A SYNOPSIS OF ENTERPRISE CROWDSOURCING LITERATURE

Complete Research

Hetmank, Lars, TU Dresden, Dresden, Germany, lars.hetmank@tu-dresden.de

Abstract

In the past few years, researchers have provided a desirable sense of clarity regarding the general term crowdsourcing and what it constitutes. However, with its emergence, several derivatives of the term have appeared in scientific literature. This research article focuses on enterprise crowdsourcing as one of the recent derivatives, which, due to its ambiguity, requires further discussion and clarification. Thus, the article aims to reveal the various nuances of how the term enterprise crowdsourcing is interpreted by diverse scholars. As the term has now gained reasonable momentum in available crowdsourcing literature, it is time to reflect. In this work, a systematic literature review is applied to survey different explanations of the term and to derive its constitutional characteristics. Additionally, the article provides an overview of crowdsourcing applications deployed in an enterprise context for both primary and support activities of the value-added chain. Finally, this paper concludes with suggestions of how to prevent misinterpretation and what key questions should be addressed in future research.

Keywords: enterprise crowdsourcing, business crowdsourcing, corporate crowdsourcing, systematic literature review

1 Introduction

Since the first appearance of the term crowdsourcing in 2006, researchers have provided several contributions to clarify its meaning (Estellés-Arolas and González-Ladrón-de-Guevara, 2012; Howe, 2006). Along with its emergence, several derived concepts of the term appeared in scientific crowdsourcing literature. These derivatives aim to accommodate the peculiarities of different types of crowdsourcing contributions (e.g., crowdfunding, crowdvoting, crowdcreation), application domains (e.g., citizen science, crowdtesting), technical environments (e.g., mobile crowdsourcing), or organizational settings (e.g., enterprise crowdsourcing). Citizen science, for example, describes the use of crowdsourcing principles in the domain of scientific research, mainly by tapping into a crowd of amateurs and non-professional scientists (Hand, 2010). Mobile crowdsourcing, in contrast, focuses on the technical capabilities and features of mobile devices to harness the power of the crowd for certain use cases (Govindaraj, K.V.M., Nandi, Narlikar, and Poosala, 2011; Gupta, Thies, Cutrell, and Balakrishnan, 2012). When placing the general concept of crowdsourcing in the context of an enterprise that seeks to gain profit, literature often refers to the term enterprise crowdsourcing. Unfortunately, this term seems to be defined too vaguely, or it may be understood in more than one way. Thus, this work intends to shed light on the various nuances of the term enterprise crowdsourcing and to develop a framework that helps researchers clarify their own understanding and perception of the term.

The main objective of this research paper is to explore and analyze the current body of literature in order to get a consolidated view of the different perspectives and applications and to identify the key characteristics of enterprise crowdsourcing. As there is no clear and broad consensus on what the term enterprise crowdsourcing constitutes, the article strives to answer the following research question:
What are the constitutional properties that make enterprise crowdsourcing unique compared to other types of crowdsourcing? The first step in answering the question is to adopt a theoretical perspective and analyze how the research community interprets the term enterprise crowdsourcing in their field of research (section 4.1). The second step is to adopt a practice-oriented perspective to determine what types of application domains are typically associated with the term enterprise crowdsourcing (section 4.2).

The next section lays the terminological foundations for this survey by briefly reviewing the concept of crowdsourcing and related terms. Section 3 introduces the methodology of the systematic literature review in answering the aforementioned research question. The findings of the review are presented in section 4, and they are then discussed in section 5. The work concludes with suggestions of how to prevent misinterpretation of the term enterprise crowdsourcing, and it states key questions that should be addressed in future research.

2 Terminological Foundation

The term crowdsourcing was first coined by Jeff Howe (2006), a contributing editor at Wired magazine. He defined the term as “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.” Since that time, an increasing public and academic interest has been shown in the crowdsourcing business model¹. Howe’s definition highlights three key prerequisites to harness the benefits of crowdsourcing. First, the crowdsourcing task must be solvable by a large group. Second, the requester must have access to a large group of people that work either collaboratively or independently toward a solution. Third, the requester needs to attract these people to engage in a crowdsourcing task via an open call. This is mainly achieved by the use of social software applications and Web 2.0 technologies (Saxton, Oh, and Kishore, 2013).

