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ABSTRACT

"Crowdsourcing" is the use of large groups of individuals to perform tasks commonly performed by employees or designated agents. Many organizations are attempting to tap into the crowd's productivity and knowledge, however, we know little about the strategic use of the crowd to meet specific organizational needs. Based on a review of literature, interviews with practitioners, and exploratory case studies, a framework matching organizational need to key characteristics of the crowd is presented. The theoretical contribution of this study is the development of a framework from which researchers can begin to further define key uses and characteristics associated with the phenomenon of crowdsourcing. Its contribution to practice is the development of preliminary guidelines for matching the right crowd to the right job.

Keywords

crowdsourcing, framework, distributed knowledge, diversity, innovation, knowledge capture, marketing, productivity

INTRODUCTION

Changes in the current competitive landscape along with recent economic and market pressures are forcing organizations to rethink strategies for driving efficiency, improving product/service offerings, connecting with customers, and opening new markets (IBM Global Business Services, 2006). A growing number of organizations are looking to the "crowd" to address these needs. Commonly referred to as "crowdsourcing" (Howe, 2006), this new business practice leverages online technologies to connect organizations with large groups of people for the purpose of completing a variety of tasks. As such, the crowd may represent a potential new source of productivity, innovative, knowledge, and creativity (Andriole, 2010; Lindič, Baloh, Ribière, and Desouza, 2011).

Currently, crowdsourcing is being used across a variety of different industries for a variety of different purposes (Andriole, 2010). Tasks include simple and complex problem solving, remote data collection, knowledge sharing, and evolutionary and revolutionary innovation. Some organizations are finding the crowd brings both tangible and intangible benefits (Jouret, 2009), while others are experiencing less positive outcomes (Knuden and Morteusen, 2011).

The growing use of crowdsourcing by organizations raises many questions. How best do researchers compare and contrast findings across this wide spectrum of uses? How do practitioners make strategic decisions about how and when to leverage the crowd? Work to date has been helpful in describing the phenomenon at a broad level. However, an organizing framework categorizing crowdsourced tasks based on organizational need would provide a roadmap from which researchers could anchor their research and practitioners could make more informed decisions.

This paper presents a framework that matches organizational needs to key characteristics of the crowd. The focus here is on established organizations attempting to leverage the crowd to replace or supplement current resources. That is, it does not address new organizations built on a crowdsourcing business model. Four major categories of crowdsouring needs are presented: marketing/branding, productivity, innovation, and knowledge capture. Additionally, linkages between *organizational need*, *crowd value*, *crowd knowledge*, and *crowd location* are described.

LITERATURE REVIEW

According to Howe (2006), crowdsourcing is "the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form of an open call." Currently, the crowd is being used to complete a wide variety of tasks requiring a wide variety of skills and knowledge. Further, organizations are reaching out to a wide variety of crowds and realizing different value from the crowd's efforts.

Tasks the Crowd Performs

The tasks the crowd performs vary dramatically in terms of complexity and outcomes. A popular use of crowdsourcing is the completion of routine, time-consuming tasks that are easy for humans but difficult to automate. Routine tasks are typically well-understood, structured tasks that can be broken into a series of linear steps. These types of tasks often have a single acceptable solution, or a defined range of acceptable solutions (Perrow, 1967). Often referred to as human intelligence tasks (HITs), these tasks include tagging images (Lindley, 2009), identifying handwriting (Little, Chilton, Goldman, and Miller, 2009), and improving search results (Lindley, 2009).

Organizations are also turning to the crowd to complete non-routine, complex tasks such as generating advertizing (Brabham, 2009; Whitla, 2009), making decisions regarding anticipated market trends (Bichler, Gupta, and Ketter, 2010; Howe, 2008), generating product ideas (Bogers, Afuah, and Bastian, 2010; Jouret, 2009), and solving complex problems (Albors, Ramos, and Hervas, 2008; Jeppesen and Lakhani, 2010). These non-routine tasks are typically less structured, not well understood, and can be approached in many different ways (Perrow, 1967).

Further, crowdsourcing tasks may result in partial deliverables such as a collection of ideas (Di Gangi & Wasko, 2009; Lindič et al., 2011; Howe, 2008), as well as complete deliverables such as the programming of complex software (Boudreau, Lacetera, & Lakhani, 2011; Howe, 2008; Kazman & Chen, 2009).

