

Abstract: As part of their embrace of open innovation, many organizations have established innovation contests to gather creative ideas from online users. Some of these contests are deployed on platforms that use hybrid coopetitive models to promote a combination of competition and cooperation. In this paper, we investigate how such models influence the modes of individual interactions and how these interaction patterns, in turn, influence the creative process. In our empirical study using both behavioral and social network data of 19,516 registered users of a crowdsourcing platform, we first analyze different user profiles that display varying levels of competitive and cooperative behaviors. Second, with a qualitative study, we explore the users' perceptions of the structured coopetition model. We find that the mixture of cooperative and competitive design features positively impacts the creative process and nudges the nature of competition along constructive lines.

Keywords: Crowdsourcing; gamification; coopetition; cocreation; interdependence

Highlights:

- Coopetitive crowdsourcing platforms promote social interdependence among individuals.
- Adding cooperative features transforms competition from a destructive process into a constructive process.
- The core of the community is composed of participants who display coopetitive behavior who lead the community.
- Engaging participants produces controversies that are important in terms of creativity.

Social interdependence on gamified crowdsourcing platforms

1. Introduction

Growing acceptance of open innovation appears to have provided the impetus to use crowdsourcing to generate creative ideas and solutions by organizations. Since the launch of the Fiat Mio, the world's first crowdsourced concept car based on more than 11,000 ideas submitted by more than 17,000 users around the world, many organizations have adopted idea crowdsourcing through open-innovation platforms (Chesbrough, 2003). Crowdsourcing is an organizational act that outsources a function once performed by employees to an undefined, generally large network of people by inviting ideas and contributions typically from volunteers over the Internet. Whereas the general virtual community relies on a strong sense of belonging, crowdsourcing platforms rely on users who are defined more by their voluntary contributions than their affiliation to specific groups (Gloor, 2006). Crowd contributions range from relatively simple (e.g., voting for high quality ideas) to more complex actions (e.g., solving scientific problems). Idea crowdsourcing platforms seek to exploit the creativity of the crowd participants because non-specialists can often be more valuable sources of ideas than professionals, given that the latter draw exclusively on domain-related knowledge and expertise (Agogu   et al., 2014).

To harness the potential power of the crowd, organizations have developed different types of sociotechnical systems (Geiger & Schader, 2014). Several studies demonstrate that extrinsic incentives might play a limited role in participants' motivations (Kaufman et al., 2011). Therefore, the designers invest in tools to create productive environments for crowd engagement (Goh et al., 2011). Recent years have seen a rapid proliferation of crowdsourcing systems that take inspiration from video games to positively influence motivation and behavior (Morschheuser et al., 2017b). Although topics related to crowdsourcing have been studied

extensively, little attention has been paid to the design of coordination mechanisms that enhance crowd performance. This study therefore explores a new hybrid crowdsourcing system, referred to as coopetition, a neologism contracting “cooperation” with “competition”. This model represents a new area of research with enormous potential (Füller et al., 2014), but questions arise with regard to interactions among group members and the possibility of competition and cooperation (Luo et al., 2015). Recent literature has brought the construct of coopetition into information sharing in professional contexts (Baruch and Lin, 2012; Burström, 2012; Enberg, 2012), in workgroups (Bergendahl et al., 2015) or in idea crowdsourcing platforms (Hutter et al. 2011; Bergendahl et Magnusson, 2014; Zhao et al., 2016; Leclercq et al., 2018). However, this literature does not discuss the theoretical implications by clarifying the relationship between structural coopetition and behavioral coopetition. In our study, we analyze the effects of the coopetition model on promoting social interdependence at the interindividual level and how this affects idea generation. Social interdependence exists “when individuals share common goals and each individual’s outcomes are affected by the actions of others” (Johnson and Johnson 2002, p. 4)

As part of this research, we gathered and analyzed data from an idea crowdsourcing platform with a coopetitive structure. First, we used cluster analysis to identify groups of actors (n = 19,516 users) that display varying levels of competitive and cooperative behaviors. Second, we conducted a qualitative study of users’ perceptions of competitive and cooperative features. The mixture of cooperative and competitive elements positively impacts the creative process and nudges the nature of competition along constructive lines. While sociotechnical affordances favor the emergence of a core group, they also engage the most active participants in developing strategies to achieve their personal goals.