From an etymological point of view, the neologism crowdsourcing is composed of the term crowd, which refers to a large group of workers who have gathered together to participate in an event—for example, a crowd gathered to watch something or to protest about something—and the term sourcing, which denotes a number of purchasing strategies aimed at finding, selecting, and engaging providers of goods and services (Longman, 2009). Therefore, crowdsourcing is heavily related to outsourcing practices in general and to business process outsourcing (BPO) in particular. Whereas outsourcing focuses on subcontracting parts of activities of the supply chain to independent suppliers (Voigt, Lackes, and Spiepermann, 2013), BPO puts emphasis on business processes as the core objects to be moved from inside the organization to an external provider (Duening and Click, 2005). Similarly, crowdsourcing shares the notion of outsourcing tasks to external agents. In the case of outsourcing, however, the agents are not predetermined, and they are mostly unknown.

Aside from Howe’s initial definition, various other explanations have been suggested in related literature to characterize crowdsourcing. Recently, Estellés-Arolas and González-Ladrón-de-Guevara (Estellés-Arolas and González-Ladrón-de-Guevara, 2012) consolidated these diverse views to promulgate an integrated and consistent description of crowdsourcing. They define crowdsourcing in the following way:

Crowdsourcing is a type of participative online activity in which an individual, an institution, a non-profit organization, or company proposes to a group of individuals of varying knowledge, heterogeneity, and number, via a flexible open call, the voluntary undertaking of a task. The undertaking of the task, of variable complexity and modularity, and in which the crowd should participate bringing their work, money, knowledge and/or experience, always

¹ Search interest of the term crowdsourcing (Source: http://www.google.com/trends/, requested on 1st of December 2013)
entails mutual benefit. The user will receive the satisfaction of a given type of need, be it economic, social recognition, self-esteem, or the development of individual skills, while the requester will obtain and utilize to their advantage what the user has brought to the venture, whose form will depend on the type of activity undertaken. (Estellés-Arolas and González-Ladrón-de-Guevara, 2012, p. 197)

Although their proposed definition seems to be slightly cumbersome, it helps prevent misinterpretation, and it distinguishes the term from other concepts with similar meaning. In particular, their definition distinguishes itself from the concepts of collective intelligence, wisdom of crowds, commons-based peer production, human (based) computation, open innovation, and open source.

As Leimeister (2010) states, collective intelligence is not a new concept, and it has been used by scientists to explain phenomena where humans or animals coordinate themselves to achieve a common goal. Hence, the term emphasizes the inherent decision-making abilities of large groups. Malone, Laubacher, and Dellarocas (2010) broadly define collective intelligence as “groups of individuals doing things collectively that seem intelligent” (p. 2). The conditions that characterize wise crowds and lead to collective intelligence have been widely discussed in the book The Wisdom of Crowds, and they comprise diversity of opinion, independence, decentralization, and aggregation (Surowiecki, 2005). Due to the fact that collective intelligence is more widely understood as a general term to describe situations in which large group of individuals make better, more informed decisions and choices than individuals or a group of experts, it can be considered as a superset of crowdsourcing (Quinn and Bederson, 2011). However, it must be noted that crowdsourcing, as opposed to collective intelligence, inherently takes more of a technology-oriented view rather than a socially-oriented view, in which group behavior plays a major role.

Another concept that closely relates to crowdsourcing may be described with the term commons-based peer production. Commons-based peer production depends on decentralized information gathering and exchange to lower the uncertainty of participants (Benkler, 2002). It differs from market-based production in that it is based on price mechanisms and firm-based production that relies on managerial hierarchies. To make commons-based peer production work for large-scale projects, three prerequisites are necessary. First, the projects must be divisible into smaller modules that can be processed independently. Second, each of these modules must be relatively fine-grained so that the participants can self-select one according to their interest and motivation. Third, all contributions of the participants require easy and low-cost, often automated integration into a whole end result. Although both concepts, commons-based peer production and crowdsourcing, expect a large group of individuals, crowdsourcing—as opposed to commons-based peer production—not only focuses on tasks performed collaboratively, but also on tasks accomplished independently by individuals (Howe, 2006).

At first glance, the term human computation seems synonymous with crowdsourcing. Ahn (2005) defines it as “a paradigm for utilizing human processing power to solve problems that computers cannot yet solve” (p. 3). Thus, human computation and crowdsourcing both highlight the important role of humans in performing a task. However, compared to crowdsourcing, human computation puts the focus on replacing computers with humans and not on replacing traditional workers with an undefined large group of people (Quinn and Bederson, 2011).

