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Crowdsourcing as a strategic IS sourcing phenomenon: Critical review and insights for future research☆

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ABSTRACT

Fueled by the development of Internet-based platforms that provided its technological foundation, and the need for an agile and uniquely skilled workforce, crowdsourcing has grown from the grassroots, with a burgeoning body of research investigating its many aspects. To gain insight into organizational crowdsourcing as a strategic IS sourcing phenomenon, this paper thoroughly reviews the literature to identify both areas of saturation and gaps, with a focus on the strategic organizational context. Pulling together knowledge on specific aspects of crowdsourcing, we first offer a high-level analysis of definitions to reveal rather broad coverage of various activities involving the crowd, many of which do not involve *sourcing*. We further build on the literature to establish boundary conditions and clarify the focus on crowd*sourcing*. This is followed by an in-depth critical analysis of selected studies published in top IS and general management journals to date. Through this review, we identify key themes that emerge out of the crowdsourcing literature and synthesize the literature to chart a more focused research path moving forward. Guided by our analysis, we offer a road map for future research that brings together fine-grained insights from existing crowdsourcing studies towards developing a high-level, macro-perspective of the crowd*sourcing* phenomenon and its strategic impact.

Introduction

Since the early 2000s, technological developments have fueled the emergence of new organizational sourcing models such as crowdsourcing. Crowdsourcing describes "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" (Howe, 2006). It enables organizations to reach beyond their immediate resources to tap into new knowledge and skills (Fréry et al., 2015). Fueled by the growth of Internet-based platforms that provided its technological foundation, and by the need for an agile and uniquely skilled workforce, crowdsourcing has grown from the grassroots. Accordingly, research on crowdsourcing slowly transitions from an early descriptive focus on applications and cases to studies investigating specific aspects of crowdsourcing, such as crowd motivation, metrics and performance measures, and platform design. However, two specific issues have become evident as a result of this grassroots growth.

First, the boundaries of crowdsourcing are not well defined, leading to construct overload and ontological ambiguity. Seeking to

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address this ambiguity, researchers have offered crowdsourcing taxonomies and classifications (e.g., Geiger et al., 2012; Saxton et al., 2013). While these papers contribute to our understanding of the different crowdsourcing models, there is still room to clarify their boundaries, and the specific roles identified within each model. Second, an integration of the literature is needed to better capture insights and pull together complementary results. While there are several compilations of the literature, they have predominantly taken a static, componential perspective of crowdsourcing rather than a more holistic ecosystem perspective that accounts for different stakeholders and lifecycle stages. Consider, for example, a group of papers exploring the motivation of crowd members for participating in crowdsourcing. One paper might report the crowd's point of view, while another adopts the firm's point of view. A third paper could focus on the motivation for pariticipating in a single competition and another look at ongoing participation. As a result, classfiying all these papers under a single "crowd motivation" category could easily result in losing some of the richness within this literature.

In addition to the above, when focusing on the organizational context, there is general agreement that pursuing any form of sourcing simply to achieve cost savings represents a limited value proposition for an organization, but is typically associated with some operational benefits (Lacity et al., 2016). Organizations should consider sourcing as a strategic approach to meeting organizational goals in order to achieve higher value (Lacity and Willcocks, 2013), for example, benefiting from innovations offered by suppliers (Oshri et al., 2015; Su et al., 2015).

To address these gaps, and gain insight into crowdsourcing as a strategic IS sourcing phenomenon, this paper thoroughly reviews the literature to identify opportunities for future research. We first define the boundaries of our phenomenon of interest to place it within strategic sourcing in the organizational context. This allows us to gather insights and capture crowdsourcing as a stand-alone phenomenon, while also acknowledging its ancestry and nomological network. Guided by our in-depth analysis of this literature, we offer a framework that brings together fine-grained insights from existing crowdsourcing research towards developing a high-level, macro-perspective of the crowdsourcing phenomenon and its strategic impact. Specifically, the framework encompasses key questions and choices associated with a crowdsourcing process, from different points of view, and as it unfolds over time.

Our insights reveal four key gaps in the literature. First, the research has paid significant attention to the question of *what* can be crowdsourced, leaving room for studies that focus on *why* to crowdsource. Second, the research focus ends with the completion of projects, and thus important assessments of crowdsourcing success and long-term value are missing. Third, research on platforms is siloed and has developed in parallel streams. Integrating the role of platforms over the lifecycle of projects would facilitate our understanding of interactions among stakeholders. Fourth, research on specific components of crowdsourcing is fragmented and knowledge does not flow well from one area to the other.

We conclude our review by discussing these gaps and offer a road map for future research that will move us towards a sound understanding of the strategic organizational impact of this phenomenon.

Setting the scene: crowdsourcing background and context

In this section we situate our work within the broader context of the crowdsourcing literature and establish boundary conditions for studying crowdsourcing as a strategic IS sourcing phenomenon. Specifically, we focus our review on the involvement of the *crowd* in the *sourcing* activities of organizations. To this end, we review the literature on crowdsourcing definitions, highlighting the definition adopted in this paper and our conceptual boundaries. Further background is included in the appendices, where we review crowdsourcing taxonomies and typologies in order to further delineate the boundaries of our work and identify models to include and exclude from our review (see Appendix 1), and summarize past review papers to articulate gaps where our paper adds value (see Appendix 2).

Crowdsourcing definitions – what crowdsourcing is, and is not

While the popularity of crowdsourcing in the organizational context has soared since 2006, the concept existed long before that, including in parallel bodies of literature. For example, Morgan and Wang (2010) describe a very early tournament for ideas dating back to 1714, and Surowiecki's book (2004) on the wisdom of crowds also includes early examples. Similarly, parallel terms such as "human cloud" (e.g., Kaganer et al., 2013), "online marketplace" (e.g., Gefen and Carmel, 2008), and "open innovation" (Chesbrough, 2003) are used in the IS and related literatures.

From an ontological perspective, this multiplicity of terms for a given phenomenon is problematic, and can lead to construct overload (Wand and Weber, 1993). To some extent, such overload has been addressed through variations on the term, such as crowd*funding* or crowd *science*. Similarly, scholars have differentiated their focus by using narrower terms that fit specific characteristics of interest. For example, Deng and Joshi (2016) focus on "micro-task crowdsourcing", while Gol et al. (2019) refer to "crowdwork" to describe a form of digitally-mediated employment. Others have chosen to continue using the broad term "crowdsourcing", but offer specific definitions as it applies in their work.

However, the curse of popularity has turned "crowdsourcing" into an umbrella term that encompasses many different phenomena. Our review of the literature reveals a large number of terms and applications under the crowdsourcing umbrella, including (and not limited to) Wikipedia and specialized wikis (e.g., Geo-Wiki, See et al., 2015), online reputation systems (Dellarocas, 2010), spatial crowdsourcing (Miao et al., 2016), customer support (Lu et al., 2017), micro-task crowdsourcing (Deng and Joshi, 2016), innovation contests (Bockstedt et al., 2015), crowdvoting (Garrigos-Simon et al., 2017), and more. While these contexts broadly share the notion of *crowd* involvement, they have little in common otherwise, and therefore merit separate investigation.

In a comprehensive and highly cited literature review of crowdsourcing definitions, Estellés-Arolas and González-Ladrón-de-

Guevara (2012) conducted textual analysis of 36 different crowdsourcing definitions. They extracted information about the *crowd* (composition, task, and motivation/reward), the *crowdsourcer* (who they are and what value they derive), and about the *process* (with a focus on the process, the call, and the medium) to advance the definition below, which we adopt in this paper:

> *Crowdsourcing is a type of participative online activity in which an individual, organization, or company with enough means 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 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 crowdsourcer will obtain and utilize to their advantage that what the user has brought to the venture, whose form will depend on the type of activity undertaken*. (p. 11)

In line with this definition, an activity that does not include the *undertaking of a task* will not qualify as crowdsourcing because it lacks the essential element of *sourcing*. Thus, practices such as crowdfunding (the use of small amounts of capital from a large number of individuals to finance a new business venture)[1] and crowd-wisdom (utilizing a large group's aggregated answers to questions involving quantity estimation, general knowledge, and spatial reasoning)[2] fall outside our crowd*sourcing* scope.

Estellés-Arolas and González-Ladrón-de-Guevara (2012) further identify specific inclusion criteria based on their definition, namely: a clearly defined crowd; a task with a clear goal; clear crowd compensation; the crowdsourcer is clearly identified; the value to be gained by the crowdsourcer is clearly defined; the process is participative; there is an open call; and the Internet is the medium used. These criteria are broad enough to accommodate and reconcile different types of crowdsourcing, yet precise enough to demarcate what should be excluded. For example, *crowd compensation* may take different forms, allowing for the inclusion of tournament-based as well as tender-based (or micro-sourcing) crowdsourcing models, but excluding applications such as Wikipedia and Delicious. The *participative nature* of crowdsourcing accommodates activities that involve individual and/or collaborative contributions, and further, does not limit participation to one-off versus continuous participation. At the same time, the requirements for a clearly identifiable crowdsourcer and task, and an open call, imply that crowd-involving activities such as YouTube and Flickr, as well as open-source software development, are excluded.

The definition adopted in this paper thus helps to form boundaries for inclusion and exclusion around the term crowd*sourcing*. At the same time, the term remains broad enough to accommodate different sub-types and models. As presented in Appendix 1, we honed in on these sub-types by reviewing crowdsourcing taxonomies with the aim of identifying specific *types* of crowdsourcing models that should be included in (or excluded from) this review. Further, Appendix 2 provides an overview of prior literature reviews that focus on crowdsourcing.

We learned from our review of past taxonomies and typologies that a bottom-up classification of crowsourcing does not fully align with our inclusion and exclusion criteria. We therefore propose that a typological approach using pre-defined classification dimensions is a better fit for this review. Based on past literature reviews (Appendix 2), we develop a broad typology that places papers along three important dimenions: the crowdsourcing component studied (e.g., motivation, performance, value); the stakeholder point of view adopted (crowd, platform, or firm); and the project lifecycle stage they focus on (e.g., intiation, execution, completion).