The rest of the paper is organized as follows: we begin by developing the conceptual background and providing a review of the related literature. We then introduce our methodology, discuss the data gathering and related procedures, conduct data analysis, and present the results of the quantitative and qualitative segments. Finally, we present a discussion of our contributions and some of the managerial implications of the research.

2. Background and review of literature

2.1. Idea Crowdsourcing and platforms

The evolution of digital technology has enabled a shift from passive consumption to consumer co-creation (Zwass, 2010). In marketing, co-creation is defined as the joint creation of value by an organization and its customers (Prahalad & Ramaswamy, 2004). Value emerges not only from organizations' internal value chains but also from interactions between consumers and their experience networks (e.g., communities, suppliers, and partners). Platforms connect consumers and allow them to build relationships and form communities that could potentially lead to productive collaboration. By expressing ideas or posting comments and ratings, users have transitioned from being passive consumers of content to being dynamic contributors; they generate ideas in ways that redefine the environments in which they operate.

In recent years, many organizations have adopted the concept of user co-creation by developing crowdsourcing platforms (Kim et al., 2008; Estellés and González, 2012). Crowdsourcing is considered an effective way to harness the power of large groups of people for performing various types of work (Geiger and Schader, 2014). Prpić et al. (2015) categorized crowdsourcing systems into four categories depending on the types of work and the collective process. First, crowd-voting approaches use the wisdom of crowds to request choices between alternatives. Second, microtask crowdsourcing relies on the crowd to undertake work that is an

unachievable thought standard procedures. Third, solution crowdsourcing is used to resolve well-defined problems. Fourth, idea crowdsourcing harnesses the potential of the crowds to create emerging solutions. Such crowdsourcing systems make it possible to outsource the creative process of new idea generation to an undefined and generally large network of people. According to Amabile and Gryskiewicz (1989), creativity is the production of new and useful ideas by individual people or groups of people working together.

2.2. Gamification and social interdependence theory

There is an ongoing debate in the literature about the most appropriate mechanisms for engaging users on crowdsourcing platforms. The platforms' success depends on the willingness of people to participate in collective value creation (Prpić et al., 2015). Since a crowd with many participants is crucial for any crowdsourcing initiative, organizations need to understand the sociotechnical features that are capable of engaging large groups of people. Therefore, crowdsourcing systems are increasingly gamified to positively influence the intrinsic motivation of people towards participating in crowdsourcing systems and their behaviors in doing so. Gamification refers to the use of characteristics commonly associated with video games in non-game contexts (Zichermann & Cunningham, 2011). Previous research has shown that applying game design features in crowdsourcing can influence participants' motivations, participation, engagement, and output quality in various forms of crowdsourcing (Suh et al., 2017). However, different kinds of gamification implementation can lead to different motivational effects and behavioral outcomes (Morschheuser et al., 2017a). Morschheuser et al. (2017b) identified several categories of gamification features and proposed classifying them into four groups: individual features, cooperative features, competitive features, and competitive-cooperative features. Individualistic game features provide a gameful experience (e.g., badges and levels) without affecting the actions of others; the probability of success of one person is neither enhanced nor

diminished by another person. In contrast, competitive, cooperative and competitive-cooperative gamification features influence the way users interact. Consequently, the nature of social exchanges can be transformed by sociotechnical mechanisms.

The paradoxical situation simultaneously involving cooperation and competition has been documented in the strategy and management literature under the name of “coopetition”. Noorda was the first to propose the concept, using it to describe the strategy of Novell Inc. (Nalebuff et al., 1996). Coopetition was originally defined as a dyadic and paradoxical relationship in which two firms compete in some activities while cooperating in others; most studies highlighted its positive effects on organizational performance (Luo et al., 2015; Park et al., 2014). Initially, coopetition was thought to exist only at the interorganizational level, but today, it is viewed as a multilevel phenomenon (Bengtsson and Kock, 2014). Thus, coopetition, more broadly defined, is the simultaneous presence of cooperation and competition between any two agents. Although several empirical studies have shown significant differences between them, studies explaining the simultaneous and paradoxical presence of cooperative and competitive features are relatively few (Zhao et al., 2016). Therefore, the coopetition concept requires more conceptual and theoretical development that considers those two dimensions. In this study, we use the social interdependence theory (Deutsch, 1949; Johnson and Johnson, 1989) to address this gap.