Several authors widely investigated the relationship between crowdsourcing and concepts that emphasize aspects of openness, such as open source and open innovation (Rouse, 2010; Schenk and Guitard, 2011). Chesbrough, Vanhaverbeke, and West (2006) describe the concept of open innovation as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” (p. 1). Thus, the main idea of open innovation is that a company should not only rely on internally generated knowledge to support innovation processes but also on external knowledge sources. As opposed to open innovation, crowdsourcing might be used for open innovation initiatives, but it is not limited to such.
The term *open source* refers mainly to software in which the source code is available to the general public. Diverse, mostly geographically distributed developers—some of them paid and some of them volunteers—create the source code in a collaborative manner. Open source aims to form a counterpart to proprietarily developed software that is owned by a certain company. Although the idea of open source is mainly used for software development, there is ongoing research on how to apply the principles of open source to other application areas (Brabham, 2008). The notion of open source is also part of the crowdsourcing paradigm. However, the main difference between crowdsourcing and open source is how the company makes use of the intellectual property. In crowdsourcing, the intellectual property of a contribution is usually transferred to the company that issued the task, whereas open source licenses grant the right to copy, change, and redistribute.

Table 1 summarizes the intersecting and distinguishing properties of each related concept of crowdsourcing. Out of the discussion about the term *crowdsourcing* and its related concepts, some basic principles and implications for establishing a better and more accurate understanding of the term *enterprise crowdsourcing* can be adopted. First, to harness the potentials of crowdsourcing, social and individual aspects should be taken into account, for example, how to motivate the crowd to participate or, if required, how to support collaboration among contributors. Second, in addition to social aspects, crowdsourcing focuses strongly on technical aspects. Therefore, crowdsourcing must consider the utilization of modern ICT systems that are based on social software and Web 2.0 technologies. Third, on an organizational level, the bottom-up approach of crowdsourcing must be aligned with the prevailing top-down goals of the company.

<table>
<thead>
<tr>
<th>Related Concept</th>
<th>Intersecting Property</th>
<th>Distinguishing Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outsourcing / Business process outsourcing (BPO)</td>
<td>Sourcing organizational tasks to external agents</td>
<td>Predetermined and known agents instead of an undefined large group of people</td>
</tr>
<tr>
<td>Collective intelligence / Wisdom of crowds</td>
<td>Shift from the individual to the collective</td>
<td>Takes a socially-oriented view rather than a technically-oriented view that is based on social software and Web 2.0 technologies and does not necessarily require an external crowd</td>
</tr>
<tr>
<td>Commons-based peer production</td>
<td>Refers to a new problem-solving and production model that harnesses the power of large numbers of individuals</td>
<td>Puts emphasis on tasks performed collaboratively</td>
</tr>
<tr>
<td>Human (based) computation</td>
<td>Applies human processing power to solve problems</td>
<td>Replaces computers instead of traditional workers with an undefined large crowd</td>
</tr>
<tr>
<td>Open innovation</td>
<td>Uses external resources to improve the organizational innovativeness and efficiency</td>
<td>Focuses primarily on innovation processes</td>
</tr>
<tr>
<td>Open source</td>
<td>Denotes a decentralized production model based on a mostly geographically-distributed workforce</td>
<td>Refers mainly to software development in which the intellectual property is usually not transferred to the company</td>
</tr>
</tbody>
</table>

Table 1. **Intersecting and distinguishing properties of related concepts of crowdsourcing**

If crowdsourcing is a new production and problem-solving model based on features of social software and Web 2.0 technologies that harness the power of a large group of undefined people working either collaboratively or independently towards a common goal, what makes crowdsourcing unique in an enterprise context compared to other general-purpose or non-profit crowdsourcing applications, such as Wikipedia, FoldIt, or Ushahidi², and thereby justifying the emergence of the term *enterprise crowdsourcing*?

---

3 Methodology

This article conducts a systematic literature review to answer the aforementioned research question and to gain a deeper theoretical understanding of the enterprise crowdsourcing domain. A systematic literature review provides a repeatable and well-structured procedure to identify, assess, and interpret relevant literature for a certain research objective (Webster and Watson, 2002).

Based on the principles of a systematic literature review, a search strategy should be derived after formulating the research question. Defining the search strategy consisted of determining the population, selecting the search resources, identifying the search terms, and defining several inclusion and exclusion criteria. Conference proceedings and journal papers were sought out according to the population. Only full papers that were accessible through the database subscription of the library were included. With respect to search resources, the following databases were queried: ACM Digital Library, Ebscohost (Academic Search Complete and Business Source Complete), Emerald, IEEE Xplore Digital Library, Sage Journals, ScienceDirect, SpringerLink, and Wiley. Based on the research questions, the following search strings were derived after several test queries were conducted: Enterprise crowdsourcing, business crowdsourcing, and corporate crowdsourcing. The search result contained 69 articles (table 2).

