Clustering, Chainstorming, and Cheatstorming: a Method for Optimizing Ideas Selection in Crowdsourcing

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1. INTRODUCTION

This paper presents an early-stage application of the design science research (DSR) method [Hevner et al. 2004] to obtain a new idea selection approach, which uses clustering to filter ideas while taking into account the seeker's goals and the learning dynamics. Most of previous researches has considered the idea provider as main subject of analysis. Instead, we focus on the bounded rationality of the solution seeker. Seekers often estimate that the main cost of an idea challenge comes from the reward itself; yet, making mistake in the selection process and picking the wrong idea might result in the seeker wasting time and money. Thus, we argue that the research contribution can be classified as "exaptation" [Gregor and Hevner 2013], a known solution to a new problem. To do so, we consider crowdsourcing as the search for new sources of innovation or solutions for challenges faced by an organization [Majchrzak and Malhotra 2013; Afuah and Tucci 2012]. Thus, our kernel knowledge comes from the notion of learning in idea competitions [2009, p.202] that are "distant" (that is looking also outside its established boundaries [Afuah and Tucci 2012]), investigating its effects on seekers. Moreover, our suggested method extends the use of two solutions for brainstorming [2013]: (a) *chainstorming*, where participants have to use ideas from a previous brainstorming to solve a new problem and (b) *cheatstorming*, where participants can't use new ideas but only the ones from previous brainstorming.

2. THEORETICAL BACKGROUND

In the last two decades, open innovation [Chesbrough and Bogers 2014] has been more and more considered by private and public organizations [Viscusi et al. 2015] as a way to obtain competitive advantage or public value [see, e.g., Cordella et al. 2018] through the exploitation of the opportunities and capabilities offered by digitalization [Yoo 2013; Tilson et al. 2010; Kohli and Melville 2018] as well as a means of exploration of alternative solutions for research and development. Among the phenomena related to open innovation, in this article we will consider what Schlagwein et al. [2017] identify as a specific definition of openness in terms of participatory processes, either "collaborative or competitive" (*ibid*, p. 299), that could take place "with" or "without it" . Among the forms "openness with it" [Schlagwein et al. 2017], crowdsourcing through digital platforms has received an increasing attention as a way to exploit collective intelligence for innovation as well as to improve performance of organizations [Malone and Bernstein 2015; Woolley et al. 2015; Riedl and Woolley 2016]. As to this issue, crowdsourcing raised interest among practitioners and scholars especially for the opportunities in terms of economies of scale and scope derived by the tokenization of work and the adoption of collective contests for ideas searching and problem solving through crowdsourcing [Afuah and Tucci 2012; Afuah et al. 2018; Boudreau and Lakhani 2013; Felin et al. 2015]. Moreover, we are considering crowdsourcing from the specific lens of *crowd-driven innovation* [Afuah et al. 2018; Viscusi and Tucci 2018] as the search for new sources of innovation or solutions for challenges faced by an organization [Li et al. 2012; Katila and Ahuja 2002; Rhyn et al. 2017; Afuah and Tucci 2012]. This search can either be "local", relying on internal resources to an organization, or "distant", when looking also outside its established boundaries [Afuah and Tucci 2012; Fayard et al. 2016; Jeppesen and Lakhani 2010], with a consequent often implicit distinction between "internal" and "external" crowdsourcing

