Exploring the implementation of the Ambidextrous Organization Through Collaborative Crowdsourcing Technology

Abstract

The organizational realization of ambidextrous innovation processes, characterized by the simultaneous pursuit of innovation exploration and exploitation, has been recognized as an important source of long-term competitive advantage. However, scholars are no closer to understanding how organizations can effectively manage the contradictory tensions of radical and incremental innovation to operationally implement dual innovation processes. Drawing on theories of organizational ambidexterity–namely contextual ambidexterity–we position collaborative crowdsourcing technology as an enabler of both exploratory and exploitative innovation processes to explore its potential for achieving organizational ambidexterity. We conducted an empirical investigation using longitudinal case studies with four large organizations, engaged in innovative activities with different crowds of individuals, via a collaborative crowdsourcing technology. Our results provide strong support for the technology as an enabling mechanism of organizational ambidexterity and reflect on these findings in the context of crowds of differing composition. This IT-mediated solution for achieving dual innovation processes represents a significant advance in our understanding of the ambidextrous organization.

Keywords: Crowdsourcing, Ambidexterity, Exploration, Exploitation, Innovation

INTRODUCTION

Despite the increasing interest in understanding organizational ambidexterity from a knowledge management perspective (Afuah and Tucci 2012; March 1991), few scholars have considered the potential of new digital technologies for providing opportunities to explore new knowledge through radical innovation, while simultaneously exploiting existing knowledge through incremental innovation (Majchrzak and Malhotra 2013; Saxton et al. 2013). This represents an important line of inquiry for organizations seeking long-term competitive advantage, as there is a distinct need to balance processes of innovation exploration and exploitation to facilitate new knowledge acquisition and novel knowledge combination/ recombination (Bonabeau 2009; Jansen et al. 2006). Innovation exploration is characterized by search, variation, risk taking, and experimentation activities, whereas exploitation is characterized by refinement, choice, efficiency, and improvement activities (March, 1991).

Several mechanisms have been proposed in the literature to balance contradictory organizational design architectures that encompass different structures, processes, and cultures to support parallel processes of innovation exploration and exploitation, such as the creation of dual organizational forms that consist of multiple tightly coupled subunits that are loosely coupled with each other, as to separate exploratory from exploitative units (Benner and Tushman, 2003). However, Durisin and Todorova (2012, p. 54) argue that while popular proponents of the ambidextrous organizations theory propose organizing mechanisms, "there's a troubling lack of studies that empirically examine their validity with regard to the processes of ambidextrous organizing." Accordingly, very little is known about 'how' managers can operationally achieve ambidextrous innovation processes.

To address this gap, this paper explores the potential role of collaborative crowdsourcing technology as an operand resource to enable ambidextrous innovation processes. As such, we position collaborative crowdsourcing as an enabling mechanism (Lusch and Nambisan 2014) for balancing the needs of innovation exploration and exploitation. We focus on collaborative crowdsourcing technology, as it represents an underexplored, yet potentially rich, context in which to examine organizational ambidexterity. Crowdsourcing is a sourcing model in which organizations use advanced collaborative technologies to harness the efforts of a virtual crowd of individuals, internal or external to the firm, to perform specific tasks (Saxton et al. 2013). Building on this definition, we position collaborative crowdsourcing as a repository of ideas and knowledge in which the accommodation of one idea can trigger the development of others.

Previous studies have struggled to identify the role of collaborative crowdsourcing technology in pursuing the contradictory duality of exploration and exploitation for innovation, paying little attention to whether a balance could be achieved. Furthermore, the current application of crowdsourcing research, drawing from the knowledge-based view (KBV) of the firm, tends to focus on managing knowledge as a source of internal problem solving (Afuah and Tucci, 2012) or with regards to exploration at the fuzzy front-end of innovation (Bayus, 2013; Morgan and Wang, 2010). Considering the theoretical and managerial significance of understanding how dual learning can be achieved, we aim to address the following research question: '*Can the implementation of collaborative crowdsourcing technologies enable organizational ambidexterity*? We have two primary goals: (1) to explore the role of collaborative crowdsourcing technology as a radical and incremental innovation enabler, and (2) to take an initial step towards understanding how an organizations can simultaneously pursue exploratory and exploitative innovation processes.