<table>
<thead>
<tr>
<th>Consulted Databases</th>
<th>Search Results</th>
<th>Selected Results</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enterprise Crowdsourcing</td>
<td>Business Crowdsourcing</td>
</tr>
<tr>
<td>ACM Digital Library</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Science Direct</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Ebscohost</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>IEEE Xplore Digital Library</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Emerald Insight</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Wiley Online Library</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Springer Link</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>SAGE Journals</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>57</td>
<td>9</td>
</tr>
<tr>
<td>Total (all search terms)</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Total (without duplicates)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (Google scholar cross-check)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Consulted databases and selected results

After preparing the search strategy of the systematic literature review, the selection of relevant studies in the search result was accompanied by three steps. The first step was studying the abstracts, introductions, and conclusions of each article to get an initial impression of the relevance and to sort out those articles that provided less or no contribution toward answering the research question. Second, Google Scholar was accessed to carry out a cross-check on the preliminarily selected results. Those results were supplemented with four additional articles. Finally, 33 publications (28 conference and 5 journal articles) were identified as relevant and were carefully read to record definitions of the term enterprise crowdsourcing, characteristics of enterprise crowdsourcing, and typical application domains of enterprise crowdsourcing (table 2). Although these 33 research publications were a good starting point to answer the research question, additional resources were required that were not part of the systematic literature review, but which nevertheless helped to understand the concept of enterprise crowdsourcing.
4 Results

This section presents the results of the systematic literature review. Subsection 4.1 focuses on the usage of the term enterprise crowdsourcing in scientific literature, and subsection 4.2 presents applications of enterprise crowdsourcing along the value-added chain.

4.1 Characteristics of Enterprise Crowdsourcing

The systematic literature review revealed that some confusion exists about what the term enterprise crowdsourcing actually means. Especially, some interpretations undermine or contradict the initial perception of crowdsourcing, which would be that crowdsourcing has the inherent property of outsourcing tasks to an external crowd (Howe, 2006). When analyzing the literature, two types of attempts to explain the very nature of enterprise crowdsourcing can be identified (table 3). The first one limits the target audience to whom the crowdsourcing task is available to employees only (narrow definition). The second one focuses on enterprises as the source of potential crowdsourcing tasks and does not restrict the target group (broad definition).

<table>
<thead>
<tr>
<th>Article</th>
<th>Interpretation of Enterprise Crowdsourcing</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gassenheimer, Siguaw, and Hunter, 2013</td>
<td>... a business entity’s “use of an enthusiastic crowd or loosely bound public” to voluntarily provide solutions via online technology to the organization’s problems.</td>
<td>broad</td>
</tr>
<tr>
<td>Hirth, Hoßfeld, and Tran-Gia, 2013</td>
<td>… the work is not done by a huge anonymous crowd, but by a crowd of company employees or employees of sub-contractors. Still the work is submitted to a pool of workers instead to a designated one, but using a verified crowd even confidential tasks can be crowdsourced.</td>
<td>narrow</td>
</tr>
<tr>
<td>Jayakanthan and Sundararajan, 2012</td>
<td>… posits the use of crowdsourcing in the enterprise to “access scalable workforce on-line”</td>
<td>-</td>
</tr>
<tr>
<td>Jayakanthan and Sundararajan, 2011</td>
<td>… tackle problems within enterprises – large business organizations … involve attracting the attention of individuals outside the organization and members of the general public, to solve problems and present solutions for the organization, … aim to utilize the capabilities of members within the organization.</td>
<td>broad</td>
</tr>
<tr>
<td>Lykourentzou, Vergados, Papadaki, and Naudet, 2013</td>
<td>Corporate crowdsourcing occurs when crowdsourcing is applied, instead of web workers, to the human network of a company.</td>
<td>narrow</td>
</tr>
<tr>
<td>Skopik, Schall, and Dastdar, 2012</td>
<td>… takes the usual concept of crowdsourcing on the Web and applies it to an enterprise collaboration context.</td>
<td>narrow</td>
</tr>
<tr>
<td>Stewart, Huerta, and Sader, 2009</td>
<td>… distinction between two kinds of crowdsourcing: inside the firewall (within the enterprise, available to only its employees) [enterprise crowdsourcing], and outside the firewall (open to the general public) [public domain crowdsourcing].</td>
<td>narrow</td>
</tr>
<tr>
<td>Villarroel and Reis, 2010</td>
<td>Intra-Corporate Crowdsourcing (ICC) refers to the distributed organizational model used by the firm to extend problem-solving to a large and diverse pool of self selected contributors beyond the formal internal boundaries of a multi-business firm: across business divisions, bridging geographic locations, leveling hierarchical structures.</td>
<td>narrow</td>
</tr>
<tr>
<td>Vukovic, Laredo, and Rajagopal, 2010</td>
<td>… applicability of crowdsourcing methodology within the enterprise, thereby engaging internal networks of knowledge experts.</td>
<td>narrow</td>
</tr>
<tr>
<td>Vukovic, Laredo, Ruan, Hernandez, and Rajagopal, 2013</td>
<td>… a process where a group of network-connected experts solve problems.</td>
<td>narrow</td>
</tr>
</tbody>
</table>