Deutsch (1949) was one of the first social psychologists to conceptualize and unpack the subtle relationships between cooperation and competition from both structural and behavioral perspectives. Deutsch’s theory expanded Lewin’s well-known work on group dynamics (Lewin, 1935). According to Lewin, the essence of a group is the interdependence between its members; a change in the state of a member changes the state of any other member. Social interdependence exists “when individuals share common goals and each individual’s outcomes are affected by the actions of others” (Johnson, 2002) (p.4). By extending Lewin’s theory, Deutsch conceptualizes

two different aspects of social interdependence: positive and negative. The premise of social interdependence theory is that the way in which users' goals are structured determines the ways they interact, and their interaction patterns determine the outcomes. *Positive interdependence* among goals between two agents implies that the probability of a person's goal attainment is positively correlated with the probability of the other reaching his or her goal. *Negative interdependence* among goals between two agents implies that the probability of a person's goal attainment is negatively correlated with the probability of another obtaining his or her goal. Deutsch also notes a third possibility: *goal independence*, in which the goal attainment and activities of people do not have any impact on one another. Goal interdependence research has been applied to a wide range of situations; several studies have shown that positive goal interdependence results in higher achievement and productivity (Johnson and Johnson, 1989).

Building on Deutsch's theory, subsequent research has introduced other types of interdependence. Johnson and Johnson (2005) propose a typology comprising three main categories: outcome, means, and boundaries, wherein *outcome interdependence* includes goals and rewards; *means interdependence* includes resource, role, and task interdependence; and *boundary interdependence* describes discontinuities that distinguish one group from another, unifying those within each group. Although there has been considerable research on outcome interdependence, neither means nor boundary interdependence has received much research scrutiny (Johnson and Johnson, 2005).

2.3. Analyzing social interdependence on cooperative platforms from a structural perspective

The social interdependence theory provides a useful framework with which to conceptualize cooperation from a structural perspective. In terms of technical architecture, cooperative

crowdsourcing platforms are characterized by the simultaneous presence of competitive and cooperative sociotechnical features.

Many coopetitive crowdsourcing platforms apply the principle of user competition. Typically, the platforms are structured around idea competitions (Leimeister et al., 2009), crowd contests, or tournaments for ideas (Morgan & Wang, 2010) in which only a limited number of people can win prizes or rewards. In other words, there are always a few winners and many losers. Users are evaluated on the basis of their performance typically based on clear, unbiased, and detailed rules. The participants generally know what to expect and what they need to do to be successful. In the creativity literature, researchers recognize idea competitions as an effective way to generate innovative ideas (Adamczyk et al., 2012; Morgan & Wang, 2010; Piller & Walcher, 2006). Such competitions operate on the premise that competitions—and the rewards that go with them—motivate users to exert more effort towards tasks (Connely et al., 2014). However, in terms of creative performance, there is no consensus on the positive effect of competition (Brown et al., 1998; Majchrza & Malhotra, 2013).

Whereas competition focuses on individual actors, cooperation underlines shared objectives, collaboration, and collective dynamics. Coopetitive platforms implement shared goals and create new forms of means interdependence among individuals. In this context, users need to receive support from the community to achieve their goal (e.g., collective evaluation). Users not only receive and/or post content but also participate both individually and collectively in a global culture of sharing, exchange, and evaluation. Table 1 describes the characteristics of coopetitively structured idea-crowdsourcing platforms that combine competitive and cooperative features.

[TABLE 1]

While the implementation of different game affordances has been used in crowdsourcing systems, there is limited empirical research into the effects of the affordances on individual behaviors. According to Deutsch (1949), positive interdependence creates promotive interaction, which occurs when individuals encourage and facilitate each other's efforts to reach the group's goals. Negative interdependence results in oppositional interaction (Johnson and Johnson, 1989). In this research, we first investigate the composition of crowds in terms of behaviors that may coexist among users who engage competitively in some activities and cooperatively in others. Second, through a qualitative study, we explore how and the extent to which the coopetition model (combining competitive and cooperative features) promotes social interdependence at the interindividual level. Accordingly, we use a mixed-method research design combining a large-scale field quantitative study with qualitative interviews.