CROWDSOURCING FOR INNOVATION

Crowdsourcing is used in different contexts, including innovation, design challenges, problem-solving, and management (Saxton et al. 2013). We define innovation in a crowdsourcing context as the crowd's ability to identify and modify knowledge (i.e. innovative solutions) that originates externally and internally to complex problems posed by an organization sponsoring the challenge. Innovative solutions range from radical innobvation, which entail fundamental changes in technology and the creation of differentiation-advantage by opening-up new markets and/or changing customers' behaviors, to the incremental, which involve modifications or changes to existing processes, technology and practices (Chandy and Tellis 1998). Following Yli-renko et al. (2001), we consider knowledge to be a crowd's knowledge (i.e. knowledge of products/service offerings, markets) rather than 'organizing' knowledge (i.e. knowledge of structures).

It has been recognized, however, that existing crowdsourcing architectures for innovation offer little functionality for exploitation and collaboration beyond ideation (Madsen et al. 2012). Informed by Majchrzak and Malhotra (2013) and Pavlou and El Sawy (2006), we propose four key characteristics of crowdsourcing technology (coding and sharing of knowledge, creation of knowledge directories, developing collaborative work system, and knowledge networking) and map the existing literature against possible enabler mechanisms for organizational ambidexterity. Considering these characteristics we argue that collaborative crowdsourcing technologies have a potential role in supporting organizational ambidexterity.

METHOD

We adopted a longitudinal multiple case study design to quantitatively examine the enabling role of a collaborative crowdsourcing technology in four large organizations. Case organizations were selected from Codigital Ltd (Codigital hereafter), the technology provider, based on two criteria: (1) the locus of crowd participants–*internal vs. external*; and (2) participating crowd size–*small vs. large crowds*. We distinguished between internal and external projects and crowd size to capture and account for potential differences in radical and incremental development dynamics owing to innovation locus and project scale. This served as a mechanism to improve the validity and generalizability of the research findings through theoretical replication across diverse cases (Eisenhardt 1989). Each case demonstrated high levels of internal consistency, regarding the motivation to use

crowdsourcing technology for innovation, but differed in their innovation objective and focus.

Empirical Setting

Codigital is a UK-based SME that provides an online crowdsourcing tool for facilitating innovation and co-creation among crowds. The platform's architecture and social design features condition both radical and incremental innovation processes. In terms of radical developments, users are able to submit entirely new ideas that represent a novel recombination of knowledge from a cross-section of existing ideas or a departure away from any existing idea. Participants are motivated to develop new, radical innovations through a live leaderboard of top contributors and top ideas, which promote competition among users (Butler 2013). The leaderboards, illustrated in Figure 1, are the primary basis for competition and are used to document an idea's and individual's ranking in terms of quality and quantity of contributions respectively.