Table 3. A selection of articles that describe the concept of enterprise crowdsourcing

Stewart, Huerta, and Sader (2009), for example, take the view of the narrow definition and make a distinction between enterprise and public domain crowdsourcing. They argue that in enterprise
crowdsourcing, the issued crowdsourcing task is only available to employees inside the firewall of a company, whereas in public domain crowdsourcing, the crowdsourcing task is also open to the general public outside the firewall of a company. Similarly, Hirth, Hößfeld, and Tran-Gia (2013) note that compared to the original concept of crowdsourcing in which the work is completed by a large anonymous crowd, in enterprise crowdsourcing the crowd is formed by employees of the company or by sub-contractors. The authors precisely remark that the crowd of employees are somewhat verified and can be harnessed for business-critical and confidential tasks. However, the second part of their interpretation raises the question if employees of the partners, suppliers, and strategic alliances of the company can also be counted as part of the enterprise’s crowd. Further details of which characteristics determine enterprise crowdsourcing are discussed in the work by Skopik, Schall, and DUSTdar (2012). They emphasize that in collaborative enterprise crowdsourcing environments experts can, to some extent, be preselected and flexibly involved in ongoing tasks. Additionally, they argue that especially complex business tasks require mechanisms to support active coordination and collaboration between crowd members.

Gassenheimer, Siguaw and Hunter (2013) draw attention to the idea that enterprise crowdsourcing aims to solve organizational problems or to serve business purposes instead of focusing on satisfying social or scientific demands. Likewise, Jayakanthan and Sundararajan (2011) describe enterprise crowdsourcing as “the use of crowdsourcing approaches to tackle problems within enterprises – large business organizations … [and] this may involve attracting the attention of individuals outside the organization and members of the general public” (p. 25). In this broad definition of enterprise crowdsourcing, the authors focus more on the enterprise as the source of the crowdsourcing task and do not restrict the size of the potential crowd to employees only. They discern that whether to harness the collective intelligence and workforce inside the company, outside the company, or both, may depend on the type and goal of the task. For example, if confidentiality is an issue, the company may restrict the target audience to employees, or in other words, to an internal crowd only. In contrast, the company may focus exclusively on the general public to avoid entrenched ways of thinking and to exploit the creative potential of a huge external crowd.

**4.2 Application Domains of Enterprise Crowdsourcing**

The reasons of a company for tapping into the power of the crowd are manifold and address aspects of cost reduction, time saving, and quality improvement (Vukovic et al., 2010). One reason is that crowdsourcing offers a way for organizations to get access to a large, globally distributed pool of workers with diverse skills, experiences, and knowledge, as well as an availability of 24 hours a day, seven days a week (O’Neill, Roy, Grasso, and Martin, 2013). Another motive—especially when engaging people outside the company—is to reduce personnel and equipment costs (Erickson and Trauth, 2013). Moreover, a company may use a large group of workers to minimize product development and service delivery time (Jayakanthan and Sundararajan, 2011).

When skimming through the literature of enterprise crowdsourcing, a variety of applications are launched along the entire value-added chain and range from accomplishing knowledge-intensive tasks, over creating user-generated content, to filtering and ranking data or content items (Sobczak and Groß, 2010). Enterprise crowdsourcing contains examples of applications for primary as well as support activities of the value-added chain. These applications consider both internal and external crowds.

According to primary activities, typical examples of enterprise crowdsourcing comprise launching innovation initiatives, developing and testing software, or solving geometric problems.

- **Launching innovation initiatives.** Firms have experimented with both internal and external innovation competitions (Jouret, 2009). The advantage in launching internal innovation initiatives through the mechanisms of crowdsourcing is twofold. First, companies can overcome their formal organizational boundaries and harvest the unexploited creative ability of all employees while protecting the undesired flow of intellectual property to competitors. Second, they can promote the formation of new or the maintenance of existing communities.
• **Developing and testing software.** The software developer’s utilization rate in most of the large IT enterprises is far from perfect. Often developers wait for incoming projects, are in training, or their intellectual ability and experience do not match to the task requirement appropriately (Jayakanthan and Sundararajan, 2011). Applying a bottom-up approach to the software-development process in which employees select a task according to their interests, skills, and availability can improve their utilization rate.