3. Step 1 – Analyzing Social Interdependence through Cluster Analysis

3.1. Field Site: an Innovation Crowdsourcing Platform

We carried out the empirical segment of our research using an idea crowdsourcing platform known as Imagine with Orange operated by Orange, an innovation-focused international telecommunications company. The company invites people from all over the world to share their ideas on various thematic topics ranging from education and shopping to health care. The platform is designed with a mix of features that support both competition and cooperation; it can therefore be viewed as coopetitive in nature. Competition-related elements of the platform include rankings on the basis of relative performance in idea-generation tasks and the offering of rewards to a limited number of winners. Users may win either Amazon vouchers or invitations to travel to Paris for innovation coaching sessions. Since the launch of the Orange platform in 2014, 62 users have been rewarded for the ideas they submitted (a total of 94 ideas rewarded), either by

a jury of experts or by the crowd. The platform ranks users on the basis of their relative performance and displays recent winners' names on a leaderboard. A jury evaluates users' performance according to well-established criteria.

However, to overcome the negative effects of competition, the organizer has incorporated a series of cooperation-related elements (Table 1). The first is that users have the opportunity to be evaluated by the community (e.g., via a vote button). This instills the idea that individual participants are involved in a common dynamic and need the support of community members. From the resource-dependence perspective, community members' votes represent a resource that the winners need to be successful at gathering. The second element is the users' ability to view ideas proposed by others, which allows members to inspire, influence, and build on each other's contributions—a form of resource sharing and co-creation. The final element is the opportunity to collaborate offline through direct messaging and emails.

3.2. Data Collection

Our dataset includes data on 19,516 registered users of the Orange platform and their contributions. Since its launch in 2014, the platform has hosted 22 innovation contests. Our data pertains to both the actions carried out by the users and the interactions that link them. The dataset contains 2,494 ideas, 7,895 comments, and 41,518 votes. We focused on the behavior of the 19,516 registered users and excluded the actions of the community manager. Figure 1 shows the frequency of contributions per individual user (ideas, comments, and votes) over the entire period.

[FIGURE 1]

3.3. Methodology

We used *cluster analysis*, a statistical method that identifies homogenous groups of objects known as clusters. Cluster analysis divides observations in such a way that objects belonging to the same class are more similar. We used a mixed method that combines the advantages of *hierarchical methods* (ascending) and *partitioning* (k-means) methods. Hierarchical clustering methods are characterized by the tree-like structures that are established in the course of analysis. The algorithm combines or divides existing groups, creating a hierarchical structure that reflects the order in which groups are merged or divided; k-means clustering is the most popular partitioning method. The algorithm works by calculating the centroid of each group and assigning each object to the group with the closest centroid. It minimizes overall intra-cluster dispersion and maximizes inter-cluster distance by iterative reallocation of cluster members.

We classified users according to two variables: number of contributions (*idea count*) and position in the social network (*degree centrality*). Idea count is the most basic (and somewhat objective but imperfect measure) for evaluating quality. The definition of an idea varies from one context to another (Reinig et al., 2007); we define it as a contribution that contains a solution to a problem. Degree centrality (in-degree and out-degree) represents a basic form of centrality measure in social network analysis (SNA) (Borgatti et al., 2013; Wasserman & Faust, 1994). According to SNA, social relationships consist of *nodes* and *ties*. Nodes are the individual actors within networks, and ties are the relationships between the actors. In our study, we used social network analysis to understand the social interdependence between platform participants. To build a social network, we identified three activities that users could engage in: (1) submitting creative ideas, (2) voting for others' ideas, and (3) interacting with others (e.g., posting comments). We built two social networks, one related to the voting activity and the other to the interaction activity. We computed each user's structural position within the networks. The centrality of degree corresponded to the number of nodes (or participants) adjacent to a user; that

is, the number of participants that the user was linked to directly with no intermediary or third party. The number of out-degrees represented the actions directed to others (comments or votes). Users with high out-degree centrality scores were characterized by support for others (comments or votes). High in-degree centrality scores implied that users enjoyed high levels of respect within the community. We also noted recursive loops (users commenting on their own ideas) (47.98%); we removed these loops from the calculation of in-degree and out-degree centrality.

Table 2 describes the characteristics of our dataset. There was significant variation among users in terms of the number of ideas and in-degree and out-degree centrality scores. We observed that the average value of out-degree centrality was higher than the average value of in-degree centrality, indicating that a minority of users received comments and votes from a large number of users who had limited activity on the platform. We performed a logarithmic transformation to obtain a distribution closer to Gaussian.

