Crowd Dynamics in Small Teams in Higher Education

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1. INTRODUCTION

This article aims to empirically study "crowd" dynamics in small teams and complement the work presented in Tucci et al. [2016], and Tucci and Viscusi [2017]. As in previous papers, we use as theoretical lens the framework and related typology of "crowd" dynamics discussed in Viscusi and Tucci [2015; 2018]. The framework considers the number of participants a sufficient, but not necessary condition for crowdsourcing, and distinguishes different types of crowd dynamics according to their *growth tendency*, degree of *seriality* and the intervening role of properties such as, e.g., *density*, *equality*, and *goal orientation* for distinguishing the distribution of agents within and between the different types of "crowds", namely between *communities*, *open crowds* (*multitudes* [Virno 2004] e.g., Twitter users), *closed crowds* (controlled by intermediaries, such as, e.g., Innocentive that restrict growth and provide self-established boundaries), groups as *crowd crystals*, potentially leading to any of the others. Furthermore, as in previous papers, another goal of the study is to provide the setting for experiments in business domains to investigate how crowd characteristics may lower or increase "crowd capital," here defined as *the total number of crowd units having a demonstrated effectiveness in idea generation or task achievement* [Tucci et al. 2016]. This definition adopts a more outcome-oriented perspective compared to other definitions emerging from this research stream [Lenart-Gansiniec 2016]; thus, our definition complements the conceptualization by Prpić & Shukla [2013, p.35035] and Prpić et al.[2015].

Finally, the article aims to contribute to the research on coordination in temporary groups [Valentine and Edmondson 2014] as well as on how dynamically assemble and managing paid experts from the crowd through flash teams [Retelny et al. 2014].

2. THE STUDIES

This paper discusses four studies carried in 2015, 2016, and 2017 in higher education institutions in Italy and Switzerland. A pilot study was carried out in the 2015 winter semester at the College of Management of the École Polytechnique Fédérale de Lausanne (EPFL) [Tucci et al. 2016]. From November 16th to December 9th, students in a Master's course in IT and e-Business Strategy were involved in a crowdsourcing exercise. The goal of the competition was to identify a business model for a new company, discussing it and motivating it in a text of 3000 characters. The challenge was divided into 3 phases:

- *Submit*: every group advanced its proposal. Each user was randomly assigned a temporary identity to avoid any biases concerning the identity of participants.
- *Vote*: each user was asked to vote on the other groups' proposals. While voting, each user could save comments on the proposals, which were published only during the Discuss phase.
- *Discuss*: each user was asked to comment on the other proposals.

The 30 students were asked to form six groups of five. The groups were made up of people with different background, with participants from the management course working with people from Life science, Engineering, Computer Science, Chemistry, Architecture, etc. Every group had to elect a captain, i.e., the editor of the group's proposal. The captain could amend her/his group's proposal

during the *Submit* phase and/or during the *Discuss* phase. Posting, voting, commenting was recognized as class participation. Participants' names were disguised using anonymous IDs. At the end of the challenge, the top group was given a symbolic prize and the maximum grade for this part of the exam. The pilot as well as the subsequent two crowdsourcing exercises (discussed below) have been carried out via the OXWAY platform (https://oxway.co), a crowdsourcing and collective intelligence platform from a start-up based in Milan, Italy and London, UK, while the fourth study has been carried out via the VIIMA platform (https://www.viima.com/), an open innovation platform from Viima Solutions Oy, a company based in Espoo, Finland. The results for the pilot study were discussed in Tucci et al. [2016], and can be summarized as follows. During the *voting* phase, the individuals were anonymous and ignored the instruction to only vote for the other groups; thus, they favored their own projects, defending their own proposals and giving them higher votes than the others. In general, despite the limited number of members and their mutual acquaintance from the class the groups acted as *crowd crystals* oriented to *crowd* types rather than as a *community* with factors such as identity, membership, or friendship seeming less relevant with regard to the unifying focus on the outcome: having the winning proposal supported individually by the group members and without reference to real team coordination. The same format of the pilot was applied for two other studies. In what follows we discuss the next two studies on crowdsourcing exercises carried out always through the OXWAY platform following the same structure as the pilot study, see also the discussion in Tucci and Viscusi [2017].