Who Participates

A wide variety of "crowds" are being recruited to complete these tasks. Organizations are leveraging both external (i.e., non-employees) as well as internal (i.e., employees) crowds. Crowds may be found within existing online communities of interest (Hogue, 2011), product communities (Di Gangi and Wasko, 2009; Jeppesen and Frederiksen, 2006), or via an open call to the general public (Chilton, 2009; Haklay and Weber, 2008). Further, there is evidence to suggest that hobbyists and "lead users" (i.e., users with advanced understanding of future customers' needs) may play a more active role in crowdsourced tasks (Jeppesen and Frederiksen, 2006). But, other studies suggest that lead users may not be the only source of innovation within the crowd. "Ordinary users" (i.e., those with little knowledge of materials or manufacturing process) also possess critical knowledge that can be leveraged for innovation (Reichwald, Seifert, Walcher, and Piller, 2004). While lead users tend to contribute innovative ideas, ordinary users play a key role in refining the ideas put forth. This suggests that ordinary users may play a different, yet still valuable, role. Finally, large corporations concerned about leakage related to intellectual property (IP) or competitive strategy often enlist employees in crowdsourcing initiatives, versus external crowds, in order to reduce risks (Andriole, 2010; Knudsen and Mortensen, 2011).

The Value of Turning to the Crowd

When it comes to the value the crowd brings to the task, organizations are attempting to benefit from both the diversity and the sheer numbers in the crowd. A diverse group approaches problems in both traditional and non-traditional ways. In fact, individuals who attempted to solve problems outside their specific domain are often more successful than those closely associated with the domain (Lakhani, Jeppesen, Lohse, and Panetta, 2007). It is the wide variety of experiences, knowledge, and viewpoints the crowd brings to the task that allows them to potentially outperform even experts within the field (Hong and Page, 2004). Diversity is beneficial both when crowds collaborate to come up with a collective decision or solution (often referred to as "collective intelligence") (Levy, 1997), as well as when individuals work independently of each other but inputs are aggregated (often referred to as the "wisdom of the crowd") (Surowiecki, 2004). Incorporating a variety of different viewpoints also helps to reduce the biases and self-serving beliefs that many bring to the problem solving process (Bonabeau, 2009).

Organizational also benefit from the sheer numbers in the crowd. When large numbers of individuals participate, there is an increase in the likelihood of finding the one right or best solution, often referred to as "extreme-value outcomes" (Boudreau et al., 2011). Additionally, organizations benefit from localized knowledge that is distributed throughout a large crowd (von Hayek, 1945). By aggregating or collecting information from a diverse group of individuals, each providing a "bit" of knowledge, organizations benefit from the collective pool of knowledge that when combined provides a better solution than any one individual could produce (Morgan and Wang, 2010). By leveraging a large pool of individuals, organizations are

also more likely to find the one solution with the highest possible value. Large numbers are also critical when attempting to complete simple tasks in a timely manner (Schenk and Guittard, 2011).

While some organizations report both tangible and intangible benefits (Anthes, 2010; Poetz and Schreier, 2012), others caution that leveraging the crowd may result in decreased time to market (Knudsen and Mortensen, 2011), more costly and resource intensive projects (Jouret, 2009), increased costs in setting up legal frameworks and protecting IP (Jouret, 2009), as well as loss of control by the organization (Bonabeau, 2009).

Linking Organizational Need to the Right Crowd

Work to date on the use of crowdsourcing has been invaluable in identifying the broad uses of the crowd by organizations. It is clear that organizations are leveraging a diverse set of crowds to complete a wide variety of tasks related to a growing number of organizational needs. Research is less clear, however, about which needs necessitate which crowds with which skills, experiences, and knowledge. To complete this wide variety of tasks requires a wide variety of different skills, knowledge, cognitive strategies, experiences, and problem solving approaches (Mumford, 2003). Routine tasks commonly require general or specialized skills (Eckert et al., 2010), while non-routine, complex tasks require a wider variety of knowledge and skills (Schenk and Guittard, 2011). Additionally, the number of domains a problem draws on for a potential solution, often referred to as the level of "uncertainty," impacts the skills and experiences needed to address the problem (Boudreau et al., 2011). The nature of the task can also directly impact the knowledge needed to generate a potential solution as well as the diversity and sheer numbers of participants desired (Boudreau et al., 2011; Terwiesch and Xu, 2008).