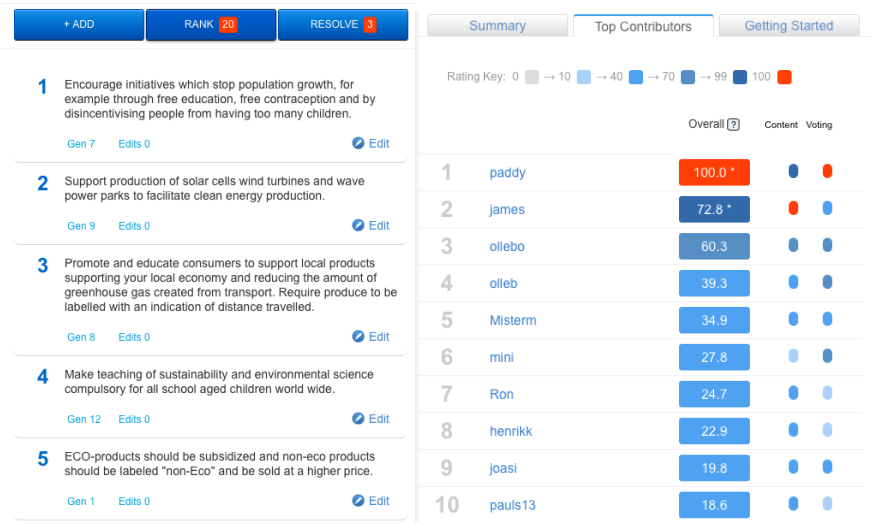

Figure 1. Top Idea and Contributor Leaderboards

Idea rankings on the leaderboard are driven by a distinct voting procedure, in which ideas are served up to participants in a pairwise comparison and judged based on the quality of contribution with respect to the innovation objective (see Figure 2).

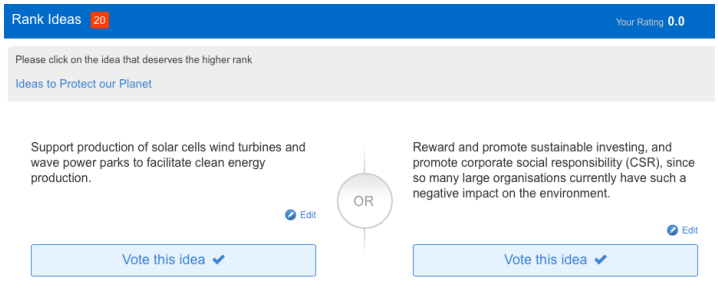

Figure 2. Pairwise Voting Interface for Idea Rankings

In parallel to submitting new, radical ideas, users are also able to incrementally innovate through proposing edits to existing ideas, which are openly visible to all participants on the platform, resulting in multiple idea generations that represent an evolutionary progression from the original 'parent' idea.

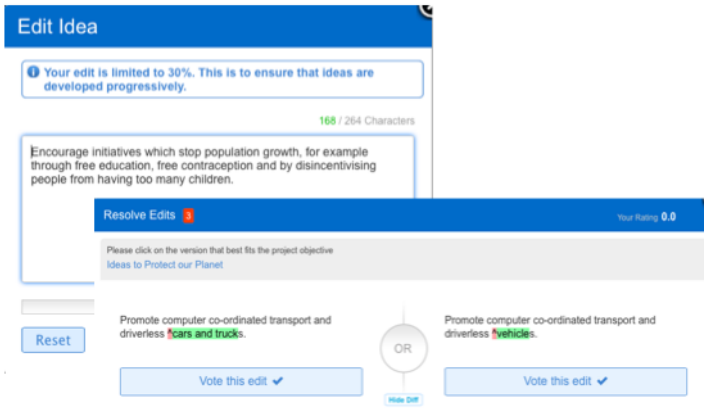

Figure 3. Idea Edits and Pairwise Voting Interface for Idea Generations

Data Collection

Codigital provided us with raw data for each project. Data collected was coded and compiled into a unified, time series dataset that comprised all user activity on the crowdsourcing platform. User activities and interactions were coded according to whether they represented exploratory or exploitative development, depending on whether the focus of activity was on driving new, radical innovations or existing, incremental innovations. Four categories of interaction were identified in the dataset using this distinction and subsequently coded by all authors as follows:

1. New project ideas (*PI*)–the number of new, radical ideas submitted to an innovation project in a given time point.
2. New project idea votes (*PIV*)–the number of votes driving the ranking of new, radical ideas in a given time point.

3. Idea generations (IG)–the number of incremental edits to existing ideas submitted to an innovation project in a given time point.
4. Idea generation votes (IGV)–the number of votes driving the commercialization of next generation ideas into the ranking process in a given time point.