The second study was carried out in the 2015 spring semester at the Department of Informatics Systems and Communication (DISCo) of the University of Milano-Bicocca, Milan Italy. Specifically, from May 27th to June 19th, students in the Master's course in Information Systems have been involved in a crowdsourcing exercise. The 34 students were asked to form 11 groups of 2 (three groups), 3 (four groups) and 4 (four groups). Compared to the pilot study, in this study one group of three people did not to vote for itself, and a group of two persons did not put forward a proposal at all, thus failing to compete for the prize. This latter group had a member who actively participated in discussion phase, thus exhibiting a community-like collaborative orientation rather than a competitive contest one (age, education, and current employment could be worth investigating, considering the two members of this group were persons returning to higher education and actually working full time in companies or public administration). Although the teams in this and the pilot study exhibited on average a similar degree of collaboration, the members of the teams of the study at DISCo shown higher individual collaboration with regard to the pilot study and team coordination (Median Team Collaboration 0.8 and 0.4 respectively). It is worth noting that in both the pilot study and in this study, the average "collaborative" team had two members. That point could be a first insight worth investigating in future work for identifying crowd capital units and the appropriate flash team number in crowd crystals (e.g. three members for teams in a crowd may have 70% of observed collaboration).

The third study was carried out in the 2016 winter semester at the College of Management of the École Polytechnique Fédérale de Lausanne (EPFL). Specifically, from November 24th to December 18th, students in the Master's course in IT and Digital Strategy were involved in a crowdsourcing exercise. The 25 students were asked to form 8 groups of 3 (seven groups) and 4 (1 group). The exercise considered in the third study demonstreated the lowest degree of participation by each group (overall groups median = 0.2) with 2 groups relying on the activity of only one member and two groups of three persons having the activity of the other two members close to zero. It is worth noting, that one of these two groups had one of its members unable to access the discussion and the other was actually the team winning the prize for the crowdsourcing exercise; thus, the case resembles what we observed in the pilot study (having the winning proposal supported individually by the group members without real team coordination). Finally, in this study as well, the average collaborative members were 2 (2 out of 3 members for 5 out of 8 groups).

The fourth study was carried out in the 2017 winter semester at the College of Management of the École Polytechnique Fédérale de Lausanne (EPFL). Specifically, from November 23rd to December

15th, students in the Master's course in IT and Digital Strategy were involved in a crowdsourcing exercise. The 26 students were asked to form 8 groups of 3 (6 groups) and 4 (2 groups) persons. As mentioned above, the fourth study was carried out through the basic/free version of VIIMA, an open innovation platform, which did not allow to design the challenge with strict separation between the different phases, thus resulting more suitable for ideation initiatives rather than crowdsourcing (see a snapshot of the environment in Figure 1). Consequently, we adapted the structure of the challenge having only two main continuous phases: the *Submit Ideas* phase, and a unified *Vote/Discuss & Develop* phase. The figure of the captain was kept also for this challenge. It is worth mentioning that the openness of the structure of the challenge resulted in a higher degree of participation by each group (overall groups median = 0.5) than the other two exercises carried out in Switzerland. It is also worth noting that in this study the average "collaborative" teams had three members (with full collaboration of members in three out of 6 groups of two members), the groups made up of four members relied on the activity of only one member (the "captain"), and one group of three had none of members active in the discussion.

Figure 1. The VIIMA open innovation environment used in the fourth crowdsourcing exercise held during the 2017 winter semester at the College of Management of the École Polytechnique Fédérale de Lausanne (EPFL).

3. CONCLUSION

The fourth study has confirmed what observed in the pilot and the other two studies and is worth investigating in future work for identifying crowd capital units and the appropriate flash team number in crowd crystals (e.g. three members for teams in a crowd may have 70% of observed collaboration).

Regarding opportunistic behaviors, only in two cases group members voted only for their own idea (2 out of 14 total votes). Considering the outcome of the challenge, the winning as well as the three final selected ideas were produced by groups with only one member active on the platform during the discussion phase. Thus, also in this case and despite the open innovation environment, the limited number of members, and their mutual acquaintance from the class (especially in the case of one the finalists), the winning group as well as the other two finalists acted as *crowd crystals* oriented to *crowd* types rather than as a *community*, having the unifying focus on producing the winning proposal supported individually by the group members and without exhibited team participation in the discussion. In fact, these groups showed more engagement and collaboration in the design phase of the proposal rather in the social and co-creation aspects of the challenge.

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