• **Solving geometric problems.** Corney et al. (2010) show an example that uses crowdsourcing for visually comparing machined parts in computer-aided design and manufacturing (CAD/CAM) environments. Matching machined parts according to their similarity and creating a classification system supports the cost estimation for other machined parts and reduces the cost by reusing existing design or manufacturing information.

Several crowdsourcing applications are used to perform support activities within the company, such as applicant selection, business strategy development, process analysis, document and translation management, or knowledge acquisition.

• **Assessing resumes of job candidates.** In the domain of human resources management, enterprise crowdsourcing is applied to evaluate resumes of job applicants (Harris, 2011). As the evaluation of resumes is a repetitive, subjective, and highly labor-intensive task that cannot be processed easily by a computer algorithm, it is a perfect candidate for crowdsourcing. Like other business tasks that can be crowd-sourced, the review of resumes requires an appropriate task design and proper incentive mechanism.

• **Developing business strategies.** Opening up the strategy-development process of a company through a crowdsourcing approach allows the process to not only improve the quality of the strategy by considering the diverse viewpoints and specializations of the employees, but also to encourage enthusiasm and to establish alignment with the overall strategic direction (Gast and Zanini, 2012). Although a crowd-based approach increases overall transparency and continuously updates and evaluates the strategy of the company, special care must be taken as it sometimes leads to the undesirable effects of groupthink.

• **Conducting process analysis.** Somewhat similar to the previous example, an internal consulting department may engage the employees of a company in business process reengineering tasks. Therefore, the collective intelligence of the enterprise is used to conduct a process analysis with the goal of identifying and improving the existing model of processes and organizations. Keeping business-critical knowledge inside the company is the main advantage of this approach (Khasraghi and Tarokh, 2012).

• **Supporting document and translation management.** Further examples are found in the area of document management and processing. Enterprise crowdsourcing is applied, on the one hand, to validate and correct erroneous text modules of scanned documents that are processed by optical character recognition (OCR) programs (Karnin, Walach, and Drory, 2010) and, on the other hand, to create and translate technical documents (Stewart et al., 2009; Vukovic, Salapura, and Rajagopal, 2013).

• **IT inventory management and end-user support.** Finally, enterprise crowdsourcing solutions are used for knowledge acquisition in the domain of information technology (IT) inventory management and end-user support (Vukovic et al., 2010; Vukovic, Lopez, and Laredo, 2010; Vukovic and Naik, 2011). These solutions manage virtual teams of knowledge workers on demand to address knowledge-intensive tasks. The results often lead to a consolidated view of a particular knowledge domain.
5 Discussion

The review of literature on enterprise crowdsourcing revealed that researchers use the term enterprise crowdsourcing in two different ways. The first way is in a broad sense in which the target group is not restricted. The second is in a narrow sense in which the target group is limited to the employees of a company (section 4.1). As a consequence of this ambiguity and to prevent misunderstanding, researchers and practitioners should refer more consistently to intra-corporate (employees only), inter-corporate (contracted freelancers, partners, subcontractors, strategic alliances of the company), or corporate crowdsourcing (members of the public domain) to denote a certain target audience, and they should only use the term enterprise crowdsourcing (in a broad sense) to summarize activities in which all three target groups are addressed. Table 4 suggests a set distinguishing aspects to separate the two extremes of intra-corporate crowdsourcing and corporate crowdsourcing.

<table>
<thead>
<tr>
<th>Comparison Criteria</th>
<th>Intra-corporate Crowdsourcing</th>
<th>Corporate Crowdsourcing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job roles and formal relationships</td>
<td>- Known</td>
<td>- Mostly unknown</td>
</tr>
<tr>
<td>Task type</td>
<td>- Often complex, knowledge-intensive tasks</td>
<td>- Predominately simple tasks</td>
</tr>
<tr>
<td>Suitability</td>
<td>- Mainly for large and international companies</td>
<td>- Also possible for small and medium-sized companies</td>
</tr>
<tr>
<td>Opportunities</td>
<td>- Assigning a verified crowd to business-critical and confidential tasks</td>
<td>- Reduction of personnel and equipment costs</td>
</tr>
<tr>
<td></td>
<td>- Using existing business relationships, networks and communities, and organizational units for recommending crowdsourcing tasks</td>
<td>- Decreasing product-development and service-delivery time</td>
</tr>
<tr>
<td></td>
<td>- Reaching the critical numbers of contributors to accomplish a crowdsourcing task due to the limited size and heterogeneity of the internal crowd</td>
<td>- Benefit of having a larger pool of workers compared to relying only on an internal workforce</td>
</tr>
<tr>
<td></td>
<td>- Jeopardizing traditional formal work settings</td>
<td>- Unwanted crowdsourcing activities of a crowd that is not easy to control</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Legal aspects, such as loss of intellectual property, or issues of data privacy and security concerns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Difficult to integrate the crowdsourcing activity into the prevailing hierarchical organization or business processes, especially aligning the top-down approach of the organization with the bottom-up approach of crowdsourcing</td>
</tr>
</tbody>
</table>