[TABLE 2]

3.4. Results

We carried out agglomerative hierarchical clustering by using Ward’s method (1963) because we could not specify the number of clusters a priori. This approach uses a sum-of-squares criterion, producing groups that minimize within dispersion at each binary fusion (Mooi et Sarstedt, 2010). We used the variables described above (number of ideas, in-degree/out-degree centrality [votes], and in-degree/out-degree centrality [comments]) in the clustering. We obtained four clusters that differed significantly from one another. Next, we repeated the clustering using the partitioning method of k-means. This is superior to hierarchical methods because it is less affected by outliers and by the presence of irrelevant clustering variables (Mooi et Sarstedt, 2010). Instead of using distance measures, the k-means method uses within-cluster variation as a

measure to form homogenous classes. However, the use of this method required us to specify the number of clusters. In our case, the k- value was parameterized by the value 4, which was the number of clusters that we obtained from our first step.

Table 3 shows the results of the k-means clustering analysis. We obtained four clusters whose behavior and performance can be understood based on the social interdependence framework: (1) coopetitors, (2) competitors, (3) co-operators and (4) supporters. Coopetitors (n = 243) include 243 users with high scores on each of the five dimensions. Competitors (n = 724) include users who engaged mainly in self-directed activities. Cooperators (n = 547) and lurkers (n = 18,002) include users who did not submit any ideas; their actions were confined to commenting or voting on others' ideas. Analysis of Variance (ANOVA) was performed to test the statistical significance of the differences between the clusters. The results support the distinctive clusters, as our five criteria differ significantly across the identified clusters.

[TABLE 3]

Coopetitors. Users in this cluster play a central role in the idea-generation process. Although they represent only 1.24% of all users, coopetitors demonstrate a threshold level of creativity and productivity ($AVE_{IDEA\ COUNT} = 1.35$). They contribute 59.40% of the ideas and garner 97.10% of the votes. Coopetitors are highly respected within the platform community; their ideas are evaluated positively ($AVE_{IN-DEGREE\ (VOTES)} = 3.10$) and are frequently commented on ($AVE_{IN-DEGREE\ (COMMENTS)} = 1.39$). These users exhibit a mix of competitive and cooperative behaviors that may be linked to their motivation to participate. In this cluster, the effects of negative goal interdependence are limited; users are willing to share their knowledge with the expectation that they will receive some degree of community support (they provide 65.02% of comments). Coopetitors are inclined to share knowledge and practice to benefit reciprocally from personal

mastery and the collective knowledge accumulation of a group of attitudinally similar people. Coopetitors do not hesitate to vote for ideas submitted by others because for them, the selection of the best ideas is as important as winning the contest: 60.14% have submitted their own ideas but voted for others in the same contest. Table 4 indicates that the number of winnings (crowd) is positively related to the number of ideas, the number of votes, and the number of comments, showing that providing resources to others (support, suggestions, inspiration) has the potential to generate reciprocity.

[TABLE 4]

Competitors. Users in this cluster are competitively oriented. They represent 3.77% of all users and have submitted 29.51% of the ideas. Our results provide indirect support for Deutsch's conjecture of negative interdependence. Given that people's beliefs about how their goals are related determine the ways in which they interact, users in this cluster tend not to support others ($AVE_{OUT-DEGREE(VOTES)} = 0.06$). This low average value for out-degree centrality indicates a one-sided relationship; these users are on the platform to generate content and are less integrated into the social life of the community. Competitors rarely comment on others' ideas; the few comments they make are generally on their own ideas (85.43% of their comments are recursive). The orientation of these users is primarily competitive. Nevertheless, some competitors do pose creative ideas and attract comments and feedback, as shown by their relatively high average in-degree centrality score ($AVE_{IN-DEGREE(VOTES)} = 0.64$). With regard to the number of winnings, the community members rewarded 0.53% of ideas submitted by competitors (vs. 1.47% rewarded by the jury), whereas they rewarded 4.12% of the ideas submitted by coopetitors (vs. 1.68% rewarded by the jury).

