for companies addressing innovation as well as the rewards for individuals participating in these projects. Following the I-P O framework classification, we will further explore the main issues raised by the literature study in order to generate suggested research questions (SRQs) that will be addressed in future research.

5. INPUT

One of the most challenging aspects of crowd sourcing is determining the structure of the innovation problems that will be disseminated to a pool of solvers. To organise a problem effectively, seekers must formulate a number of acceptable trade-offs. Initially, seekers must encounter a variety of forms of innovation-related challenges, and it is likely that not all of them will be answered successfully by the public, necessitating a preliminary selection (Boudreau and Lakhani, 2012; Poetz and Schreier, 2012; Sieg, Wallin and Von Krogh, 2010; Terwiesch and Xu, 2008).

SRQ 1)- How may an innovation problem be constructed to maximise its solvability, intelligibility, and solver engagement in the related crowd sourcing session all at the same time?

SRQ 2)- In which industries and under what conditions does crowd sourcing provide the greatest benefit to job seekers?

6. PROCESS

In general, platform managers supervise crowd sourcing sessions and perform important actions that are critical to the process's success. Platform managers are in charge of identifying and preparing the innovation problem to be aired to the crowd (Feller, Finnegan, Hayes, and O'Reilly, 2012; Pénin and Burger-Helmchen, 2011; Sieg, Wallin, and Von Krogh, 2012). Platform managers set the award for the best solution received in addition to defining the problem, a process that entails understanding and capitalising on the reasons why solvers want to participate, as this improves the quality of the submissions (Frey, Lüthje, and Haag, 2011; Terwiesch and Xu, 2008; Wang, Ghose, and Ipeirotis, 2012). Platform managers should ensure that the intelligence of the innovation problem is distributed appropriately, that solvers participate constructively, and that solvers interact appropriately during the session (Alam and Campbell, 2012; Hutter, Hautz, Füller, Mueller, and Matzler, 2011; Trompette, Chanal, and Pelissier, 2008).

SRQ 3)-Which talents and abilities do platform managers need to learn in order to assure the crowd sourcing session's success?

SRQ 4)- In which cases do the various crowd sourcing session types bring the most value to the seekers?

SRQ 5)- Which procedures and policies should be implemented to fairly handle IP rights associated with submitted solutions?

7. OUTPUT

After selecting the finest concept from among those given by solvers, the seeking company should incorporate that solution into its innovation processes. At this stage, a number of complications may arise. Because the audience has no in-depth knowledge of the requesting organization's internal operations or cost structure, crowd-sourced solutions are generally less practical than those created by professionals (Huang, Singh and Srinisavan, 2011; 2012). Furthermore, personnel of the seeking company may suffer from the "not invented here" mentality (Katz and Allen, 1982) and hence only unwillingly apply externally developed information (Lüttgens, Pollok, Antons, and Piller, 2012). Seekers may lack the necessary procedures to successfully manage the transfer of IP rights, resulting in obstacles to obtaining solvers' solutions (Garavelli, Messeni Petruzzelli, Natalicchio and Vanhaverbeke, 2011; Marjanovic, Fry and Chataway, 2012).

Furthermore, in order to assimilate and exploit externally developed ideas, seekers acquiring external knowledge should develop a high absorptive capacity (Cohen and Levinthal, 1990; Zahra and George, 2002), which is especially important in the case of ideas originating in knowledge domains other than the seeker's knowledge base (Cohen and Levinthal, 1990; Zahra and George, 2002). (Natalicchio, Messeni Petruzzelli and Garavelli, 2012). As a result, the seeker must establish particular capabilities and methods to incorporate the chosen solutions and assure the effectiveness of crowd sourcing. Nonetheless, to our knowledge, there have been no studies on the follow-up of crowd sourcing sessions in the literature. Such research could dramatically improve the value of crowd sourcing for businesses, hence we propose the following research question:

SRQ 6)-Which capabilities and techniques can help the solvers' ideas to be more effectively integrated into the searchers' innovative processes?

SRQ 7)-How can the friction that arises when seekers combine micro-tasks completed by many individuals be effectively overcome?