Table 4 Comparing intra-corporate with corporate crowdsourcing

Intra-corporate crowdsourcing seems to bear some characteristics that are worth highlighting. First, intra-corporate crowdsourcing focuses more on complex, knowledge-intensive tasks rather than on simple tasks (Lykourentzou et al., 2013). Second, due to the complexity of these tasks, active coordination between the crowd members is often required (Skopik et al., 2012). Third, a crowd that consists of employees only might be more reliable and trustworthy than an external crowd. Thus, they are more appropriate to solve confidential tasks (Hirth et al., 2013). Finally, the company usually knows the job roles—that is, the skills and the availability of its employees—and can therefore easily recommend a crowdsourcing task to a worker based on these criteria.
Although intra-corporate crowdsourcing obviously has some special characteristics and seems to be important for large, international companies, we clearly have to demarcate intra-corporate crowdsourcing from other concepts that also focus on distributed work within companies via ICT, such as computer-supported collaborative work (CSCW) or virtual teams. CSCW investigates how technology can support humans who collaboratively work together (Koch and Gross, 2006). A virtual team comprises individuals that are distributed geographically and across organizational units and who, enabled by ICT, work asynchronously together toward a common purpose (Schweitzer and Duxbury, 2010). The main differences between intra-corporate crowdsourcing and these concepts, however, are that the crowd member must not necessarily work collaboratively in teams and that the tasks will not be pre-assigned to a group of workers in advance. However, the CSCW research community is aware that they should focus not only on groupware that supports the collaborative work of small and medium-sized groups, but also on so-called crowdware that also considers large crowds (Schneider, Moraes, Moreira de Souza, and Esteves, 2012).

Interestingly, the shift from the generic concept of crowdsourcing to the more specific form of enterprise crowdsourcing closely resembles the discussion of the transformation from the free and open source software (FOSS) phenomenon to the commercial form of OSS 2.0 (Fitzgerald, 2006). Similar to OSS 2.0, enterprise crowdsourcing—both in the narrow sense and in the broad sense—requires experts with the necessary knowledge to address business needs efficiently. It also requires rigorous support of project management and quality control to integrate the sourced task into the complex business processes of the company. A further analogy can be drawn between the idea of transferring the open source principles to an inner or corporate source of software developers within an organization and the idea of applying the crowdsourcing approach to employees inside a large organization (intra-corporate crowdsourcing). While the requester-participant relationship in crowdsourcing might not be as close as the user-developer relationship in open source, both concepts share a sense of joint adventure among the people involved that is not common in the traditional production models of the company (Fitzgerald, 2006).

Regardless of the assembly of the target group (section 4.1) and the supported business activities (section 4.2), the term enterprise crowdsourcing is mainly used in the context of for-profit organizations. These organizations seek to improve their profits by accessing the crowd to perform strategic, administrative, or operational tasks that are normally accomplished by a designated employee or group of employees. Additionally, by overcoming formal organizational, geographical, and temporal boundaries, organizations strive to reduce both costs and execution time and to improve the quality of these tasks. To sum up, the main constitutional characteristic of enterprise crowdsourcing is that it serves the business needs of an organization and, as a consequence, must be deliberately measured.

6 Conclusion

To avoid any misunderstanding of the term enterprise crowdsourcing and to improve the discussion among researchers and practitioners, authors who publish in the field of enterprise crowdsourcing are encouraged to make clear and explicit statements about:

- Who is part of the target group (e.g., intra-corporate crowdsourcing, inter-corporate crowdsourcing, or corporate crowdsourcing)?
- Which strategic, administrative, or operational tasks does the crowd perform? Which business needs does the crowd address?
- Where is the enterprise crowdsourcing platform hosted (e.g., using in-house, on premises solution vs. crowdsourcing intermediaries, such as Amazon Mechanical Turk)?

In addition to clarifying the specialties of enterprise crowdsourcing, the following key questions to guide future research activities in the field of enterprise crowdsourcing should be addressed:
Key Question 1: How should an organization form and attract a critical mass of appropriate contributors within and beyond the boundaries of the organization?