Cooperators. Users in this cluster have a cooperative orientation ($AVE_{OUT-DEGREE (VOTES)} = 0.84$; $AVE_{OUT-DEGREE (COMMENTS)} = 0.79$). Whereas competition stems from individual self-interest, cooperation implies shared objectives, collective dynamics, and social concerns. Cooperative users appear to energize the community through activities such as rating and commenting. Although they contribute few of their own creative ideas ($AVE_{IDEA COUNT} = 0.00$), their role in the network is valuable because they have a win-win attitude despite the pressures of competition (they contributed 28.25% of all the comments).

Supporters. Users in this cluster do not contribute any creative ideas ($AVE_{IDEA COUNT} = 0.00$). They represent 92.20% of the users, a figure that is consistent with previous studies of online communities (Gloor, 2006). Users in this group have low activity levels on the platform; they provide few votes or comments ($AVE_{OUT-DEGREE (VOTES)} = 0.69$; $AVE_{OUT-DEGREE (COMMENTS)} = 0.00$). The results show that 75.18% of supporters voted for only one person; computation of the weighted sum of outgoing edges shows that 71.79% voted once, 18.84% voted twice, and 9.37% voted three or more times for the same person, suggesting that these users were more motivated to support someone they knew than they were to vote for the proposed ideas.

4. Step 2 – Exploring users’ perceptions of sociotechnical features

3.1. Methodology

As noted by Deutsch (1949), interdependence influences behavior only if it is actually perceived by the users. Therefore, to complete our study, we performed a qualitative analysis over a three-month period to explore the users’ perceptions of the simultaneous presence of competitive and cooperative design features. We interviewed twenty-one users on the basis of their activity on the platform (Appendix A). Seven interviewees were Orange employees; all of these interviewees expressed a high degree of interest in innovation and technology. Given our

interest in creativity, we asked participants describe the creative process from idea generation to idea evaluation (votes) and to explain their perception of competitive and cooperative features. The participants were then asked to explain how they perceived the other members. Responses to these questions, along with analysis of users' behaviors, allowed us to capture both the perceptions and actions of the users. The semi-structured interviews ranged in length from 30 to 50 minutes; we audio-recorded and transcribed them. Our analysis approach followed emergent logic to develop themes within the data. The process proceeded through six stages: familiarization with the data, generation of initial codes, search for themes, definition of themes, naming of themes, and reporting of findings (Braun & Clarke, 2006).

3.2 Results

The first subsection of the findings examines the goals pursued by clusters through their contribution (ideas, comments, votes). The second subsection examines the role of competitive and cooperative features and their effects on social interdependence among individuals. The final section examines the consequences of creativity by focusing on the process of controversies.

3.2.1. Exploring individual goals pursued by clusters' members

The group of coopetitors is characterized by a mix of competitive and cooperative behaviors that are linked to their motivations and situational variables. From this perspective, some coopetitors can be more inclined toward competition and the other part toward cooperation. The coopetitors with a competitive orientation share common characteristics with competitors and are mainly focused on personal benefits they can obtain from their participation (e.g., monetary rewards and recognition). The coopetitors with a cooperative orientation are engaged for several reasons: curiosity, intrinsic interest, to have fun, and to share their ideas.

Peter (coopetitor): “Generating an idea is something very personal. It brings me a lot of pleasure. If people I do not know naturally come and vote on it, it's great. On the other hand, making my friends vote to win the prize, I can't see the value.”

The group of competitors is relatively independent from the rest of the community. Whereas competitors are guided almost exclusively by their desire to win an award or symbolic recognition, cooperators encourage others' ideas for two different reasons. The first is that they consider an idea to be valuable. The second is that they know the author of an idea and seek to help him with support or constructive comments for improvement.

3.2.2. The simultaneous presence of competitive and cooperative sociotechnical features

Our analysis reveals that users' behaviors are influenced by their goals and the means by which the goal will be reached. While competitors focus mainly on monetary rewards and recognition, the positive effect of financial gratification is far from certain in the core of the network (coopetitors). The outcome of the competition is not seen as crucial. The presence of rewards for a limited number of winners does not promote working against others' ideas. It does not matter who wins and who loses. However, coopetitors express a strong attachment to their own ideas, and they work hard on the quality of the ideas they post. The most important incentive is the personal sense of having successfully accomplished something meaningful. Therefore, coopetitors enjoy the competition, both because they can have their ideas recognized by the jury/community and because they have a need to compare themselves socially with other challengers—particularly with regard to their vote-getting strategies. Although coopetitors pursue their own interests, they demonstrate the capacity to provide assistance to others and accept others' influences. Coopetitors do not hesitate to vote for ideas submitted by others because, for them, the selection of the best ideas is as important as winning the contest.