Over 13,000 individual interactions were tracked and coded into a unique dataset using the above categorizations. Coded interactions were presented to the CEO and vice CEO of Codigital and externally verified as a true representation of the platform's dynamics.

Table 2. Cases

	Internal Crowdsourcing		External Crowdsourcing	
	Health Corp.	E-Commerce Corp.	Non-Profit Corp.	Medical Corp.
No. Employees/Members[a]	11,000+	1000+	800+	8000+
Company Description[b]	A UK-based wellbeing organization that offers a range of health services, including private hospitals, health clinics, gyms, diagnostic units, and a range of treatments.	A European multinational organization that specializes in the provision of online payment solutions for e-businesses and e-stores across the world.	A major global advocate for accelerating public, private and governmental movements on key societal issues and provides access to resources and services for key stakeholder groups.	A US-based non-profit organization composed of physicians, residents, and students that aim to improve public health through the provision of education and insurance services.
Innovation Objective	To identify and develop technical and architectural concepts that should be included on an internal communications platform.	To identify the key issues limiting the alignment of departmental and corporate objectives and to develop potential solutions to combat misalignments.	To generate ideas and develop innovative strategies for overcoming the key challenges experienced by different stakeholders in a complex societal problem.	To generate ideas for improving health insurance services and increasing health insurance coverage for average Americans.
Innovation Focus	Technological – New IT solution.	Strategic – Core process change and enhancement.	Social – New infrastructural and process solution.	Service – New service solution.
Crowd Participants	Project was only open to top-level, senior management level staff.	Project was open to all internal staff members of across operational, managerial, and strategic levels.	Project was only open to a select group of youth activists, external to the organization, from across the globe.	Project was open to all physicians, residents, and students, internal or external, to the organization.
Crowd Size	10	129	31	194
Project Duration	6 Days	6 Days	12 Days	39 Days
No. Platform Interactions	781	3063	1539	8438

Modelling Procedure

Following March's (1991) definition, innovation exploration is operationalized as the ratio of all activities performed on the crowdsourcing platform pertaining to the development of radical innovations among project participants over time:

$$EXPLORATION_{jt} = \sum \left(\frac{PI_{ijt}}{N_t} \right)$$

PI refers to a new project idea, N is the total number of participants to an innovation project, i is the individual user, j is project, and t is time. New project ideas are indicative of exploration as they embody a departure away from existing ideas and draw on new information and knowledge to start a new, radical stream of development. As such, they represent search, risk taking, experimentation, and discovery, which are defined as exploratory characteristics (March 1991).

Similarly, innovation exploitation is operationalized as the ratio of all activities performed on the crowdsourcing platform pertaining to the development of incremental innovations among project participants over time:

$$EXPLOITATION_{jt} = \sum \left(\frac{PIV_{ijt} + IG_{ijt} + \sum_{g=1}^{G} IGV_{ijt}}{N_t} \right)$$

PIV refers to new project idea votes, IG are incremental idea generations that emerge from edits to existing project ideas, and IGV are idea generation votes, which refer to the voting activity driving the commercialization of a particular idea generation $g \in G$. The number of idea generations is unlimited, such that $g = 1, 2 \ldots n$. Project idea votes are indicative of exploitation, as they constitute a user choice or preference towards a specific project idea. Likewise, idea generations and idea generation build on and sustain existing knowledge in order to incrementally develop existing ideas. As such, they represent selection, choice, and refinement, which are defined as exploitative characteristics (March 1991). Results of this process are presented in the following section.

RESULTS

The modelling procedure was operationalized in MATLAB, a numerical computing programme, to document the observed levels of exploitation and exploration enabled by the collaborative crowdsourcing platform. The simulation was used to empirically explore the ability of collaborative crowdsourcing technology to enable organizational ambidexterity.