While past reviews have predominantly taken a componential view, we believe that distinguishing between the different stakeholders and different lifecycle stages is imperative in order to understand the phenomenon and fully leverage past literature. For example, papers on the component “crowd attributes” may focus on crowd members’ points of view (e.g., who are their competitors/collaborators?) to gain insight into how to source crowd workers. Alternatively, they may take the intermediary’s point of view (e.g., how homogenous is the crowd, how easy it is to manage?) to learn how to manage this sourcing relationship, or consider the firm’s/crowdsourcer’s point of view (e.g., what knowledge and skills does the crowd possess?) to understand the potential value of crowdsourcing. As such, grouping these studies under a single category (e.g., “crowd attributes”) leads to the loss of valuable information and insights. Similarly, studies on crowdsourcing projects may have explored different lifecycle stages. For example, the focus of some papers could be how the crowd is recruited and motivated, or the crowd’s contributions as the project unfolds. Yet others might look at how organizations can retain strong crowd members for future projects. Again, studying these papers under a single component (e.g., “crowd motivation”) would not provide sufficient granularity to gain all relevant insights.

Our review therefore aims to integrate the componential structure of past reviews with lifecycle factors and stakeholder perspectives under a single framework, guided by our view of crowdsourcing as a sourcing model in the organizational context. We next offer an in-depth critical review (Paré et al., 2015) based on our analysis of common themes that emerge from crowdsourcing studies published in top IS and general management outlets. We describe our review approach, present the results of the critical review, and offer insights for future research.

Review method

Our approach to reviewing the crowdsourcing literature followed recommendations for conducting a comprehensive and systematic literature review by Webster and Watson (2002); Rowe (2014); Fink (2013). Driven by the ultimate objectives of providing a critical assessment of extant literature (Paré et al., 2015) and developing insights for future research on crowdsourcing as a strategic IS phenomenon, our review was designed in two phases. The first phase was a broad scoping review and involved a comprehensive

[1] https://www.investopedia.com/terms/c/crowdfunding.asp
[2] https://en.wikipedia.org/wiki/Wisdom_of_the_crowd

search for conceptual and empirical articles, which we then examined thematically, focusing on definitions taxonomies and typologies, and reviews of the crowdsourcing literature. The second phase was designed as a critical review of carefully selected articles, which we analyzed using a critical interpretive method (Paré et al., 2015). We elaborate below on each of these phases and provide the detailed criteria used for the searches, and for inclusion and exclusion of papers.

Phase 1: scoping review

A scoping review "attempts to provide an initial indication of the potential size and nature of the available literature on a particular topic" (Paré et al., 2015; p. 186). Our aim was to understand the extent and range of research on crowdsourcing, to capture the scope of the crowdsourcing phenomenon with its boundary conditions, and to establish clear screening criteria for the critical review (phase 2). For this phase, we conducted a search using ABI/INFORM Complete as well as Business Source Premier, searching initially on the keywords (i) "crowdsource" OR "crowdsourcing" within a paper's abstract, and limiting the search to peer reviewed journal articles in English only. This resulted in 560 papers. We then conducted a second search adding the keywords (ii) "innovation contest", (iii) "crowd" AND "tournament", and (iv) "crowd" AND "contest". Finally, given that some journals are not indexed in the ABI/INFORM and/or Business Source Premier databases, or have up to a few years' embargo on recent articles, we checked whether the top IS journals are covered by these databases, and their embargo status. For example, this check revealed that the *Journal of Strategic Information Systems* is not included in ABI/INFORM (see Appendix 3 for summary of coverage of mainstream IS journals in ABI/INFORM). Accordingly, we conducted a further manual search to ensure that all mainstream IS journals were covered in our review and that we had included all relevant papers published up to mid-May 2019 (including papers published online ahead of print). This brought the total number of papers to 603. We then carefully screened these papers for crowdsourcing definitions, as well as identifying papers that offer typologies or taxonomies and review papers. We presented a summary and discussion of these papers earlier in the "Setting the Scene" section of this paper. Finally, we identified an additional 28 papers from the International Conference on Information Systems (ICIS). After removing duplicates, we were left with 622 articles in total.

Phase 2: critical review

For the critical review, we narrowed the selection of papers identified in the scoping review to reflect both relevance and quality (i.e., selecting only papers published in high quality IS and general management journals). Given the interdisciplinary nature of crowdsourcing, we decided not to limit our choice to IS journals only, but to also include quality journals from other disciplines related to business and management (e.g., marketing, strategy, organization studies). This approach is in line with Webster and Watson's (2002) recommendation to diversify sources in a literature review. We established clear criteria for including and excluding papers for the critical review based on four commonly recognized key quality benchmarks for journals, as elaborated in detail in Appendix 4.

To apply the selection criteria, we made a list of the 261 journals in which the papers included in the scoping review are published. After checking these journal titles against the four key benchmarks of journal quality (Appendix 4), we then marked papers published in journals that meet at least one of these four criteria for inclusion in the critical review. The remaining papers were excluded from the critical review. The initial list of papers for our critical review comprised 103 journal articles and the abovementioned 28 ICIS papers. After carefully reading these papers, we excluded 26 journal articles that either did not fit the boundaries and scope of our review (e.g., Dellarocas, 2010; Kane, 2014), or had already been reviewed as part of our previous discussion of taxonomies and literature (e.g., Gol et al., 2019; Zhao and Zhu, 2014; Zuchowski et al., 2016). Six ICIS papers were also excluded because they were either not relevant to the boundaries and scope of our review, or they also appeared as a published journal article included in our list of papers (e.g., Nevo et al., 2012). In total, 77 papers published in journals meeting at least one of the benchmark criteria were included in the critical review, as well as 22 ICIS papers. The 99 papers included in the critical review are listed in Appendix 5.

In our detailed analysis and coding of the selected papers, we utilized a framework that builds on the three abovementioned approaches to structuring management research and practice, namely the stakeholder approach, the lifecycle approach, and the componential approach. This framework allowed us to organize papers according to *whom* the paper focuses on, as well as *when* the phenomenon is studied, and *what* questions and variables are examined (see Table 1 later in the paper). Organizing papers within this framework helped us develop insights on gaps and links in extant literature, and, at the same time, identify several new themes and patterns. For example, we identified the most common characteristics used to design crowdsourcing projects, which we report later in this paper, and a growing interest in understanding crowd participation in subsequent/continuous (rather than one-off) crowdsourcing projects. Furthermore, we documented theoretical perspectives, the data collected, and research methodologies used in the selected critical review papers. We later build on these analyses to synthesize the existing crowdsourcing literature into a roadmap for future research (see Fig. 1), and identify gaps for future research.

Critical review of the crowdsourcing literature

As we compared and contrasted findings across the papers included in our critical review, we were guided by the three approaches discussed in our earlier summary of literature reviews: the componential approach (what is the focus of the study?); the stakeholder approach (whose point of view is taken?); and the lifecycle approach (what stage of the process is studied?). While the componential approach features in many of the review papers we summarized, the other two are less prevalent. For the stakeholder

approach, we built on Barnes et al. (2015), who note that: "Crowdsourcing for paid work involves the following key actors: buyers (those requiring tasks to be completed for compensation); platform owners (those providing an online platform or website in which tasks are advertised); and workers (those who respond to advertisements, undertake and submit work, then receive financial compensation)" (p. 18). Hence, we classified papers according to whose point of view the study takes, but acknowledge that a paper may discuss more than one point of view. For example, the paper by Terwiesch and Xu (2008) looks at the interaction between a seeker and a set of solvers. However, on closer reading, the paper is more about the seeker's (firm) view and thus was classified as such. Hence, even when papers acknowledge multiple points of view, in most cases it is possible to identify a predominant stakeholder based on the stated contributions and model variables.

To classify papers using the lifecycle approach and capture the temporal dimension of crowdsourcing projects, we initially adopted a framework from the traditional project management literature (Pinto and Prescott, 1988), according to which a project's lifecycle consists of a conceptualization stage, a planning stage, an execution stage, and a termination stage. During the conceptualization stage, the strategic need is identified and preliminary goals and courses of action established. The planning stage involves drawing up more formalized plans to accomplish the project's goals. During execution, the actual work of the project is performed, and performance capabilities are verified. Finally, termination refers to the release of committed resources and delivery of the project to its intended users. One limitation of this approach is the abrupt ending of the project upon delivery, especially given that a major stakeholder in crowdsourcing is the focal firm – the intended user of the project. Similarly, we felt that some of the studies reviewed seemed to pertain to an earlier stage than conceptualization, for example studies on the firm's decision to crowdsource (e.g., Afuah and Tucci, 2012) or the crowd's decision to participate (e.g., Deng and Joshi, 2016). A second limitation stems from the fact that some studies span multiple stages within this lifecycle, for example research by Fayard et al. (2016) exploring how two firms experienced crowdsourcing. Finally, several papers (which we discuss later in the section) take an ongoing view of crowdsourcing, studying continued engagement and the impacts of repeated interactions between the crowd and firm or platform. We therefore attempted to modify this project lifecycle framework to make it more suitable for crowdsourcing projects. In doing so, we considered an approach from a related crowd phenomenon, crowdfunding, where the temporal focus is placed on the dynamics and progression of a project, rather than its specific stages (e.g., Chen et al., 2018; Crosetto and Regner, 2018). This more fluid approach streamlines the transitions between the lifecycle stages of the traditional project management framework, and allowed for easier classification of papers.

While there is no perfect fit with any specific lifecycle approaches, an issue we will return to in our discussion of future research, we believe that some differentiation is merited given the different foci of the papers we reviewed. Table 1 therefore presents the papers in our critical review organized by stakeholder (rows) on a temporal continuum. The table is followed by a detailed discussion of the papers from each stakeholder perspective, and differentiating between studies focusing on one-off versus ongoing crowdsourcing initiatives.

Focal firm perspective

We identified 43 papers incorporating the firm's perspective. Following our temporal outline in Table 1, we start with the early decision to crowdsource, where papers examine factors that lead organizations to choose crowdsourcing over other sourcing models. For example, Afuah and Tucci (2012) developed a model delineating factors that play into the probability of crowdsourcing, which include characteristics of the problem, the knowledge needs, the crowd, and the solution, and Ye and Kankanhalli (2015) studied antecedents of the crowdsourcing decision, such as brand visibilty, access to skills, solution diversity, and costs.