For companies to extract value from crowdsourcing initiatives, they must match the right crowd to the specific organizational need (Bogers et al. 2010; Dahl, 2011; Malone, Laubacher, and Dellarocas, 2010). Gaining a better understanding of the similarities and differences between different organizational needs and the crowd characteristics best suited to meeting these needs would contribute to theory as well as practice. As with other domains requiring completion of a variety of tasks, researchers must strive to create models that clearly define the unique types of problems to be tackled so as to generate an understanding of the different knowledge, skills, and strategies most appropriate to finding an acceptable solution (Mumford, 2003).

METHODS

The goal of this research is to identify common organizational needs that may be met through crowdsourcing, as well as to build a clear understanding of which crowds may be best suited to meeting those needs. As crowdsourcing is a relatively new phenomenon with limited empirical research and theory, grounded theory methods are employed to build a framework that matches organizational needs to key characteristics of the crowd (Orlikowski, 1993). As such, an interpretivist qualitative approach is taken to data collection and analysis (Meyers, 1997). The goal is doing so is to generate explanatory theory that is grounded in the experiences of those currently engaged in these initiatives.

Data Collection

Data was gathered from two primary sources. First, a search of literature referencing "crowdsourcing" was conducted. Limiting our search to publications that reference crowdsourcing was seen as helpful in assessing the current state of research specifically purporting to examine this new phenomenon. In line with grounded theory methods, literature was used as a source of data and not for theoretical positioning (Glaser and Holton, 2004). A total of 71 publications from peer-reviewed journals, conference papers, and books were reviewed to identify current uses and crowd characteristics. Based on this review, a second systematic review of the 30 top journals within the disciplines most commonly cited in the literature was conducted.[1] After elimination of duplicates, book reviews, and editorials, the total corpus consisted of 106 publications.

Second, as the goal is to uncover patterns of use within contextual settings, data was collected from practitioners in the field (Mason, 2002). Semi-structured interviews with 18 individuals representing small to large U.S. organizations were conducted to assess current use of the crowd as well as the perceived value crowdsourcing initiatives bring. Based on interviews, criteria for the field study portion of our data collection was created (i.e., mature organizations (3+ years) with 500+ employees, using online channels to connect with the crowd to meet a specific organizational need).

Next, six field sites were recruited. Field sites represented a wide variety of organizations including car manufacturing, defense contracting, document management, and governmental institutions. Across these six field sites, a total of 28

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[1] Top journals in information management, organizational, science, management science, technology innovation, communications, and general business were identified based on rankings from the Association of Information Systems, Association of Business Schools, and ScienceWatch.com's Journal Citation Reports (JCR) impact factors.

interviews each lasting between 30 to 90 minutes were conducted with individuals at all levels within the organization. A flexible interview protocol with open-ended questions (Meyers, 2009) help focus discussions on the organization's motivations for leveraging the crowd as well as the specific tasks to be completed.

Data Analysis

In line with grounded methods, data collection and analysis proceeded simultaneously; therefore insights were not the result of a linear process. Instead, patterns and trends unfolded through an iterative process of data collection, coding, and categorization (Glaser and Strauss, 1967). Using open coding, themes related to *organizational needs* as well as *common tasks* performed by the crowd were identified. Axial coding was then used to further abstract themes into categories. For example, themes related to *common tasks* were first collapsed into six common *uses*: 1) completion of routine time-consuming tasks, 2) collection of distributed data, 3) sharing of knowledge, 4) marketing and marketing research, 5) ideation and evaluation of new product/service ideas, and 6) solving of complex problem. These six categories were further collapsed into the core category of "*use*," specifically: 1) marketing/branding, 2) productivity, 3) product/service innovation, and 4) knowledge capture (Erickson, Petrick, and Trauth, forthcoming). Themes related to the characteristics of the crowd were also identified; specifically: 1) *crowd knowledge,* 2) *crowd value*, and 3) *crowd location*. Finally, selective coding was used to explore relationships between *use* and emerging themes with the purpose of building a theoretical framework.

FINDINGS

While categories often became clear at different times and at different points in our analysis, for clarity of discussion we present an overview of each of the four broad categories of organizational *use* related to crowdsourcing followed by a discussion of crowd characteristics and patterns.

Organizational Need and the Use of Crowdsourcing

As described, organizations turn to the crowd to meet a wide variety of needs. Current data analysis reveals four common organizational *uses* of the crowd. While these four common uses likely have some overlaps, there are distinct difference in terms of *organizational need* and *desired outcomes*. That is, each identified *use* links to a specific *organizational need* with specific *desired outcomes* (see Table 1).