Figure 4 illustrates the levels of innovation exploitation and exploration, per participant, enabled by the crowdsourcing platform for each case organization. Interestingly, we observe

across all four cases that the technology enabled ambidextrous innovation processes through the simultaneous pursuit of radical and incremental innovation over time. This suggests that the utilization of collaborative crowdsourcing technology creates a context, separate from that of the organization, in which users are free to radically and incrementally innovate. Results show that small crowds tend to innovate to a higher degree, both radically and incrementally per participant, than individuals in larger crowds. This result suggests an inverse relationship between crowd size and intensity of innovation processes.

Results suggest that individuals in smaller crowds, on average, document a higher intensity of exploitation and exploration compared to individuals in larger crowds. Yet, we find that smaller crowds show a higher level of variation in patterns of ambidexterity, and tend to work more cyclically phasing between intense work and rest periods (see Figure 4). In absolute terms, however, the volume of exploitative and exploratory interactions documented by larger crowds far outweighs that by smaller crowds. Furthermore, we find that there is less variation in patterns of ambidexterity in larger crowds, with processes of exploration and exploitation being more consistent over time. A similar pattern is observed between internal and external crowds, with individuals in internal crowds working more intensely, but falling short in absolute terms.

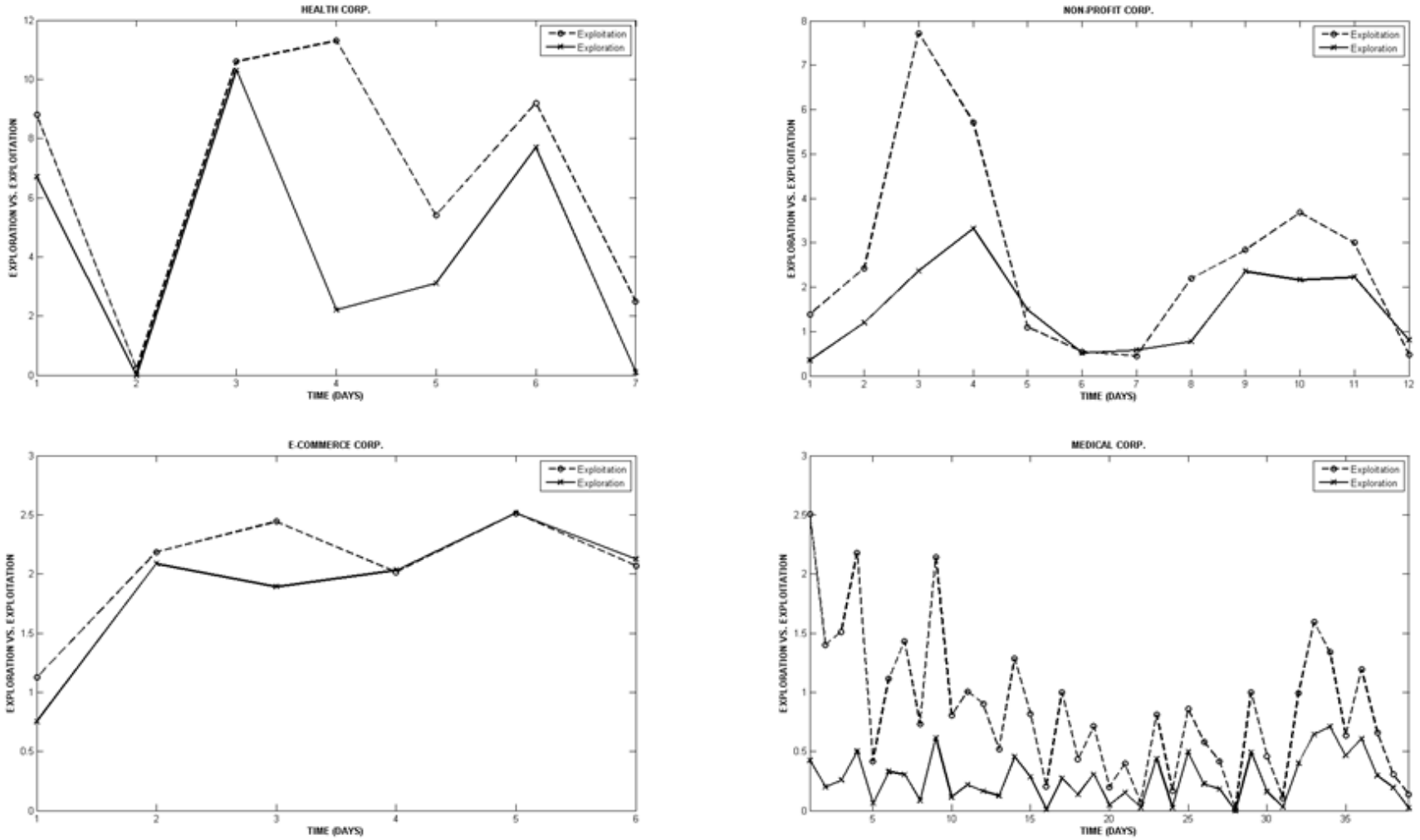

Figure 4. Model Plots for Levels Exploration and Exploitation

Post-Hoc Analysis

To explore the patterns of innovation enabled by the collaborative crowdsourcing technology further, we performed a post-hoc analysis of the exploration and exploitation dynamics. Specifically, we fit mathematical functions to scatter plots that mapped levels of exploitation relative to exploration in order to examine the rate of change in incremental relative to radical innovation.