Design issues are a major focus in papers that take the firm's perspective. Studies of crowdsourcing design can focus on the early stages of designing the compeition and task, or look at the impact of various design decisions later in the process. Focusing on contest design, Terwiesch and Xu (2008) looked at solution efficiency for different types of projects and under different fee and incentive structures, Archak and Sundararajan (2009) investigated contest design in terms of price allocation, and Martinez (2017) examined how design differences in terms of competition complexity and autonomy, task variety, and knowledge characteristics impact the intrinsic motivation of participants, and ultimately the quality and number of submissions. Again in relation to design issues during the crowdsourcing project, Leimeister et al. (2009) focused on the role of incentives in promoting competition and motivation to contribute solutions. Finally, with regard to the impact of design decisions, Natalicchio et al. (2017) studied the effect on competition performance of different interaction scenarios for the problem characteristics, the problem solvers, and the platform, and Hwang et al. (2014) looked at the balance between deep and shallow generalists, as well as non-generalist knowledge, in terms of the number and quality of ideas.

We found additional papers spanning all lifecycle stages of the project that provide broader and more general guidelines for crowdsourcing firms (e.g., Malhotra and Majchrzak (2014) on knowledge integration, and Morgan and Wang (2010) on general contest design), as well as papers that outline general "how to" insights, such as crowdsourcing frameworks (Bonabeau, 2009) and required capabilities for crowdsourcing organizations (e.g., Nevo and Kotlarsky, 2014).

Focusing on the crowd's behavior from the firm's point of view, Gatzweiler et al. (2017) looked at deviant content in response to ideation contests, Koh (2014) studied how firms can shape participants' strategies, Chua et al., 2015 considered cultural alignment between the innovator's and the audience's country, and Ebel et al. (2014) examined a pyramid approach for crowd recruitment.

Finally, quite a few papers adopting the firm's perspective look at aspects of value and utilization of crowdsourced ideas. The evaluation and selection of submissions is identified as potentially presenting a heavy load for firms (Nagar et al., 2016). One paper discusses the problem of crowding, which occurs when organizations are required to filter many ideas (Piezunka and Dahlander, 2015). The authors argue that under the pressure of many submissions, firms tend towards what is familiar, and propose three

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Table 1
Overview of Key Focus Areas in the Crowdsourcing Literature.

Stakeholders	Crowdsourcing lifecycle progression					
Initiating entity (e.g., focal firm) – 43 papers	Decision to crowdsource (4)	Early design consideration (4); Required capabilities (2)	Shaping participants' strategy (1)	"How to" frameworks (1); Project design impacts (2); Crowd behavior (3)	Submissions' evaluation (3); Design impact (2); Combination with existing knowledge (2)	Utilization (2); Value (3)
	11 papers were identified as spanning all stages 3 papers were identified as focusing on ongoing crowdsourcing projects					
Crowd – 31 papers	Expectations (1); Decision to participate (3)	Motivation (2); Attitudes (4)	Effort and performance (5); Learning (2); Engagement (2); Knowledge sharing (1)	Community and teams (3)	Employability (1); Success (2)	
	2 papers were identified as spanning all stages 3 papers were identified as focusing on ongoing crowdsourcing projects					
Platform – 25 papers	Task allocation (1); Reward structure (2)	Matching crowd to firm (1); Developing trust (1)	Platform design (5); Idea combination (2)	Value (1)		
	10 papers were identified as spanning all stages 2 papers were identified as focusing on ongoing crowdsourcing projects					

distance measures to reflect the extent to which the idea differs from what the organization has previously known or done. These measures look at content distance, structural distance, and personal distance. To facilitate the evaluation of ideas, Nagar et al. (2016) developed an automated approach based on features such as the length of the proposal, its completeness, the proportion of likes it receives, and various linguistic features. Along similar lines, Hoornaert et al. (2017) propose different approaches to aggregate and screen ideas, namely a content-based approach, a contributor-based approach, and a crowd-based approach.

Focusing on value and utilization, Hu et al. (2016) propose a framework for improving crowdsourcing performance in the context of crowd labeling, Allen et al. (2018) report the positive impact of design crowdsourcing on product performance, and Nishikawa et al. (2017) demonstrate the value of marketing crowdsourced products as such. Other papers examine the value of crowdsourced data (Steelman et al., 2014) and the ability of crowd members to compete with experts in terms of novelty, benefits, and the feasibility of generated ideas (Poetz and Schreier, 2012).

We also note 14 papers spanning all stages of crowdsourcing projects, or which look at crowdsourcing as an ongoing phenomenon. Examples include organizational learning from crowdsourcing (Schlagwein and Bjørn-Andersen, 2014), the potential of crowdsourcing to solve organizational problems (Fayard et al., 2016), and the strategic case for crowdsourcing (Fréry et al., 2015).

Crowd perspective

It is evident from the studies reviewed that understanding individual crowd member perspectives is important for firms who want to benefit from crowdsourcing. Across the 31 papers focusing on the crowd, three broad research themes are evident: crowd members' motivation, attitudes, and engagement; understanding the effort invested by crowd members in terms of submissions and related outcome variables; and understanding broader crowd contexts, where individuals are placed within teams and communities to leverage network ties and social capital.

The first theme captures most of the early categories in Table 1. Similar to the papers that take the firm's perspective, crowd focused papers also investigate the factors that lead to participation in contests. From these papers we learn that individuals choose to participate in crowdsourcing based on a combination of needs, values, job characteristics, and hedonic and satisfaction outcomes (Deng and Joshi (2016), in the context of micro-task crowdsourcing). Yang et al. (2011) introduce the dimension of past successes as impacting crowd members' submission decisions for specific contests, as well submission timing decisions. Once individuals decide to compete, fairness expectations have been shown to affect participation and willingness to contribute (Franke et al., 2013).

Closely related to the participation decision is crowd members' motivation. Both extrinsic and intrinsic motivation have been studied in the crowdsourcing literature, including monetary rewards, skill enhancement, enjoyment, work autonomy, and cognitive effort (a negative effect) (Ye and Kankanhalli, 2017). In the context of micro-task crowdsourcing (e.g., AMT), Deng and Joshi (2016) identify motivators for participation, including the flexibility and simplicity of the work context; task attributes such as task autonomy, variety, significance, clarity, and payment; workers' financial, social, and personal growth needs; firm's ability to control the work; and hedonic and work value outcomes. They propose all these motivators ultimately link to crowdsourcing satisfaction as a key outcome variable. Similarly, Moussawi and Koufaris (2015) identify factors that affect workers' participation in low paid micro-tasks, grouping them under existence needs, relatedness needs, and growth needs. Taking an ongoing view of crowdsourcing, Hofstetter et al. (2018) describe the lasting impact of intrinsic rewards and reward feedback on subsequent participation in contests.

Research with a crowd focus also encompasses papers that look at attitudes and engagement. Among the attitudes that have been studied in the context of crowd members, Hutter et al. (2015) tested relationships between distrust of others, amoral manipulation, and desire for status against the number of submitted ideas, as well as for contributed comments. We also found papers that explore performance and mastery orientation (Nevo and Tajedin, 2016), loss aversion (Zheng et al., 2018), and the contribution of feelings of pride and respect to ongoing crowdsourcing participation (Boons et al., 2015). Beyond attitudes, solver engagement has also been studied (Cahalane et al., 2014). Solver engagement, which is associated with factors such as attitude, expected risk, autonomy, task variety, feedback, and problem solving, has been empirically shown to affect solution creativity (Martinez, 2015).

Moving forward in our Table 1 timeline, the second broad theme that emerged highlights research on effort investment and performance. Looking at effort, Dissanayake et al. (2019) found that self-efficacy and motivation are positively linked to effort, as moderated by the extent of competition present. Effort, in turn, is further linked to performance, as measured by the solver's ranking. Also related to effort, Dissanayake et al. (2018) studied solvers' strategic behavior in terms of the timing of submissions and investment of effort and skill. They found that solvers strategically alter their effort to increase their chances of winning, making greater investments as the deadline draws near. Moussawi and Koufaris (2013) developed and tested a model of perceived effort in crowdsourcing contests, and further linked effort to performance. In their model, effort is elicited by perceptions of task autonomy, use of skills, and task meaningfulness, as well as the valence of extrinsic rewards. Taking a different angle, Blohm et al. (2016) studied the effort involved in evaluating ideas under different IT support scenarios, and linked this variable to decision quality. Finally, focusing on performance, Lee et al. (2018) examined the role of salience bias in Kaggle competitions outcomes.

Studies have also examined crowdsourcing success, including crowd member attributes that lead to a specific idea being implemented, such as attention to the ideas of others (Schemmann et al., 2016), the link between ideators' expertise and the success of their ideas (Zhu et al., 2017), and the link between past and future successes (Yang et al., 2011).

As our third and final theme indicates, some papers report studies of the crowd within its broader community or network, as well as crowd members within teams. For example, when the solvers in the Dissanayake et al. (2018) study were placed within a team, team members exhibited similar behavior in terms of strategically timing their effort investment. Hofstetter et al. (2018) showed that the number of social ties a crowd member has is positively related to the number of votes an idea receives. Füller et al. (2014) studied the heterogeneity of participants in hybrid contest communities using the Swarovsky platform. Based on log files for the community,

they identified different user types based on out-degree and in-degree centrality, as well as the number of design ideas submitted. The five user types were socializer, idea generator, master, efficient contributor, and passive user. Dissanayake et al. (2015) looked at task division for crowdsourcing teams participating in Kaggle contests. They found that teams will perform better if members with strong intellectual capital are not prioritized to focus on the main task at the expense of members with strong social capital. Finally, Majchrzak and Malhotra (2016) discuss the impact on innovative outcomes of different knowledge sharing trajectories within collaborative innovation challenges.

Beyond the above three themes, we also identified papers that study what we call externalities of crowd work, for example, the effect of crowdsourcing on workers' employability (Barnes et al., 2015), and on individual learning throughout the crowdsourcing project (Huang et al., 2014).

Platform perspective

The literature on crowdsourcing platforms is quite diverse, not only in terms of the issues it covers, but also the terminology that has been used over time to refer to what we today call "crowdsourcing platforms". For example, some earlier studies talk about "online marketplaces" (e.g., Gefen and Carmel (2008)), while more recent papers refer to "online labor markets" (Bergvall-Kareborn and Howcroft, 2014) and "crowdsourcing intermediaries" (Du and Mao, 2018). Further, a significant platform related literature lies outside the specific crowdsourcing context, with seminal papers focusing on the broader phenomena of two-sided markets and online platform design such as video-game consoles, online platforms such as Amazon and eBay, and credit card payment services (e.g., Parker and Van Alstyne, 2005; Rochet and Tirole, 2003). Within this broader context, IS researchers have studied the design and governance of platforms, looking at openness versus control, economic versus technological design, the regulatory role of platform owners, and various pricing determinants (e.g., Bapna et al., 2004; Boudreau, 2010; Gawer, 2014).