	Marketing/ Branding	*Productivity*	*Product/Service Innovation*	*Knowledge Capture*
Organizational Need	To increase profits and brand affinity by engaging customers to supplement current resources/ processes	To reduce time and/or costs by replacing current resources/ processes	To gain competitive advantage and increase innovative potential by supplementing current resources/ processes	To advance understanding or accuracy by capturing distributed knowledge to create new resources/ knowledge
Desired Outcomes	- Creative outputs - Market insights - Increased market exposure	- Completion of routine, time-consuming tasks, or tasks difficult to automate	- Identification of evolutionary and/or revolutionary product/service opportunities	- Accumulation of knowledge in a central location - Additional source of training data to improve automated processes

Tale 1. Categories of Organizational Uses of Crowdsourcing

Marketing/Branding Needs

A number of organizations are leveraging the crowd to increase profits and brand affinity by engaging customers in multiple aspects of the marketing process. Most commonly, organizations are looking for the crowd to assist in the design and development of creative outputs such as advertising or market promotions. Here the crowd is used to supplement current in-house or outsourced processes (e.g., marketing resources, advertising agencies). Additionally, for organizations that pride themselves on openness and transparency, reaching out to the crowd helps promote and reinforce brand attributes as it sends the message that the brand cares about what the crowd thinks.

Productivity Needs

Organizations looking to reduce time and or costs related to delivery of services look to the crowd to ultimately replace more costly in-house or outsourced resources. Typical of these initiatives is the use of the crowd to complete routine or time-consuming tasks such as document translation or tagging of images. Crowds are also being enlisted to complete complex, time-consuming tasks such as developing software applications. Final outputs of these tasks may be used internally or as deliverables to clients as is the case where service level agreements (SLAs) may be in place.

Product/Service Innovation Needs

Organizational also look to the crowd to supplement current in-house innovation capabilities with the objective of increasing innovative capacity. Here, organizations hope to maintain or gain competitive advantage by incorporating a more diverse pool of individuals into the product/service innovation processes. Tasks include suggesting revolutionary and evolutionary product/service ideas, evaluating ideas submitted by others, or even development of off the shelf products ready for sale.

Knowledge Capture Needs

The crowd is also used to advance understanding by capturing and aggregating distributed knowledge. In these instances, organizations may either create a centralized repository of knowledge for use by employees or customers, or integrate crowd knowledge into products to improve performance (e.g., as a source of training data to improve algorithms).

Crowd Characteristics

Analysis also reveals three key themes related to the crowd, specifically: 1) *crowd knowledge, 2) crowd value*, and 3) *crowd location*.

Crowd Knowledge

Data analysis reveals five types of *crowd knowledge*: 1) general, 2) situational (e.g., time, place, event), 3) product/service (i.e., specific to the organization's offerings), 4) specialized (e.g., programming), and 5) domain expertise (e.g., chemistry). Analysis shows patterns related to *organizational need* and the specific types of *crowd knowledge* required to complete the task. For example, an organization attempting to increase productivity related to translation of documents from English to Spanish seeks out crowds who are fluent in both languages as well as who have good typing skills. That is, the crowd possesses specialized skills (e.g., language and typing). Tasks such as verifying the transfer of numbers from one document to another, on the other hand, require only general knowledge. Moreover, certain tasks may require more than one type of knowledge. For example, if the crowd is being asked to suggest improvements to current product design, they must bring with them product knowledge. Further, specialized knowledge about materials and manufacturing processes may also be beneficial.

Crowd Value

The *value* the crowd brings to the task may be a result of: 1) diversity, 2) distributed knowledge, and/or 3) sheer numbers. Depending on the task, organizations realize value from one or more of these crowd attributes. For example, when attempting to solve difficult R&D problems, the diversity of the crowd increases the likelihood of finding a novel solution. Additionally, the more diverse the crowd, the more distributed knowledge can be applied to the task. Further, increasing the number of individuals who attempt to solve a problem also increases the likelihood of finding the one right, or best, solution. Therefore for complex problems solving related to innovation, a crowd that is both large and diverse may be most beneficial.

Crowd Location

Finally, analysis reveals that organizations target crowds outside the organization (i.e., external crowds), as well as inside the organization (i.e., internal crowds). External crowds may be made up of customers, partners, communities of practice/interest, and/or the general public. Internal sources include employees who are not typically assigned to complete the task (e.g., asking employees whose job description does not include product development to generate and collaborate on product ideas). As organizations tap into external sources, diversity and size of the crowd increases but so do potential risks

and noise. Therefore, depending on the organization's tolerance for risk and need for diversity, one crowd may be more optimal than the other. For example, while a diverse crowd is optimal when attempting to increase innovation capabilities, organizations may prefer internal crowds over external ones to order to reduce risks associated with IP leakage or loss of competitive advantage.