Jim (coopetitor): “I like to invest time in ideas, invest time in the topic itself and if another idea won, I will be ready to join in and to contribute to this submission in different kind of way.”

Coopetition models strengthen positive social interdependence by dividing resources among group members during the idea-evaluation stage in preparation for the idea-generation stage. Users who are mutually dependent on resources are engaged in a common dynamic in which each individual user needs the help of others to succeed. Rather than being in conflict to reach their goals, users increase their probability of goal attainment by cooperating with others. We find that resources can be classified into three categories: inspiration, community feedback, and community support. With regard to the first resource inspiration, our findings show that viewing others’ ideas is important in obtaining inspiration. During the idea-generation stage, individual participants generate new ideas by combining old and existing ideas. Viewing others’ ideas is an opportunity to form new associations and produce new ideas; it starts a new cycle of idea generation. With regard to the second resource, community feedback, we find that it plays an essential role in the idea-generation process. The third resource, community support, recognizes that when the crowd selects ideas, one user does not control all of the winning conditions. The coopetition model encourages cooperation, given that individual users increase their probability of goal attainment by cooperating (e.g., voting for others’ ideas). Individual users negotiate with the community to obtain the votes necessary to win (mutual benefit). There is recognition that what helps other participants also benefits oneself.

Tim (coopetitor): “When we are among the first three to win the award, they become competitors but otherwise they are friends because we vote for each other. But I recognize that when we finish in the first 10 first and only the first three win the prize...what a pity!”

3.2.3. Social interdependence and creative process: the role of constructive controversies

In the specific context of crowdsourcing systems, the presence of competitive and cooperative design features seems to be complementary rather than conflicting. First, competitive features are developed in a playful context and transform competition from a destructive to a constructive process. Second, cooperative features promote a situation in which individuals work supportively with each other.

Engaging participants in coopetitive crowdsourcing systems produces controversies that are important in terms of creativity. Johnson and Johnson (1989) believed that constructive controversy exists “when one person’s ideas, information, conclusions, theories, and opinions are incompatible with those of another, and the two seek to reach an agreement” (p. 70). To be successful, the constructive controversy procedure requires certain conditions. First, people must have a positive social interdependence. Second, individuals must be different and need to have conflict management skills such as active listening, being critical of ideas and not people, and encouraging others. Third, the constructive controversy procedure follows the principles of rationality.

The coopetitors are engaged in a constructive controversy process. First, coopetitors perceive their virtual environment to be a relatively safe and open environment in which people can consider the ideas of others and criticize them constructively.

Marie (coopetitor): “Why do I comment? It's to give positive feedback... I know it's a big step for people because I remember that the first time I was so scared. I had hesitated a long time to take that important step. And my comments are really stuff like “Ah it's great, it's really great” or “It can work for a particular market” or things like that. It's rather exciting stuff but it's not necessarily for...it's more encouragement...”

Second, coopetitors agree to subject their ideas to the opinions of others. When individuals are confronted with a problem to solve, they have an initial understanding and conclusion. However, when individuals are challenged by opposing views (e.g., others' ideas or comments), this controversy provokes conceptual conflict and cognitive uncertainty. This situation motivates individuals to search for additional information, which stimulates them to achieve a more adequate cognitive perspective and a better reasoning process. In terms of creativity, individuals who are engaged in controversies tend to view the problem from different perspectives.

5. Discussion

5.1. Discussion of the results

Idea crowdsourcing platforms outsource the creative process to an undefined and generally large network of people by issuing open calls. By connecting individuals, cooperative platforms give power to people to create, share, and evaluate. Through an empirical study, we explored how individuals participate in the idea-generation process on an idea crowdsourcing platform. First, we determined four user roles that can help to better understand the different user types and their behaviors in cooperative-competitive crowdsourcing. Second, with a qualitative study, we investigated users' perceptions of the simultaneous presence of competitive and cooperative design features and the effect of these features on the creative process.