In our review, and in line with the adopted crowdsourcing definition by Estellés-Arolas and González-Ladrón-de-Guevara (2012), we focus on platforms that are clearly situated in the crowdsourcing context and used to enable and facilitate engagement in *sourcing*. Thus, as elaborated in the "Setting the Scene" section, several types of platform identified by Saxton et al. (2013), such as those that facilitate voluntary knowledge contributions (e.g., Wikipedia) and digital goods sales (e.g., iStock), are not included in this review.

We identified 25 papers as being crowdsourcing platform focused. Many of these papers describe broad insights and provide either general overviews or insights for platform governance and solicitation of participation from both crowd and firm (e.g., Blohm et al., 2018; Dalle et al., 2017; Majchrzak and Malhotra, 2013; Wilson et al., 2018). Also common among the platform focused studies are platform design features that distinguish between rewards, submission disclosure (e.g., sequential all-pay auction versus simultaneous all-pay auction, versus hybrid models (Liu et al., 2014)), combining ideas (Yu and Nickerson, 2011, Sakamoto and Bao, 2011), matching crowds to firms (Qi and Mao, 2016), information revealing (Lee et al., 2018), and platform reliability (Karger et al., 2013).

Finally, some papers also propose new ways for platforms to facilitate crowdsourcing, for example, as an interoperable network of marketplaces (Gong, 2017) or a social media focused platform (Wei-Feng and Jordann, 2017). Others pose research questions related to the role of the platform, for example, the role of the Amazon Mechanical Turk platform in labor markets, employment and the commodification of labor (Bergvall-Kareborn and Howcroft, 2014), the scalability and value of platforms (Kohler, 2015, 2018), how platforms can develop trust (Du and Mao, 2018), and the role of platforms as employers (Pongratz, 2018).

Crowdsourcing as a One-off versus ongoing phenomenon

While many papers look at crowdsourcing as a one-off undertaking, more recent papers report a longer-term approach to ongoing involvement between firm and crowd. From the crowd's perspective, one area of interest is why crowd members return for additional competitions. Boons et al. (2015) showed that positive media and task feedback in one competition increased both pride and perceived respect, and encouraged members to return for additional competitions. On the negative side, Bayus (2013) studied serial ideators (i.e., crowd members who are continuously contributing ideas) and found negative effects for past successes. Specifically, as these ideators try to come up with another exciting winning idea, they end up proposing less diverse ideas that are similar to their previous successful ideas. Finally, Hofstetter et al. (2018) showed that individuals who receive positive feedback, as well as rewards, are more likely to participate again and display greater creative effort in subsequent contests. Linking to platform design, they also showed that multiple payments as opposed to a winner take all incentive structure have a positive long-term effect.

Learning is a second area evident in studies of ongoing crowdsourcing. Huang et al. (2014) demonstrated that as individuals learn about how to accurately estimate both the potential value and the cost of implementing their ideas, there is a corresponding decrease in submitted ideas over time, but an increase in the feasibility of ideas. At the firm level, crowdsourcing promotes organizational learning through non-members and infuses traditional learning over the long term (Schlagwein and Bjørn-Andersen, 2014).

Other studies at the firm level that focus on crowdsourcing as an ongoing endeavor take a higher-level view of what crowdsourcing can contribute to firms over time. For example, one study modeled a decision tree to guide firms with regard to when repeated competitions might be desirable (Morgan and Wang, 2010).

Crowdsourcing in the organizational context: an integrated framework

Crowdsourcing research and practice is now at a relatively mature state, as evidenced by the large number of papers identified in our scoping review. Accordingly, we have established a good understanding of specific aspects of this phenomenon in this field. It is

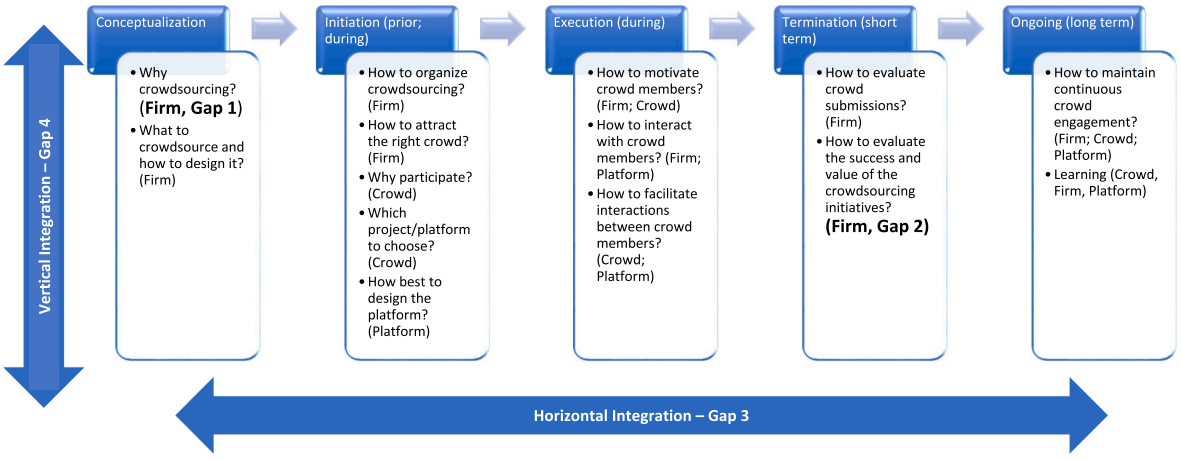

Fig. 1. A Road Map for Future Research on Crowdsourcing in the Organizational Context.

now time to step back, integrate our knowledge, and examine macro-level questions pertaining to the strategic value of crowdsourcing and its overall impact on organizations. In this final section we pull together our insights from the critical analysis to offer an integrated framework for future research.

As we reviewed the extant crowdsourcing literature attempting to consolidate findings from multiple studies into a single comprehensive perspective, we observed a high degree of disconnect in the way crowdsourcing research is evolving. While certain themes emerge as being very popular – for instance *idea generation* is widely recognized as the type of task suitable for crowdsourcing (e.g., Merz et al., 2016; Morgan and Wang, 2010; Schemmann et al., 2016), many studies have a narrow focus or study unique crowdsourcing settings, which makes their findings rather siloed. Thus, the crowdsourcing literature can be compared to a large number of colorful jigsaw pieces that belong to the same puzzle, but have yet to be put together. Once these jigsaw pieces are connected, we will be able to take a holistic look at the crowdsourcing phenomenon and uncover gaps for future research focus.

To piece this puzzle together we build on insights from our critical review as displayed in Fig. 1 in the form of four key gaps. We have opted to organize our ideas according to the traditional four-step project lifecycle model (Pinto and Prescott, 1988), but slightly modified to address issues concerning the beginning and end of projects, as previously discussed. Specifically, we extend the early conceptualization stage to include the decision to crowdsource and other pre-project concepts, and add a final stage following the project to capture an ongoing view of crowdsourcing.

We propose that the crowdsourcing process starts with a small number of macro-level decisions that may (or may not) lead to a crowdsourcing project initiation (this step is shown in Fig. 1 as *conceptualization*). Next, a large number of micro-level decisions are triggered that focus on project *initiation* and *execution*. We reviewed many of these decisions in the previous section. The final step evaluates the impact of crowdsourcing and its measurable value to the firm in the short and long term (*termination* and *ongoing* steps in Fig. 1). Each step in this process requires the organization to make choices[3], many of which relate to the strategic goals of the organization in question. We discuss these choices and their implications below. Rather than reviewing each decision within this roadmap, we focus on specific gaps and further opportunities that are important for establishing directions for future research. As illustrated by Fig. 1, Gaps 1 and 2 are relevant to specific steps in the crowdsourcing process, while Gaps 3 and 4 provide horizontal and vertical integration between the questions represented respectively by Gap 1 and Gap 2. We discuss these gaps in detail and propose research directions for addressing each gap. As part of this future research, we identify specific opportunities for cross level research that synthesizes insights from our critical review.

Gap 1. Why Crowdsourcing? Towards an Organizational Perspective on the Crowdsourcing Decision

We know from the existing literature that organizations can benefit from crowdsourcing by getting new ideas for new products (e.g., LEGO[4], Fiat[5]), solving problems (e.g., NASA[6]), and gaining access to an available workforce with relevant skills (e.g., outsourcing microtasks via platforms such as Amazon Mechanical Turk). However, it is important to recognize that organizations that engage in crowdsourcing are using crowdsourcing *in addition to* (and not *instead of*) other approaches to accomplish work and/or gain competitive advantage. For example, all three organizations listed above – LEGO, Fiat and NASA – have largely relied on their internal R&D while using the crowdsourcing initiative as a complementary way to get ideas (and also to promote brand name). Interestingly, for several years Netflix ran crowdsourcing tournaments aimed at improving the efficiency of DVD recommendations[7] (this is when Netflix was sending DVDs by post based on the wish

[3] The choices are associated with the key questions listed in Fig. 1. We also identify the different stakeholders (included in brackets) for whom each question is relevant.

[4] https://ideas.lego.com/#all

[5] https://www.ideaconnection.com/open-innovation-success/Fiat-Mio-the-World%27s-First-Crowdsourced-Car-00273.html

[6] https://www.nasa.gov/solve/index.html

[7] https://digit.hbs.org/submission/the-netflix-prize-crowdsourcing-to-improve-dvd-recommendations/

lists of their subscribed customers). While Netflix paid a prize of one million dollars for such an algorithm, subsequently the company developed a new distribution channel – online streaming of movies, which meant the end of the DVDs and thus no need for the algorithm. If Netflix had only relied on crowdsourcing to improve their distribution channels, the company would have been out of business. This example shows that crowdsourcing initiatives are *complementary* to internal resources, and that they can become an additional expense rather than a cost-saving opportunity for a firm. Therefore, before an organization embarks on a crowdsourcing journey, it should carefully examine how crowdsourcing fits into – and contributes to – its strategic goals. If crowdsourcing indeed aligns with the strategic goals of the firm, then it is also important to establish how the crowdsourcing initiative is expected to contribute to these goals, and where it fits in relation to other approaches. For instance, neither Netflix nor Lego have shut down internal R&D to become completely reliant on crowdsourcing, but rather use it as an additional way of improving operational efficiencies and ensuring client satisfaction (in the case of Netflix), or to offer new products (in the case of LEGO).