First, we examine general patterns of innovation for all case organizations by aggregating observations into either incremental or radical interactions. Second, we examine potential differences in patterns of innovation attributed to innovation locus and crowd size by isolating and analyzing observations in each grouping. In each case, a quadratic function of the form was applied as it provided a superior level of fit to the data while maintaining parsimony. Figure 5 depicts the quadratic and first order derivative graphs used for exploring general patterns of ambidexterity. The graphs show that levels of exploitation increase as levels of exploration increase on the interval $0 \leq x \leq 11.57$. This result confirms the ability of the technology to facilitate incremental and radical innovation simultaneously. However, rates of increase for innovation exploitation decrease as levels of exploration increase. This suggests that organizations are only able to pursue low to moderate levels of ambidexterity.

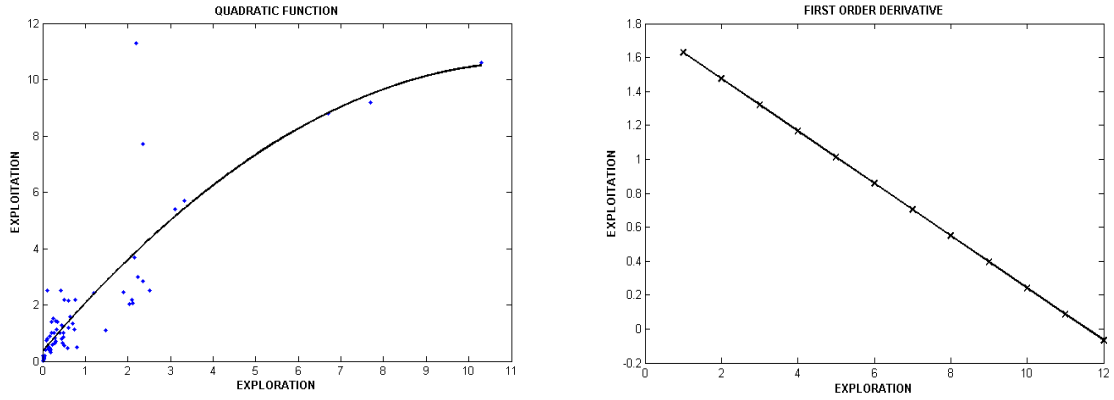

Figure 5. General Patterns of Ambidexterity

Next, we control for potential differences in patterns of ambidexterity observed between internal and external, and small and large crowds. Figure 6 illustrates the functions fitted during this process. Results reveal some interesting differences. For internal and external crowds we find that levels of innovation exploitation consistently increase on the depicted domain as levels of innovation exploration increase. In contrast, we find that for small and large crowds, levels of exploitation increase in the first instance as exploration increases, but

then start to decrease as levels of exploration surpass a certain threshold (> 8 for small crowds and > 1.5 for large crowds).