DISCUSSION

Work to date has identified four common *uses* of the crowd each designed to meet a specific *organizational need*. Further, three crowd characteristics have been identified (i.e., *crowd knowledge, crowd value*, and *crowd location*). Patterns and relationships between identified *uses* and crowd characteristics are also beginning to emerge (see Table 2).

	Marketing/ Branding	Productivity	Product/Service Innovation	Knowledge Capture
Ideal Crowd Knowledge	- Product/service - Specialized	- General - Specialized	- Product/service - Specialized - Domain expertise	- Product/service - Situational - Domain expertise
Desired Crowd Value	Diversity	Diversity	Diversity	
		Large Numbers	Large Numbers	
			Distributed Knowledge	Distributed Knowledge
Preferred Crowd Location			Internal	Internal
	External	External	External	External

Table 2. Crowd Characteristics By Organizational Use

The Marketing/Branding Crowd

Organizations leveraging the crowd for needs related to marketing/branding benefit from the value that a diverse crowd brings to the creative process. This requires the crowd to have some knowledge of the product/service being promoted and ideally an affinity for the brand. Additionally, because the objective of the initiative is to increase profits, external crowds (i.e., non-employees) versus internal crowds (i.e., employees) may be best suited to reaching desired goals.

The Productivity Crowd

When it comes to leveraging the crowd for productivity, both the sheer numbers in the crowd as well as its diversity are beneficial. When the goal is completion of simple, routine tasks such as image recognition, large numbers are optimal for reducing time. For more complex, non-routine tasks such as programming, increasing the diversity in the crowd may yield more novel or unique approaches to task completion. Further, simple tasks such as matching numbers between documents generally require only generalized knowledge, while more complex tasks such as translation of documents or programming require specialized skills. Finally, because the organization is attempting to increase productivity by replacing current resources, external crowds are preferred.

The Product/Service Innovation Crowd

Leveraging the crowd for product/service innovation, takes advantage of multiple crowd benefits. While diversity may be instrumental in coming up with novel solutions or new ideas for products and services, distributed knowledge is key when tackling difficult problems and generating revolutionary innovation. Further, increased numbers increases the chances of finding the right or best solution. As far as the knowledge required, when asking the crowd to weigh in on current products/services, some knowledge of those products/services is needed. Further, specialized knowledge of materials used in the manufacturing process may be ideal especially when asking the crowd to contribute to product design and development. Finally, for complex R&D problems some domain level expertise may be desirable, albeit as discussed not always from the domain in which the problem resides. As issues related to leakage of IP and competitive strategy may be forefront in the organization's mind, the choice to use internal crowds versus external crowds is generally a function of the risk perceived by the organization.

The Knowledge Capture Crowd

Finally, organizations wishing to advance understanding through knowledge capture extract value from the distributed knowledge in the crowd. It is the ability to accumulate distributed knowledge that generates potential value to the organization. Here, organizations are typically looking for either domain expertise or situational knowledge. Domain expertise may be related to industries such as pharmaceuticals or chemistry. Situational knowledge includes knowledge related to specific events, times, or places (e.g., crowdsourcing information related to current market trends or geographic locations). In regards to the location of the crowd, both internal and external crowds may be appropriate for knowledge capture.

CONCLUSION

Different organizational needs necessitate the completion of different tasks that in turn require different crowds with different skills and knowledge. Key to the theoretical and practical application of crowdsourcing is gaining a better understanding of the link between organizational need and desired crowd characteristics. Our framework matches different organizational needs to key crowd characteristics and begins to bring some clarity to the wide variety of uses for this new business practice. The theoretical contribution of this study is the development of a framework from to examine similarities and differences between common organizational uses of crowdsourcing. Additionally, its contribution to practice is the development of preliminary guidelines for matching the right crowd to the right job.

It is worth noting a few limitations of this study. First, a targeted literature review was conducted to gain insights in the emergent phenomenon referred to as "crowdsourcing." Some important and significant works are likely overlooked because they did not include the term "crowdsourcing" in the text of the publication or as a keyword. Additionally, as crowdsourcing is a relatively new field of research, we expect a large body of work to be found in conference proceedings. A systematic review of conferences should be added to the corpus reviewed here. Further, additional empirical data and review by researchers and practitioners is warranted to tease out nuances between categories as well as to uncover new crowd characteristics that may be critical in reaching desired outcomes.

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