However, to a great extent, the crowdsourcing literature often skips this important decision and moves directly to the decision concerning *how* to crowdsource, implying that a decision *to* crowdsource has already been made. Alternatively, some studies consider the crowdsourcing decision to be a stand-alone decision (Thuan et al., 2016) that concerns a specific task, rather than the organization as a whole[8]. Among the few papers that do address this gap, Afuah and Tucci's (2012) work is worth mentioning as they specifically investigate why and when crowdsourcing should be used to solve problems.

Proposed research direction: How does crowdsourcing as a sourcing strategy fit into a firm's strategic goals, and what is it expected to contribute to these goals? This question should be studied within the context of other organizational capabilities and initiatives.

There is significant potential for future research to develop better understanding of the decision to crowdsource from a broader, organizational perspective, so that crowdsourcing is considered along with other approaches it is expected to complement. One possible link to explore is the mature IS sourcing literature that includes extensive coverage of outsourcing and offshoring decisions from the firm or even industry perspective[9].

Gap 2. How to Evaluate the Success and Value of Crowdsourcing Initiatives?

Given that much of the crowdsourcing literature is concerned with a specific task or problem, it is not surprising that the success of crowdsourcing is usually associated with direct evaluation of crowd submissions. Yet, as we argued earlier (Gap 1), crowdsourcing is likely to complement other approaches to delivering value. Thus, it is important to be able to assess how undertaking crowdsourcing contributes to achieving organizational objectives, i.e., the value it delivers to the firm. For some firms, such value will be associated with continuous engagement of the crowd (customers) (e.g., in a specific innovation platform as in the case of Dell (Bayus, 2013)), while for others it may be the conversion of ideas into actual products (Allen et al., 2018; Nishikawa et al., 2017). In the case of crowdsourcing routine tasks, the added value is likely to be limited to operational benefits via access to cheap labor and more reliance on freelancers who can be hired when needed via crowdsourcing platforms (e.g., Digital Sweatshops and Day-labor Marketplaces (Gol et al., 2019)). However, as firms gain more experience with crowdsourcing of work and platforms that enable and facilitate such work mature, we are likely to see a rise in crowdsourcing of increasingly complex and creative tasks. For example, Gol et al. (2019) foresee value-added crowd employment expanding towards what they call Talent Factory and Talent Marketplaces in the future. In line with these predictions, we anticipate crowdsourcing initiatives will become more strategic in nature, delivering value that contributes to strategic organizational objectives, and not just operational benefits.

Proposed research direction: How should firms evaluate crowdsourcing's contribution toward achieving organizational objectives, and the value (direct and indirect) it delivers to the firm?

One avenue for future research is to distinguish between crowdsourcing objectives associated with one-off crowdsourcing projects versus ongoing crowdsourcing initiatives. The latter are likely to be designed as long-term strategic initiatives aimed at delivering new product ideas (e.g., LEGO, Dell, Swarovski and other examples used throughout the paper). This is in line with Kohler (2015) who argues that crowdsourcing raises a new set of strategic choices related to how value is created and captured. There is potential to move beyond consideration of crowdsourcing as a core approach to creating value, to understand how crowdsourcing fits within business models that do not rely solely on crowdsourcing, but rather consider how crowdsourcing can complement their main value creation approaches.

Gap 3. Horizontal Integration: The Role of Platforms in the IS Crowdsourcing Literature

We believe that a focus on the platform is key to horizontal integration of the crowdsourcing literature. Crowdsourcing platforms are explicitly discussed in many of the studies we reviewed and weave through the different lifecycle stages, albeit to different extents. Further, more so than the firm or the crowd, platforms have also been studied extensively in other contexts, such as two-sided market design and online commerce (e.g., Parker et al., 2016), and thus give rise to research questions at different crowdsourcing lifecycle stages. Platform decisions can impact many aspects of the competition. For example, platforms can be designed to support one-time competitions, or they can be designed to maintain ongoing relationships with the crowd. Further, platforms can enable varying degrees of crowd-crowd and crowd-firm interactions. Finally, platform operators can take varying roles in managing and supporting the crowdsourcing projects, while job providers (i.e., crowdsourcers) may rely on different platform features to effectively govern crowdsourcing projects toward organizational value creation (Gol et al., 2019).

[8] For example, Thuan et al. (2016) define "the decision to crowdsource as a process that evaluates whether crowdsourcing is an appropriate approach to perform particular organizational tasks. In the decision to crowdsource that starts a crowdsourcing activity, organizations need to consider multiple aspects, including organizational contexts, and crowdsourcing benefits, challenges, and capabilities in order to evaluate their readiness to crowdsource" (p. 50).

[9] See overviews of outsourcing literature in Dibbern et al. (2004) and MISQ Curation in IS sourcing (Kotlarsky et al., 2018).

Proposed research direction: A longitudinal examination of the role of platforms throughout the lifecycle of a project, with attention given to interactions among stakeholders in each stage.

The first sub-gap we identify with respect to the study of platforms is positioning. Platform design studies would benefit from better positioning, either within the digital platforms literature (e.g., Constantinides et al., 2018), or linked to the earlier literature on "online marketplaces" (e.g., Gefen and Carmel, 2008) and the "human cloud" (e.g., Kaganer et al., 2013), which discusses what we today refer to as "crowdsourcing platforms". The decision on which literature to connect to should be determined by the specific focus within the broader area of platform design. It might also be of interest for some scholars to try to establish a clear niche dedicated to crowdsourcing platforms. One challenge for these scholars is making sure they do not limit their search to the direct crowdsourcing literature, but look very carefully into alternative terms and applications that have been used over time by researchers in other fields to study such platforms.

A second sub-gap concerns the role of the platform in the crowdsourcing project. The platform can be what it literally is, an enabling digital platform for interactions, or it can play a more substantial role in the project itself (Kaganer et al., 2013; Kohler, 2015). For example, platforms can be used for data collection or as a *methodology* for prototype development and research (e.g., Graham and Mehmood, 2014; Koivisto, 2012; Steelman et al., 2014). A platform can play a more engaged role when it assumes an *intermediary* role and supports managing (rather than just enabling) projects. Research that compares and contrasts the implications of different platform roles is needed in order to understand important decisions throughout the project's lifecycle, and how to link platform features to properties of the task, characteristics of the crowd, or conditions of the project (e.g., Liu et al., 2014; Natalicchio et al., 2017).

The *intermediary* role of platforms raises a third sub-gap concerning the extent of engagement and relationships between the different stakeholders (firm, crowd, and platform). Understanding the dynamics of such relationships would help to develop synergy between studies in future research. We argue that at a high level, there is a difference between crowdsourcing platforms that act as online marketplaces (e.g., Freelancer.com and Amazon Mechanical Turk), platforms that are dedicated to a specific company or community (e.g., IdeaStorm or Challenge.gov), and platforms that take a more prominent role in managing and running competitions (e.g., TopCoder and Kaggle). While in all cases the crowdsourcing platform acts as connector between the focal firm and members of the crowd, interactions between the firm(s) and the crowd will be substantially different. Online marketplaces are typically used to bring together a focal entity and crowd with relevant interests and skills, and they support many-to-many interactions between firm and crowd. Dedicated platforms, however, are designed to support one-to-many interactions between one initiating entity (i.e., the "problem owner", represented by a firm, community or consortium), and many crowd contributors. This high-level distinction between interaction modes supported by different crowdsourcing platforms – many-to-many versus one-to-many, could help researchers to compare and contrast findings reported in studies that have focused on different platform-related issues.

Gap 4. Vertical Integration: Synthesizing Micro-level Insights Using Specific Lenses

A final research gap we wish to highlight in brief is the need for synthesizing many of the insights obtained through the research projects reviewed in this paper, but using specific lenses. In line with the role of a literature review, this paper brings together insights from the literature while maintaining a relatively descriptive focus. Moving forward, researchers could employ specific lenses to study micro-level decisions more coherently.

Proposed research direction: A stronger connection between the micro-level studies through the adoption of clear research lenses. This direction could be explored by applying clear research lenses to study specific question in depth (e.g., multi-level firm-centered studies), or to extend breadth (e.g., large crowd-centered, platform-centered or industry-centered studies).

For example, researchers could examine specific project initiation or management level decisions employing a strategic lens, and considering the best route in terms of value for the firm. Alternatively, researchers could employ a more social lens and study those decisions in terms of their implications for the crowd. Accordingly, by vertical integration we mean the adoption of a single lens to drive micro-level decisions so that they ultimately serve the same macro-level objective. Such research could also span different levels of analysis within an organization, with the top management acting as a "sponsor" or a "champion" of crowdsourcing, while employees are involved in the operational side of initiating and managing internal or external crowdsourcing projects. Alternatively, future studies could examine how crowdsourcing affects specific markets or industries. We provide three examples of such potential integration in the following section on future research.

Opportunities for future research

Our integration of the literature reveals several opportunities for future research.

The first opportunity concerns crowd member's motivation to participate in crowdsourcing projects. In our review, we encountered several models that explain crowd members' participation in crowdsourcing. One set of explanatory variables repeatedly included in many models relates to task attributes such as task autonomy, task significance, or task variety (e.g., Boons et al., 2015; Deng and Joshi, 2016; Franke et al., 2013; Martinez, 2015; Moussawi and Koufaris, 2013; Ye and Kankanhalli, 2017). This implies that firms wishing to engage in successful crowdsourcing should invest significantly in the design of tasks. Yet the studies from the firm's perspective that touch on the design of tasks focus at quite a high level (e.g., Bonabeau, 2009; Morgan and Wang, 2010; Terwiesch and Xu, 2008). There is therefore a significant opportunity to enhance our understanding of task design by developing new models that position task perceptions as their dependent variables and focus on how firms can impact how crowd participants perceive tasks. This research direction resonates with issues raised in recent IS sourcing studies on work design in general, and task representation in particular (e.g., Oshri et al., 2018). Following this route may therefore serve as a bridge to connect the traditional IS sourcing and crowdsourcing literatures.

A second variable that appears in models of crowd participation relates to the design of the platform, for example with regard to transparency (Franke et al., 2013), the ability of crowd members to control their work environment (Deng and Joshi, 2016), provision

of feedback (Boons et al., 2015), and rewards (Ye and Kankanhalli, 2017). Again, our review of the crowdsourcing platform literature did not reveal parallel understanding or discussion on how these features should be designed, thus representing another opportunity for future research. Granted, the platform-focused papers reviewed here are a subset of a broader literature on online platforms and two-sided markets (as previously discussed). We therefore see the opportunity as not in developing brand new models, but rather creating bridges to relevant models in other literature.