Our results show that large crowds are the least capable of balancing innovation exploitation as levels of exploration increase, followed by small crowds, and finally internal crowds. Analysis of first order derivative plots in Figure 7 confirms this observation, and demonstrates that the rates of increase in levels of exploitation are consistently decreasing as exploration activity increases for large, internal, and small crowds. Large crowds, in particular, strongly favor radical developments, as large crowds are only able to sustain an exploitative presence at low levels of exploration. In comparison, small crowds and internal crowds are able to sustain innovation exploitation to a higher capacity as exploration increases.

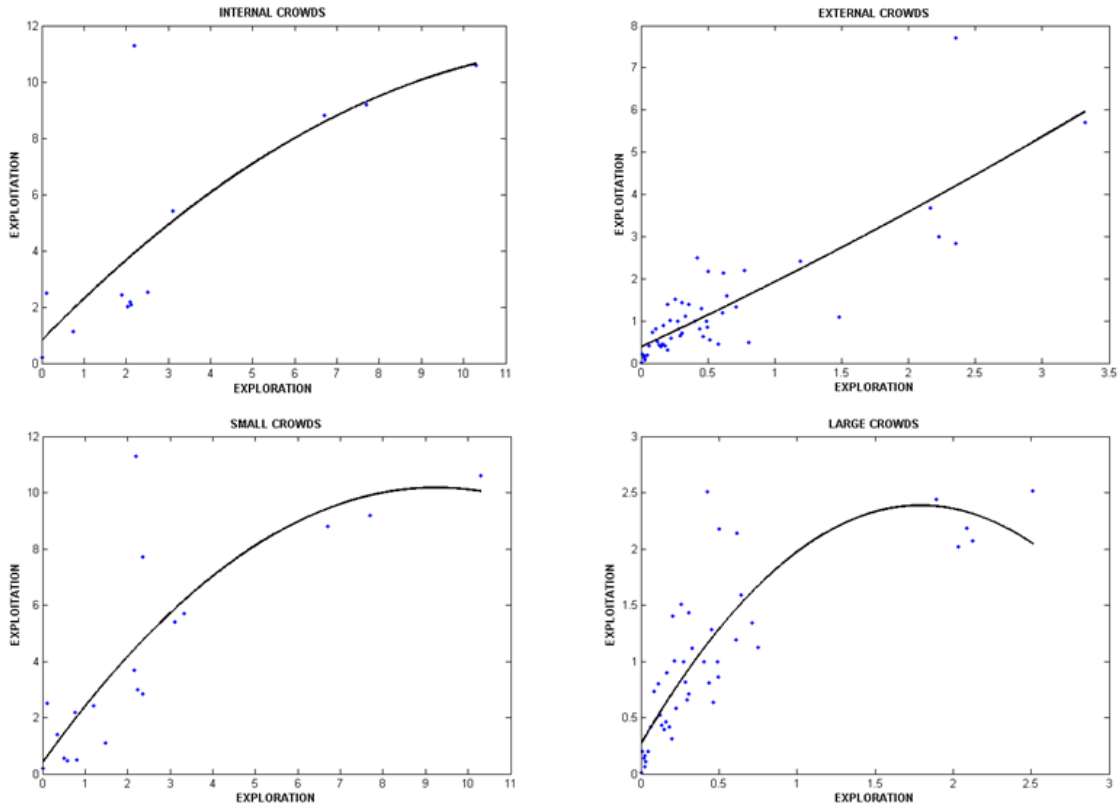

Figure 6. Patterns of Ambidexterity for Different Crowds

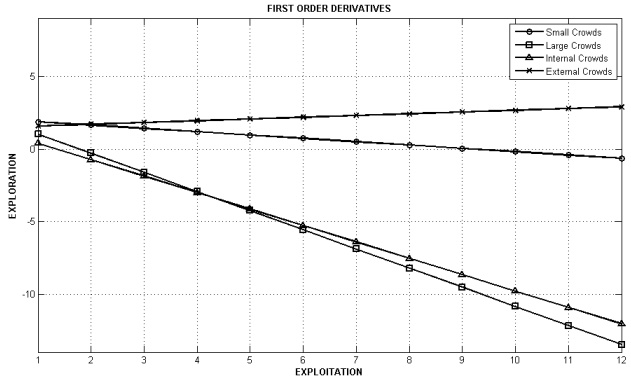

Figure 7. First Order Derivative Plots for Different Crowds

Interestingly, we find that external crowds are the most capable of sustaining ambidextrous processes as levels of exploration increase. Results show that exploitation activity increases consistently as exploration increases. More specifically, we find that external crowds are able to sustain exploitative innovation processes at any level of exploration, as $x \to \infty$. However, the relationship between innovation exploration and exploitation in external crowds is unbalanced, as there is a strong tendency to favor incremental developments over radical developments.

Overall, our results reveal some interesting dynamics regarding the general patterns of innovation enabled by collaborative crowdsourcing technology. In particular, the findings presented suggest that the composition of crowds strongly influence an organization's ability to pursue innovation exploration and exploitation.

DISCUSSION

We found significant evidence that collaborative crowdsourcing technology can facilitate organization ambidexterity. That is, on a general level, the technology was capable of enabling simultaneous processes of innovation exploration and exploitation, albeit to a lesser degree as levels of exploitation gradually diminish as levels of exploration continue to increase. As such, the general relationship observed between innovation exploration and exploitation is inverted u-shaped. More specifically, we found that once levels of exploration