[Zuchowski et al. 2016]. This distinction in the different forms of search has been often considered overlapped with the "exploitation" vs. "exploration" opposition in organizational learning [March 1991], linking innovation to the latter and consequently to distant search and eventually to external crowdsourcing. Whereas, studies like the one on the search depth and scope in new products search by Katila and Ahuja [2002, p.1191] have shown how also exploitation contribute to innovation through combining in new ways existing solutions. These issues have been further explored at the state-of-the art research in crowdsourcing in the management information systems field, where, e.g., Rhyn et al. [2017] analyze the role of network ties in the usefulness and novelty of a contribution as well as the importance the recombination of solutions with local knowledge through their discussion and development by the crowd (*ibid*, p.13). Furthermore, the combining of crowd and experts in decision-making has been subject of research and questions [Bonazzi et al. 2017]. Taking these issues into account, web-based idea competitions such as Innocentive has already been proven successful at gathering a large set of solvers to address complex problems [Lakhani et al. 2013]. Nevertheless, Majchrzak & Malhotra [2013] in their analysis of the potential contribution of the information systems research to crowdsourcing innovation they question the challenges to an effective implementation of "crowdsourced co-creation" into an architecture suitable to enforce participation in innovation (p. 264). According to Majchrzak & Malhotra [2013, p.264] this is related to three key tensions of this kind of architecture, spanning from i) coopetition, ii) the timing of innovation bounded by the limited time required for actions in crowd challenges, and iii) the lack of deep acquaintance and familiarity among their members. It is worth noting that these tensions lose their strength and relevance when a distinction is made between the characteristics of communities (sensitive to them) and crowds, where goal-oriented coopetition, seriality, and anonymity are the innovation drivers as argued by Viscusi & Tucci [2018]. The presence of these tensions and the need for further understanding of crowds' characteristics have a practical complement in the missing compliance by online or information technology (it) challenge with requirements for active participation of the involved users [Leimeister et al. 2009; Blohm et al. 2017; Blohm et al. 2013]. As to these issues Leimeister et al. [2009, p.202] propose a model for supporting active participation in ideas competitions and identify, first, six main characteristics that are common to the initiatives carried out at the time of their research (*task specificity*, *degree of idea elaboration*, *organizational appearance*, *time line*, *incentives*, and *target group*) together with a set of external motives for participation, i.e. *learning*, *direct compensation*, *self-marketing*, and *social motives* as well as their related incentives (*ibid*. P.206). In this paper we focus on learning, especially investigating its effects on seekers rather than on solvers (see also the argument in section 5), which have often been the main subject of interests for the literature here discussed. Furthermore, Bullinger et al. [2010] have reviewed 52 publications on ideas competition and identified 10 design elements for ideas competition, noticing the most common combination is: an (1) online idea competition (2) initiated by a firm (3) that sets a medium amount of specificity concerning the required tasks, which can range from (4) ideas, sketches, concepts, prototype, and working solution, for a (5) specific target group of (6) individuals that (7) competes and cooperates thanks to community functions in the online platform, for (8) a large amount of time, (9) in exchange of a mix between monetary and non-monetary rewards that are given by (10) a jury of experts. With respect to the process used to generate ideas, we refer to Faste et al. [2013], who compared classic brainstorming with two new solutions: (a) *chainstorming*, where participants have to use ideas from a previous brainstorming to solve a new problem and (b) *cheatstorming*, where participants cannot use new ideas and can only use ideas from previous brainstorming. Since performance of cheatstorming seems to outperform the other options, the authors suggested that idea generation is less about idea and more about dealing with cultural influence exerted by unconventional ideas on the ideating team.

3. THE ARTEFACT

Our method is composed of four phases, combining both chainstorming and cheatstorming, contrary to the state of the art literature, which considers them as separate alternatives [2013]. In the *Phase 1* (*Idea Generation*) each idea receives a unique identification number associated with the unique id of the user. Then, by means of automatic classification through text mining, the ideas are assigned to clusters showing the "stance" of each idea: for example, "behavioral" vs. "technical" oriented idea (*Phase 2 – Idea Clustering*). The first idea of each cluster is then selected, the associated players win a prize and are invited for *chainstorming* (*Phase 3*). In this step, the ideas are assessed by evaluators. A standard idea challenge would reward the best idea. Nonetheless, that would require an expert assessment of all ideas, whereas our model allows assessing only the pooled ideas, which are the sum of possible combinations among ideas selected in Phase 1. This leads to the first testable proposition:

P1: *automatic clustering of ideas and random selection significantly reduce the number of ideas to assess but it decreases the quality of the outcome.*

Then, we could set up a *cheatstorming* competition in *Phase 4* that uses the pool of ideas created in previous contests. These ideas would have not been retained in Phase 2, but they now perfectly fit the narrow problem of the client. Moreover, the number of pooled ideas might be significant in this step, but still below the number of ideas to assess by experts in a standard idea challenge. That leads to the second testable proposition as follows:

P2: *collection of ideas done in a previous challenge increases the quality of the outcome but it increases the number of ideas to assess.*

The propositions have been tested through a simulation. As to *P1*, it has shown that the cost for idea assessment is significantly lower, since there are only a limited number of possible combinations to evaluate. As for *P2*, the simulation confirmed that with a large set of agents it would be theoretically possible to receive a number of ideas to assess that is greater than the initial number. In future work we will investigate the learning dynamics at the seeker side, summarized in Figure 1 through the metaphor of a person looking for the right configuration of battery power (*consumption of resources*) and signal bandwidth for its mobile (*different degrees of learning* due to the diversity of sources accessed for the ideas).

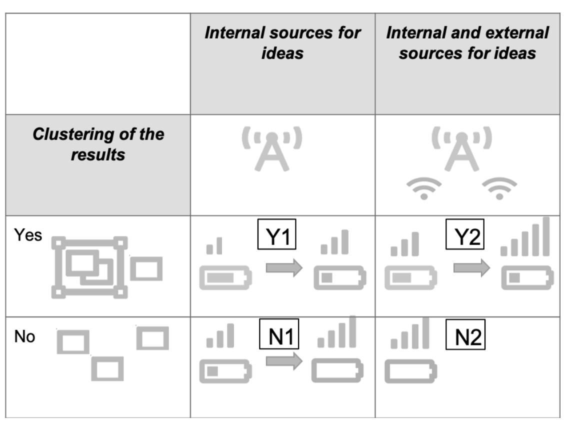

Fig. 1. Learning dynamics in clustering of ideas (a mobile phone metaphor).

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