Another interesting direction for future research is the control of competitions. Crowdsourcing participants often make a choice between several available contests. What do we know about this choice? Two of the papers we reviewed tackle this issue. Nevo and Tajedin (2016) argue that the choice is based on crowd members' goals and perceptions of the competition, while Mo et al. (2014) attribute task switching to performance and feedback during the competition. Once again, these studies are implying that firms and platforms have the ability to affect participation and draw members to specific tasks if they can influence crowd members' perceptions of task fit (to skills or goals), ongoing performance, and the visibility of other tasks and competitors. An important study in this space focuses on salience bias, which is participants' tendency to rely on the information that is explicitly shown to them (Lee et al., 2018). In the context of Kaggle, the study demonstrated that contestents are indeed biased by the displayed public and private scores, and this effect can be eliminated or at least attenuated by the crowdsourcing platform. Hence, we see an opportunity for both firm-focused as well as platform-focused research to address the presentation of tasks, performance, and competition such that they draw the crowd's attention.

Finally, future research could also focus on the crowdsourcing phenomenon at multiple levels. A specific opportunity we identified through our review is developing a multi-level model of learning from crowdsourcing. Two papers focus on learning as a result of crowdsourcing, one at the individual level (Huang et al., 2014) and one at the firm level (Schlagwein and Bjørn-Andersen, 2014). Here the opportunity lies in creating a multi-level theory of learning from crowdsourcing that incorporates both learning *throughout* the performance of the task as well as *continuous* learning in between contests. To some extent the work by Schlagwein and Bjørn-Andersen (2014) begins to address this question, as they present an "ambient learning" framework that incorporates learning by both members and non-members of the organization. An extension of this work could focus on the mechanisms that transfer learning from individuals to organizations, particularly for the special case of internal crowdsourcing, where participants are all members of the organization. Another link that can be made here is to work on knowledge sharing trajectories (Majchrzak and Malhotra, 2016) and their effect on organizational learning. Overall, learning is an interesting and underexplored outcome of crowdsourcing projects for future research focus. This angle is particularly important in crowdsourcing projects that pursue strategic objectives, as learning may have an impact on short-term and long-term organizational strategy.

Conclusion

In recent years, we have been witnessing a rise in reliance on external parties such as customers, suppliers, users and competitors as sources of innovation (West and Bogers, 2014), or as an approach to reducing the headcount of permanent firm employees by offering microtasks to freelancers via digital labor marketplaces (Gol et al., 2019). To a large extent, such reliance on external sources has been facilitated by the emergence of crowdsourcing as a new sourcing model – the focus of our review paper.

To gain insight into current crowdsourcing research themes and directions, and adopting *sourcing* as the strategic lens, we gathered research that captures crowdsourcing as a stand-alone phenomenon that is related to but also distinct from IS sourcing (Kotlarsky et al., 2018). As a first step, we placed this review within the broader context of the crowdsourcing literature and established boundary conditions for studying crowdsourcing as a strategic IS sourcing phenomenon. To differentiate crowdsourcing from other crowd-involving contexts and activities, we focused our review on the involvement of the *crowd* in the *sourcing* activities of organizations. Within this scope, we conducted in-depth analysis of the literature, aiming to bring together fine-grained insights from existing crowdsourcing research towards developing a high-level, macro-perspective of the crowdsourcing phenomenon and its strategic impact. Specifically, our framework offers a lifecycle perspective that distinguishes between the perspectives of different stakeholders – the focal firm, the crowd, and the platform – and encompasses key questions and choices associated with the crowdsourcing process as it unfolds over time.

The paper offers several important contributions to IS researchers as well as practitioners. First, our "Setting the Scene" section provides a snapshot of the current crowdsourcing literature that spans different contexts where crowdsourcing has been applied, the typologies and classifications that aim to distinguish between different platforms and approaches to engaging with the crowd, and reviews of specific aspects of crowdsourcing. This section sheds light on what has been done within this research domain to date, as well as highlighting some misconceptions and inconsistencies that become evident when trying to view crowdsourcing as an all-inclusive, one-size-fits-all concept. Second, the paper provides a critical review of a select subset of papers published in top academic and practitioner outlets to identify areas of saturation and areas that require further attention. These areas are further addressed in our integration of the literature. Third, our paper identifies four gaps that should be addressed in future research. These gaps are discussed and summarized in four broad research questions spanning the strategic relevance of crowdsourcing initiatives, assessments of the value of crowdsourcing, horizontal integration of research using platforms as the facilitating research lens, and vertical integration of research using specific lenses of interest. We also highlight opportunities for future research that build upon, and add to, existing literature and models. Through these opportunities we identify points of contact where multi-level research and integration of different perspectives can take place. In doing so we provide important insights for the development of theories within the crowdsourcing domain.

Appendix 1. Crowdsourcing types and taxonomies

A bottom-up taxonomy of crowdsourcing platforms by Saxton et al. (2013) classifies 103 popular platforms into nine groups. The taxonomy distinguishes between the different roles the platform can play in supporting a wide range of crowd-involving activities,

including peer-to-peer social financing (e.g., Lendingclub, Kiva), citizen media production (e.g., Artistshare), digital goods sales (e.g., iStock, ShutterStock), as an intermediary between crowdsourcer and crowd (e.g., Amazon Mechanical Turk, Innocentive, eLance, TopCoder), knowledge base building (e.g., Answers.Yahoo, Wikipedia), the Collaborative Science Project Model (e.g., Planetary, reCaptcha), the Consumer Report Model (e.g., AngiesList), the Product Design Model (e.g., Cafepress, Threadless), and the Collaborative Software Development Model (e.g., FossFactory.org).

When measured against the adopted crowdsourcing definition, some of the models in this taxonomy fail to address specific definitional aspects. For example, peer-to-peer social financing and digital goods sales do not involve undertaking a task, while citizen media production and knowledge-base building do not typically have a clearly identified crowdsourcer, or a specific call. Despite the various ways these online platforms enable and facilitate involvement of the crowd, some models do not facilitate engagement in *sourcing*. The intermediary role, however, is a typical example of sourcing that occurs between crowdsourcer and crowd, and meets all the criteria for inclusion in crowd*sourcing*.

We find a similar issue with another taxonomy developed by Boudreau and Lakhani (2013), which addresses three of the definitional criteria – the participative process, the task, and value for the crowdsourcer. This taxonomy distinguishes between different crowdsourcer-crowd interactions in relation to the value the crowdsourcer is expecting to receive, and the nature of the task. Specifically, it defines four ways to use the crowd as a partner through crowdsourcing contests designed to generate high value solutions to complex and novel problems, and in particular, highly challenging technical or creative problems. Collaborative communities allow organizations to aggregate large numbers of diverse contributions and are suited to addressing customer support, creating wikis, or for open collaboration. Complementors offer user generated solutions to product challenges, for example though mashups and apps. Finally, labor markets enable efficient and flexible work, matching talent to task in human computation and repeated tasks. According to the criteria adopted in this paper, crowdsourcing contests and labor markets are clear examples of crowd*sourcing*. However, collaborative communities and complementors only qualify as a sourcing activity if studied in a context that involves a specific project initiated by a crowdsourcer (e.g., Dell or LEGO) in their dedicated collaborative community, or in response to a specific open call that attracts the attention of a number of potential competitors or complementors (e.g., the space poop challenge[10] launched by Nasa in October 2016, or Fiat's "Fiat Mio" project[11] launched in August 2009).

Therefore, while good taxonomies exist to classify crowdsourcing models from the bottom up (i.e., by classifying observed models into emerging groups), there is a degree of misalignment between these taxonomies and our definitional criteria. One way to overcome this issue is to examine typologies, which are similar to taxonomies but based on conceptual classification criteria rather than empirically derived (Bailey, 1994). For example, Malone et al. (2010) classify collective intelligence projects according to four building blocks: (1) what is being crowdsourced?; (2) who is performing the task?; (3) why do people do this?; and (4) how is the task being done? They define various combinations of attributes for the above four building blocks, which they refer to as genes ("a particular answer to one of the key questions (What, Who, Why or How) associated with a single task in a collective intelligence system" (p.22)). Hence, Wikipedia will have a different genome to Threadless or Innocentive. The genome concept is appealing in that it provides a simple approach to crowdsourcing classification. However, as the authors themselves note, additional work is needed to identify all the different genes. With regard to our adopted definition, we note that our focus in this paper is on clearly defined task goals (what), performed by the crowd (who), where compensation is clear (why), and the process is participative and follows an open call (how). Hence, there is a good fit between this framework-based typology and our adopted definition.

In a similar vein, Geiger et al. (2012) focus on crowdsourcing information systems, specifically whether the system seeks homogeneous or heterogeneous contributions, and whether the value it seeks is derived from a combination of all contributions (emergent), or from individual submissions (non-emergent). The four archetypes of crowdsourcing information systems identified are: crowd processing systems or micro-sourcing (homogeneous contributions, non-emergent value); crowd rating systems (homogeneous, emergent value), such as review ratings and online opinion panels; crowd solving systems (heterogeneous, non-emergent value) such as Kaggle; and crowd creation systems (heterogeneous, emergent value), such as YouTube, iStock, and Wikipedia. Again, in light of our definitional criteria, the emergent value models in which the individual's contribution only delivers value as part of the collective contribution as a whole fall short in delivering a clear value to the crowdsourcer, and provide only abstract compensation to individuals. Such models therefore do not fit within the boundaries of our review.

Finally, Simula and Ahola (2014) divide crowdsourcing projects into internal and external projects. They then differentiate between three external models: a community crowdsourcing model, which they identify as most similar in nature to open source communities (although it can be mediated by an intermediary, as in the example of TopCoder); an open crowdsourcing model, where the challenge is open to all; and a brokered crowdsourcing model, where the task is delegated to the crowd *only* through the intermediary (the example cited here is Innocentive). Because one cannot categorically argue that internal crowdsourcing is presented as an "open call" that reaches outside organizational boundaries, we view internal crowdsourcing models as analogous to – but not fully in line with – the definition of crowdsourcing used in this paper. We therefore focus our attention only on external crowdsourcing in this review.