and exploitation reach an optimal threshold (i.e., at the peak of the inverted-u slope) the capacity of the technology to support dual innovation processes becomes increasingly reduced. Consequently, our results suggest that levels of exploration and exploitation need to be optimized within certain limits on the collaborative crowdsourcing platform to ensure both radical and incremental developments are sustained.

This paper contributes to the literature in four ways. First, building on studies that call for more research into examining IT's emerging role as an innovation enabler (Nambisan 2013), we articulate the dynamic relationship between crowdsourcing and an organization's exploration and exploitation efforts. In particular, we indicate how collaborative crowdsourcing technology serves as a vehicle for organizational ambidexterity. The insights gathered extend the literature on organizational ambidexterity and innovation (Gibson and Birkinshaw 2004; Kauppila 2010; O'Reilly and Tushman 2013) by examining the crowd conditions that lead to different patterns of innovation. Second, through following four

longitudinal cases, we generate empirical insight into organizational ambidexterity development that complements existing theorizing. Third, given the nascent nature of crowdsourcing for innovation compared to traditional, internal innovation processes, we provide new understanding to these open, collaborative modes of innovation. Finally, results of the study have significant implications for practicing managers as they demonstrate that internal knowledge development, coupled with access to external knowledge through collaborative crowdsourcing, facilitates a balance of exploration and exploitation activities.

A limitation of this research is related to the unit of analysis being that of the innovation project. In our conceptualization of contextual organizational ambidexterity, we assume that an organization exploits knowledge that it has aligned at the project level, but we do not consider how this exploitation could be managed and used at the organizational level. Future research should, therefore, consider multiple crowdsourcing projects from the same organization over time to examine how, when aggregated and considered over time, organizations manage the tensions of innovation exploration and exploitation.

REFERENCES

Available upon request