According to the existing literature, the "parallel path" effect benefits seekers when more solvers participate in the crowd sourcing session (Boudreau Lacetera and Lakhani, 2011). In the same way that increasing the number of solutions on one side raises the value of participating for both seekers and solvers, crowd sourcing platforms are analogous to two-sided markets (Chesbrough, 2006). (Eisenmann, Parker and van Alstyne, 2006). As a result, having a high participation rate in crowd sourcing activities is beneficial. The motivation that drives solvers to participate in crowd sourcing sessions has been discussed in previous sections and can be divided into two types: intrinsic motivation, which occurs when an activity is done for its own sake, and extrinsic motivation, which occurs when an activity is done for a reward (Frey, Lüthje, and Haag, 2011; Ryan and Deci, 2000). As a result, crowd sourcing session organisers should strive to maximise participation by using solver motivation. Previous research has shown that intrinsic and extrinsic motivation can have different effects on the quality of submitted solutions (Boudreau, Lacetera, and Lakhani, 2011; Frey, Lüthje, and Haag, 2011), but there has been no comprehensive study of the practises that can help to act on intrinsic and extrinsic motivation to attract specific types of solvers. As a result, we've come up with the following final research question:

SRQ 8)- Which strategies enable solvers to tap into their intrinsic and extrinsic drive to boost their engagement in crowd sourcing sessions?

8. CONCLUSIONS

Over the last decade, crowd sourcing has established itself as a viable option for businesses seeking new ideas and solutions to micro-tasks from the crowd. Scholars have been increasingly interested in crowd sourcing in tandem with the expansion of this technique among innovative firms, as evidenced by the number of relevant articles published since 2006. Crowd sourcing can be viewed as both an open innovation practise and a co-creation support tool from a theoretical standpoint. Even

when there was no strong theoretical framework, research on crowd sourcing has evolved along numerous theoretical fields, crossing a number of management disciplines, even when there was no strong theoretical base. Nowadays, we can see a high prevalence of crowd sourcing studies with a wide range of perspectives, despite the fact that the research stream's ability to supply a wide range of perspectives also implies a lack of a global and comprehensive perspective. The goal of this study is to give a formal structure for the findings available in the academic literature, which is currently lacking in the literature to the best of our knowledge. In order to further our understanding of crowd sourcing, we also plan to identify areas for future research. In particular, we used the I-P-O framework as the lens through which we examined the existing literature, because the process viewpoint is useful for integrating contributions from a variety of theoretical domains. We were also able to discuss the primary antecedents, components, and consequences of the crowd sourcing process using the I-P-O framework. As a result of this conversation, we have developed a set of suggested criteria for evaluating existing information and directing future research. Questions for research these SRQs may foresee how the narrative in the crowd sourcing literature will evolve over time, bridging current limitations in the literature and moving toward greater consistency and relevance of the findings – as the paths drawn by the research questions have their own value, but also contribute to the overall value.

Our review can benefit platform providers and seeker companies interested in using crowd sourcing for their internal innovation process, in addition to the research value that this study provides. The proposed framework, as well as the discussion of the main challenges, can be used as a checklist for building internal and external innovation processes. Our work, like all research aiming to model reality, is not without flaws and limits. To begin, the study approach used to collect and select the data. As relevant research may not completely prevent any loss of information, examined studies may not completely avoid any loss of information have been omitted from the study. The study was based on the more broad Scopus database, as well as identifying a multi-step method that incorporates various selections criteria, on the other hand, may be able to alleviate some of the restrictions. Second, the I-P-O framework could be useful. It imply that there is a one-way, linear causal relationship between the two constructing elements. It is evident, however, as demonstrated by hypotheses like the one proposed by Human action alters social structures, which might result in feedback and effects. In investigations, this possible vulnerability of the I-P-O should be carefully evaluated. The goal is to look at the causality linkages between the blocks. Thirdly, Despite the fact that the multi-step review technique was thorough, there may be some flaws.“Observer bias” in article selection: this limitation should be mitigated by the use of the final database of articles analysed had a wide range of topics. Finally, the careful selection of focusing on the literature and omitting peripheral research subjects (e.g. crowdfunding).

Finally, our study contributes to management research by offering a detailed overview of existing crowd sourcing research, as well as a specialised methodology for structuring and integrating the findings of crowd sourcing studies through numerous theoretical lenses. In addition, we were able to derive eight potential study questions from our evaluation of the literature. These can serve as a starting point for bridging knowledge gaps in the crowd sourcing literature and, as a result, increasing our overall grasp of the technique, with the goal of bolstering practitioners' attempts to harness the crowd's innovative power.

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