Appendix 2. The focus and limitations of crowdsourcing reviews

The growing popularity of crowdsourcing is also reflected in the number of review papers published between 2012 and 2019. We took a close look at these reviews to map them against the boundaries of the IS sourcing phenomenon, and the definition of

[10] https://www.nasa.gov/feature/space-poop-challenge

[11] https://www.ennomotive.com/making-the-first-crowdsourced-car-fiats-journey/

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Table A2
Overview of review papers.

Title (authors, year)	Journal	Focus	# of papers	Review objective	Review Structure	Key insights
(i) Positioning crowdsourcing in relation to other concepts						
Crowdsourcing in business and management disciplines: an integrative literature review (Hossain, 2015)	Journal of Global Entrepreneurship Research	Relationship to open innovation	50	Contextual review: Review crowdsourcing literature to understand its relationship with the open innovation concept.	Overall trends followed by review of conceptual papers, qualitative papers, quantitative papers, mixed methods, and managerial studies.	Concludes that crowdsourcing should not fall under the umbrella of open innovation. The article provides practical advice for organizations looking to crowdsource.
Crowdsourcing and organizational forms: Emerging trends and research implications (Palacios et al., 2016)	Journal of Business Research	Relationship to organizational forms	43	Descriptive review: Investigate new organizational forms and how they communicate the value of a particular project. Study how organizations acquire resources through crowdsourcing initiatives.	Papers are reviewed according to: (a) use of theoretical construct, (b) level of analysis for crowdsourcing (e.g., micro- or *meso*-level), (c) the use of research framework, and (d) future research contributions.	The paper presents insights on problem solving, learning paradigms, open innovation programs, new product development, and collaborative initiatives.
Evaluation on crowdsourcing research: Current status and future direction (Zhao and Zhu, 2014)	Information Systems Frontiers	CS research focus, compared with open innovation and open source	55	Identify research gaps: Provide an overview of types of theories used in crowdsourcing studies; research methods; research foci; and conceptualization.	Assessment of current studies by: authorship and audience; theoretical foundations; research methods; research foci (using high frequency words); the conceptualization focus (CS with respect to related concepts); the system focus; and the application focus.	Summarizes insights along three interlocking circles: participants, organizations, and systems. Offers future research directions under each to extend the studies reviewed. Comparing crowdsourcing with open innovation, the authors highlight a different focus on the innovation process between the two models, and they further note that different stakeholders typically participate in these two models. They also present some philosophical differences between crowdsourcing and the open source paradigm.
(ii) Broad Descriptive reviews						
Crowdsourcing: A Review and Suggestions for Future Research (Ghezzi et al., 2018)	International Journal of Management Reviews	General review	121	Conduct a review of existing knowledge relating to crowdsourcing. Investigate crowdsourcing from an input-process-output (I-P-O) perspective.	Input-process-output.	Provides descriptive statistics for the 121 articles reviewed; examines definitions and taxonomies; summarizes knowledge on tasks, management, and technologies in line with the I-P-O framework. Based on the findings of the review, the authors suggest research questions for future studies.
Crowdsourcing: a comprehensive literature review (Hossain and Kauranen, 2015)	Strategic Outsourcing An International Journal	General review	346	Explore the development of crowdsourcing literature.	Foci, Loci, Salient empirical studies, application areas.	Provides a broad and high level view of the crowdsourcing literature.
(iii) Narrow reviews that focus on a specific component of crowdsourcing			175			

(*continued on next page*)

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Table A2 (*continued*)

Title (authors, year)	Journal	Focus	# of papers	Review objective	Review Structure	Key insights
Towards an integrated crowdsourcing definition (Estellés-Arolas and González-Ladrón-de-Guevara, 2012)	Journal of Information Science	Definitions of crowdsourcing		To form an exhaustive and global definition that describes any given crowdsourcing activity.	The definition is structured around eight criteria: About the crowd: 1. Who forms it. 2. What they have to do. 3. What they get in return. About the initiator: 1. Who it is. 2. What they get in return for the work of the crowd. About the process: 1. The type of process it is. 2. The type of call used. 3. The medium used.	Beyond the new definition, they also review tools that qualify as crowdsourcing under their new definition. This analysis excludes YouTube, Flickr, and Delicious as crowdsourcing tools, and Wikipedia is weakly defined as such.
Understanding crowdsourcing projects: A systematic review of tendencies, workflow, and quality management (Neto and Santos, 2018)	Information Processing & Management	Crowdsourcing (CS) projects workflow	76 projects (in 72 papers)	Present classifications and trends regarding the crowd, tasks, platforms, task results, products generated, and quality management in CS projects; highlight the main concerns of CS projects.	Crowd composition, incentives offered, tasks performed, product generated. In addition, they examine the purpose of the platform used and quality management.	The paper offers practical insights for managers planning crowdsourcing projects.
Factors influencing the decision to crowdsource: A systematic literature review (Thuan et al., 2016)	Information Systems Frontiers	Decision to crowdsource	50	Address the manager's view to investigate the decision to crowdsource.	Extracts data from the papers reviewed focusing on factors that impact the decision to crowdsource.	The factors include task attributes, availability of crowd, risks, infrastructure, management expertise, budget, and lack of internal resources. The authors then organize these factors in a framework consisting of four layers: environment, management, human capital, and task.
Crowdwork platform governance toward organizational value creation (Gol et al., 2019)	Journal of Strategic Information Systems	Platform governance	78	Explore the relationship between platform governance mechanisms and organizational value creation in crowdsourcing that involves "digital employment" for completion of micro-tasks.	Mechanisms, drivers, and outcomes.	Offers a theoretical model and corresponding propositions that link drivers to specific platform mechanisms and subsequently to value outcomes for the crowdsourcer.
(iv) Applications of crowdsourcing in IS contexts						
Crowdsourcing for data management (Crescenzi et al., 2017)	Knowledge and Information Systems	Data management	37 Proposals	Lessons learned: Classify features that characterize proposals for the use of crowdsourcing in data management; provide detailed illustration of the state of the art in crowdsourced data management.	The authors develop data management dimensions including the data management task, optimization goal, role of the crowd, type of interaction, noise management, worker scoring, and task composition.	The authors provide an in-depth survey of crowd-based proposals for data management. The broad survey is followed by case studies to demonstrate specific applications.
Information Visualization Evaluation Using Crowdsourcing (Borgo et al., 2018)	Computer Graphics Forum	Visualization	190 experiments reported in 82 papers	Lessons learned: Capture the practices of crowdsourcing evaluations for visualization. Understand issues surrounding research design, methods, tasks, tools, and measures in crowdsourcing studies.	Experiments are tagged and discussed using the following dimensions: study design and procedure; task types; participants; measures and metrics; quality assurance; reproducibility.	The paper offers an in-depth summary of the process of crowdsourced user experiments. The authors systematically address each step and sub-step in the studied process.

crowdsourcing adopted. We distinguished four types of reviews: (i) reviews that focus on positioning crowdsourcing in relation to other concepts such as open innovation (Zhao and Zhu, 2014; Hossain, 2015) and organizational forms (Palacios et al., 2016); (ii) broad descriptive reviews that integrate the crowdsourcing literature from an input-process-output perspective (Ghezzi et al., 2018), and explore the development of crowdsourcing literature (Hossain and Kauranen, 2015); (iii) narrow reviews that focus on a specific component of crowdsourcing, such as crowdsourcing definitions (Estellés-Arolas and González-Ladrón-de-Guevara, 2012), governance in crowdsourcing that involves "digital employment" for completion of micro-tasks (Gol et al., 2019), factors influencing the decision to crowdsource (Thuan et al., 2016), and understanding crowdsourcing project workflow (Neto and Santos, 2018); and (iv) reviews of specific IS contexts where crowdsourcing has been applied, such as data management (Crescenzi et al., 2017) and visualization (Borgo et al., 2018). Table A2 provides a detailed overview of these review papers.

These reviews provide a bird's-eye view of the state of crowdsourcing research, as well as breaking down the crowdsourcing phenomenon into specific components to reveal its anatomy (e.g., decisions (Thuan et al., 2016) and governance mechanisms (Gol et al., 2019)). The result is a broad but somewhat disjointed view of the literature.

The positioning review papers (category i) place the crowdsourcing literature within its broader context, but lack a focus on crowdsourcing as a stand-alone phenomenon. While the broad reviews (category ii) do have this focus and offer a descriptive view of the crowdsourcing literature, they are typically underpinned by the use of the term "crowdsourcing" as an umbrella term. However, as we highlighted in the previous sections, when used in this way, the term suffers from conceptual ambiguity and is not granular enough to understand specific crowdsourcing models. Because they cater to a very broad literature, these reviews are further structured to describe common denominator components such as definitions and taxonomies, tasks, management, and supporting technologies. They therefore lack the nuances that can be gained by a more focused view of specific crowdsourcing models.

The narrow reviews (category iii), on the other hand, provide a thorough analysis of very specific crowdsourcing components, for example reviewing papers on the decision to crowdsource, crowdsourcing definitions, or platform governance. These papers zoom in to provide a detailed view of specific components, but they lack a holistic view of the crowdsourcing phenomenon and linkages between the different bodies of literature. Similarly, the specialized reviews (category iv) focus on specific application domains and have limited generalizability.

The review provided in this paper is broader than the last two categories (narrow and specialized reviews), yet it still has a clear focus and boundaries, as we examine the literature on crowdsourcing as a stragetic sourcing model. Further, as distinct from the first two categories (positioning and broad reviews), we delineate the boundaries of our phenomenon of interest and position it within the IS field.