One crucial prerequisite to enable crowdsourcing is the availability of a large number of potential participants. Sometimes, this is also referred to as the phenomenon of positive network effects because the value of a service increases when more participants are attracted and engaged in a crowdsourcing activity. However, this is only partly true. Often it is not just the size of the crowd that enables the success of a crowdsourcing initiative; rather, that the crowd is the right crowd is the key factor that enables the success of an initiative. Thus, agreeing to the narrow understanding of enterprise crowdsourcing (intra-corporate crowdsourcing), two questions basically arise: First, how many and what kind of employees does a company need to attract? And second, how heterogeneous do the employees have to be according to knowledge, skills, and experiences to solve a certain problem efficiently? As this may depend more or less on the type of a task, there is certainly a minimum threshold. It can be assumed that this critical level is not reached by most of the small and medium-sized enterprises (SMEs).

Key Question 2: How may formal organizational, geographical, and temporal boundaries be overcome?

A second precondition to tap into the power of crowdsourcing both inside and outside the company is the overcoming of organizational, geographical, and temporal boundaries. Villarroel and Reis (2010) describe enterprise crowdsourcing precisely as a “distributed organizational model used by the firm to extend problem-solving to a large and diverse pool of self-selected contributors beyond the formal internal boundaries of a multi-business firm: across business divisions, bridging geographic locations, leveling hierarchical structures” (p. 2). Therefore, on a technical level, ongoing research is required to investigate the effects of social software and Web 2.0 technologies on overcoming these boundaries. However, it also raises the question of how to deal with cultural differences among the crowd.

Key Question 3: How can a company efficiently allocate their financial, human, and technical resources to support a crowdsourcing activity?

La Vecchia and Cisternino (La Vecchia and Cisternino, 2010) call attention to an efficient allocation of financial, human and technical resources. They notice that enterprise crowdsourcing must assure that these resources are not wasted and that the performance of each task is carefully evaluated. Moreover, they point out that current crowdsourcing business models fall short of adequately addressing most of the complex business processes of an enterprise. Therefore, they suggest that a new business model for enterprise crowdsourcing is required. This model must consider a wide range of aspects of outsourcing complex internal business processes to the crowd. These aspects are, for example, the adequate allocation of resources and the control of the process regarding delivery time, quality, and cost (O’Neill et al., 2013).

Key Question 4: How can the crowdsourcing initiative be integrated with existing knowledge activities and business processes?

Several authors have discussed the importance of integrating the crowdsourcing process with the existing business processes of the company (Vukovic, Laredo, et al., 2010). Most of the current crowdsourcing platforms, however, are not able to manage the complex workflow of subtasks efficiently (Khazankin, Satzger, and Dustdar, 2012). Further, as the crowd engages in these tasks voluntarily and is not directly assigned to them, only the modification of parameters, such as the type of incentive, number of contributors, or the available time, may influence the participation rate. To enhance automation and interoperability in an enterprise crowdsourcing environment, crowdsourcing systems should also be integrated into the prevailing business and social software applications of the company. The deployment of semantic vocabularies and web standards may offer a good starting point.

Key Question 5: How should the level of risk associated with legal aspects be handled?
When engaging in crowdsourcing activities, enterprises should be aware of legal aspects, such as data security regulations, copyright ownership, patent law, or employment law (Wolfson and Lease, 2011). First, exposing user or customer data to the crowd poses the risk of violating data security regulations. Further difficulties arise in joint inventorship that may compromise patents that an enterprise already holds. Particularly challenging is the distinction between co-inventors who significantly contribute to the conception of the invention and participants who simply work under the guidance of an inventor. Similar problems occur with the issue of copyrights and losing control of the work, especially when the crowd jointly contributes copyrightable parts to the whole product. In order to take advantage of the copyright ownership, enterprises should make sure that workers are considered employees who create works made for hire. This requires complex negotiation processes and mechanisms to allow a company to control and manage the transfer of intellectual property (Aitamurto, Leiponen, and Tee, 2011). Finally, enterprises should pay attention not to infringe on employment law. According to the legislation, companies must consider whether the crowd workers are considered employees or not. This usually depends on the task type offered and the contractual relationship between the requester and the participant of the crowdsourcing task.

Although several outstanding issues remain in the emerging field of enterprise crowdsourcing, clarification could be provided regarding what the term enterprise crowdsourcing actually means. Thus, to support ongoing research, enterprise crowdsourcing was analyzed from two different angles—a conceptual perspective that examined diverse interpretations of the term and a practical perspective that explored application domains of enterprise crowdsourcing.

References