Appendix 3. Coverage of mainstream is journals in ABI/INFORMS

	Source[1]	Inclusion in ABI/INFORM[2]	Manual search
1.	European Journal of Information Systems	1991-Nov 2017	From 2017
2.	Information Systems Journal	Full Coverage from 2004 to 2019	.
3.	Information Systems Research	1993–2015	From 2015
4.	Journal of AIS	NA	Full search
5.	Journal of Information Technology	Full coverage since 1986	
6.	Journal of MIS	1993–2016	From 2016
7.	Journal of Strategic Information Systems	NA	Full search
8.	MIS Quarterly	Full Coverage since 1985–2019	
9.	Decision Sciences	Full coverage since 1976	
10.	Decision Support Systems	Full coverage since 1985	
11.	Information and Management	1981-Nov 2016	From 2016
12.	Information and Organization	NA	Full search
13.	Information Systems Frontiers	Full coverage since 1999	

[1]Journals 1–8 are included in the Senior IS Scholar Basket of journals, journals 9–13 are typically considered as mainstream IS journals, and thus included in the manual check.
[2]Last checked on May 3, 2019

Appendix 4. Criteria for including papers in the critical review

To decide which papers from the scoping review (phase 1) should be also included in the critical review (phase 2), we established criteria based on the following four key quality benchmarks:

Mainstream North American and English-language European IS journals and full papers from the major IS conference. These included[12]:

- European Journal of Information Systems
- Information Systems Journal
- Information Systems Research
- Journal of AIS

[12]The first eight journals are those included in the Senior Scholars' Basket of Journals, listed alphabetically (http://aisnet.org/?SeniorScholarBasket)

- Journal of Information Technology
- Journal of MIS
- Journal of Strategic Information Systems
- MIS Quarterly
- Decision Sciences
- Decision Support Systems
- Information and Management
- Information and Organization
- Information Systems Frontiers
- International Conference of Information Systems (ICIS)

Mainstream North American and English-language European management journals. To ensure we could narrow down the selection of papers for inclusion in the scoping review without missing out high quality publications from different disciplines, we defined the following criteria for selecting general management journals: the journal must be on at least one of the following lists:

- Inclusion in the Financial Times top 50 business journals: https://www.ft.com/content/3405a512-5cbb-11e1-8f1f-00144feabdc0?mhq5j = e6
- A 4*/4 rating in the ABS Academic Journal Guide: https://charteredabs.org/academic-journal-guide-2018/

Given that crowdsourcing is widely associated with innovation, we included journals from the list of Top 25 Innovation Journals (reported in Linton and Thongpapanl (2004); used in the literature review by West and Boger (2014).

Finally, we added the most popular applied management journals[13], such as:

- Harvard Business Review
- California Management Review
- Sloan Management Review

Based on these selection criteria, we went through the list of journals in which papers included in the scoping review are published, and excluded papers published in journals that do not meet this criteria. This left us with 77 journal papers and 22 conference papers (see Appendix 5).

Appendix 5. List of papers included in the critical review

1. Afuah, A., Tucci, C.L., 2012. Crowdsourcing as a Solution to Distant Search. Acad. Manage. Acad. Manage. Rev. 37, 355–375.
2. Alam, S.L., Campbell, J., 2013. Dynamic Changes in Organizational Motivations to Crowdsourcing for GLAMs, in: Thirty Fourth International Conference on Information Systems. pp. 1–17.
3. Allen, B.J., Chandrasekaran, D., Basuroy, S., 2018. Design Crowdsourcing: The Impact on New Product Performance of Sourcing Design Solutions from the “Crowd.” J. Mark. 82, 106.
4. Amrollahi, A., Rowlands, B., 2017. Collaborative open strategic planning: a method and case study. Inf. Technol. People 30, 832–852.
5. Barnes, S.-A., Green, A., Hoyos, M., 2015. Crowdsourcing and work: individual factors and circumstances influencing employability. New Technol. Work. Employ. 30, 16–31.
6. Bauer, J., Franke, N., Tuertscher, P., 2016. Intellectual property norms in online communities: How user-organized intellectual property regulation supports innovation. Inf. Syst. Res. 27, 724–750.
7. Bayus, B.L., 2013. Crowdsourcing New Product Ideas over Time: An Analysis of the Dell IdeaStorm Community. Manage. Sci. 59, 226–244.
8. Bergvall-Kareborn, B., Howcroft, D., 2014. Amazon Mechanical Turk and the commodification of labour. New Technol. Work. Employ. 29, 213–223.
9. Blohm, I., Riedl, C., Füller, J., Leimeister, J.M., 2016. Rate or Trade? Identifying Winning Ideas in Open Idea Sourcing. Inf. Syst. Res. 27, 27–48.
10. Blohm, I., Shkodran, Z., Bretschneider, U., Leimeister, J.M., 2018. How to Manage Crowdsourcing Platforms Effectively? Calif. Manage. Rev. 60, 122–149.
11. Bockstedt, J., Druehl, C., Mishra, A., 2015. Problem-solving effort and success in innovation contests: The role of national wealth and national culture. J. Oper. Manage. 36, 187.
12. Bonabeau, E., 2009. Decisions 2.0: the Power of Collective Intelligence. MIT Sloan Manage. Rev. 50, 45–52.
13. Boons, M., Stam, D., Barkema, H.G., 2015. Feelings of Pride and Respect as Drivers of Ongoing Member Activity on Crowdsourcing Platforms. J. Manage. Stud. 52, 717.
14. Chiu, C.-M., Liang, T.-P., Turban, E., 2014. What can crowdsourcing do for decision support? Decis. Support Syst. 65, 40.
15. Chua, R.Y.J., Roth, Y., Lemoine, J.-F., 2015. The Impact of Culture on Creativity: How Cultural Tightness and Cultural Distance Affect Global Innovation Crowdsourcing Work. Adm. Sci. Q. 60, 189.
16. Dalle, J.-M., Besten, M. Den, Martínez, C., Maraut, S., 2017. Microwork platforms as enablers to new ecosystems and business

[13] This is in line with journal selection as described in Dibbern et al. (2004). MIT Sloan Management Review and Harvard Business Review are also included in the FT50 list.

models: the challenge of managing difficult tasks. Int. J. Technol. Manage. 75, 55.
17. de Mattos, C.A., Kissimoto, K.O., Laurindo, F.J.B., 2018. The role of information technology for building virtual environments to integrate crowdsourcing mechanisms into the open innovation process. Technol. Forecast. Soc. Change 129, 143.
18. Deng, X. (Nancy), Joshi, K.D., Gallier, R.D., 2016. The Duality of Empowerment and Marginalization in Microtask Crowdsourcing: Giving Voice to the Less Powerful Through Value Sensitive Design. MIS Q. 40, 279.
19. Deng, X. (Nancy), Joshi, K.D., 2016. Why Individuals Participate in Micro-task Crowdsourcing Work Environment: Revealing Crowdworkers' Perceptions. J. Assoc. Inf. Syst. 17, 648–673.
20. Dissanayake, I., Mehta, N., Palvia, P., Taras, V., Amoako-Gyampah, K., 2019. Competition matters! Self-efficacy, effort, and performance in crowdsourcing teams. Inf. Manage. Forthcomin.
21. Dissanayake, I., Zhang, J., Yasar, M., Nerur, S.P., 2018. Strategic effort allocation in online innovation tournaments. Inf. Manage. 55, 396–406.
22. Dissanayake, I., Zhang, J., Gu, B., 2015. Task Division for Team Success in Crowdsourcing Contests: Resource Allocation and Alignment Effects. J. Manage. Inf. Syst. 32, 8.
23. Du, W.D., Mao, J.Y., 2018. Developing and maintaining clients' trust through institutional mechanisms in online service markets for digital entrepreneurs: A process model. J. Strateg. Inf. Syst. 27, 296–310.
24. Ebner, W., Leimeister, J.M., Krcmar, H., 2009. Community engineering for innovations: the ideas competition as a method to nurture a virtual community for innovations. R D Manage. 39, 342.
25. Fayard, A.L., Gkeredakis, E., Levina, N., 2016. Framing innovation opportunities while staying committed to an organizational epistemic stance. Inf. Syst. Res. 27, 302–323.
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28. Fréry, F., Lecocq, X., Warnier, V., 2015. Competing With Ordinary Resources. MIT Sloan Manage. Rev. 56, 69–77.
29. Frey, K., Lüthje, C., Haag., S., 2011. Whom should firms attract to open innovation platforms? The role of knowledge diversity and motivation. Long Range Plann. 44, 397–420.
30. Füller, J., Hutter, K., Hautz, J., Matzler, K., 2014. User Roles and Contributions in Innovation-Contest Communities. J. Manage. Inf. Syst. 31, 273.
31. Gatzweiler, A., Blazevic, V., Piller, F.T., 2017. Dark Side or Bright Light: Destructive and Constructive Deviant Content in Consumer Ideation Contests. J. Prod. Innov. Manage. 34, 772–789.
32. Geiger, D., Schader, M., 2014. Personalized task recommendation in crowdsourcing information systems - Current state of the art. Decis. Support Syst. 65, 3.
33. Glaeser, E.L., Hillis, A., Kominers, S.D., Luca, M., 2016. Crowdsourcing City Government: Using Tournaments to Improve Inspection Accuracy. Am. Econ. Rev. 106, 114–118.
34. Gong, Y., 2017. Estimating participants for knowledge-intensive tasks in a network of crowdsourcing marketplaces. Inf. Syst. Front. 19, 301–319.
35. Hofstetter, R., Aryobsei, S., Herrmann, A., 2018. Should You Really Produce What Consumers Like Online? Empirical Evidence for Reciprocal Voting in Open Innovation Contests. J. Prod. Innov. Manage. 35, 209–229.
36. Hofstetter, R., Zhang, J.Z., Herrmann, A., 2018. Successive Open Innovation Contests and Incentives: Winner-Take-All or Multiple Prizes? J. Prod. Innov. Manage. 35, 492–517.
37. Hoornaert, S., Ballings, M., Malthouse, E.C., Van den Poel, D., 2017. Identifying New Product Ideas: Waiting for the Wisdom of the Crowd or Screening Ideas in Real Time. J. Prod. Innov. Manage. 34, 580–597.
38. Hu, Q., He, Q., Huang, H., Chiew, K., Liu, Z., 2016. A formalized framework for incorporating expert labels in crowdsourcing environment. J. Intell. Inf. Syst. 47, 403–425.
39. Huang, Y., Singh, P.V., Srinivasan, K., 2014. Crowdsourcing New Product Ideas Under Consumer Learning. Manage. Sci. 60, 2138–2159.
40. Hutter, K., Füller, J., Hautz, J., Bilgram, V., Matzler, K., 2015. Machiavellianism or Morality: Which Behavior Pays Off In Online Innovation Contests? J. Manage. Inf. Syst. 32, 197.
41. Karger, D.R., Oh, S., Shah, D., 2014. Budget-Optimal Task Allocation for Reliable Crowdsourcing Systems. Oper. Res. 62, 1–24.
42. Kohler, T., 2015. Crowdsourcing-Based Business Models: How to Create and Capture Value. Calif. Manage. Rev. 57, 63–84.
43. Kohler, T., 2018. How to Scale Crowdsourcing Platforms. Calif. Manage. Rev. 60, 98–121.
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