5.1.1. Transforming competition from a destructive to a constructive process

Overall, our findings provide several significant theoretical insights and confirm the potential of social creativity situations that emphasize the role of the human and social environment in the creative process. Following the work of Johnson and Johnson (1989), we define structured cooperation in the context of crowdsourcing systems as the combination of negative goal interdependence and positive resource interdependence. When analyzing the effect of design

features, we found that coopetition enables the reduction of the negative effect of competition. First, the low value of prizes for winning reduces the challenge of winning or losing. For Johnson and Johnson (1989), competition can present negative outcomes if winning becomes too important. In contrast, competition can present positive outcomes if winning is secondary, meaning that people mainly participate to enjoy the experience. Second, the addition of cooperative features alleviates the negative effects of competition and facilitates promotive interaction through features such as user votes (likes) for ideas and the ability to interact (make comments and suggestions). Participants do not experience strong constraints while being challenged with the opportunity to receive valuable feedback at the end. According to Johnson and Johnson (1989), a minimal level of competition can take place within a context of cooperation. From this perspective, the presence of cooperative features creates an engaging and exciting environment in which participants can consider the ideas of others and criticize them constructively. Therefore, establishing a coopetitive structure facilitates the constructive controversy process that is a powerful tool to increase the number and quality of ideas.

5.1.2. The emergence of a collaborative innovation network

Our research suggests that not all members of the crowd are equal. Indeed, only a minority of the participants actually submitted ideas that may have to do with the level of knowledge and experience required. The core of the community is largely composed of coopetitors who lead the community from an organizational point of view. Each participant possesses resources (social and technical) that can be potentially shared with others. Thus, actors with significant resources occupy a central position in the network. The actors who have a high level of technical skills (technical capital) and are able to mobilize their network (social capital) have an advantage over others. This advantage allows these skilled actors to negotiate with others to gain access to certain resources they do not have. In addition, the centrality of these actors in the network

allows them to collaborate with a network of various other actors. Even if some coopetitors pursue goals that are antagonistic to other participants, they come together to exchange ideas and knowledge and work collaboratively. They are mutually engaged with respect to competitive rules and the submission of new ideas. As Deutsch (1949) notes, positive interdependence can shift self-interest to mutual interest. Coopetitors are ready to engage in a constructive controversy process because they recognize the inherent value of working together.

In contrast, competitors are task-focused, spending little or no time on social or other interactions with community members. Their behavior suggests they believe that supporting others will reduce their probability of winning. This is reflected in competitors' reluctance to collaborate even to obtain the support of their community. They are focused on winning jury prizes at the expense of earning the community's approval. For Deutsch (1949), competition is a situation in which the goals of two agents conflict, leading to serious consequences such as disinformation, false promises, and suspicion. Our results provide indirect support for Deutsch's conjecture of negative interdependence because competitors produce fewer creative ideas than coopetitors when the idea selection process is based on the community's decision. However, we do not observe significant differences between the groups when the idea selection process is based on jury decisions.

In the third category (cooperators), users contribute little to the generation of ideas but contribute fully to the creative process through collaborative practices such as offering comments or providing "likes". Whereas creators generate content, these users play a constructive role through activities such as viewing, commenting, and supporting. In these ways, cooperators contribute to value cocreation in the social network and participate in the social creative process.

In the last category (supporters), users play a neutral role; they do not exhibit any positive or negative social interdependence. However, despite their relative independence from the rest of the community, the aggregation of their votes is influential.

5.2. Managerial Implications

This research presents several managerial implications. As social networks and digital communities expand, organizations need to better measure and understand users' behaviors on these platforms. Our research provides valuable information on potential efficiency improvements of crowdsourcing platforms. Our research also provides more general recommendations in terms of users' profiles. We highlight the critical role of coopetitors; organizations can carefully nurture these users to increase not only the quality and value of the ideas they generate but also the potential influence they can have on experience networks. Through their activities, coopetitors appear to make collective intelligence possible by asking questions and seeking answers collaboratively.

5.3. Limitations and Future Research

Although this research contributes significantly to our understanding of the effects of design features on creativity performance, it has some limits. First, we conducted this study in the specific context of idea crowdsourcing. As we mentioned in the literature, various types of crowdsourcing and various types of interdependence exist. However, the coopetition model can be applied in other types of crowdsourcing models (e.g., solution crowdsourcing) based on other forms of interdependence. Thus, the team named *BellKor's Pragmatic Chaos*, who won the Netflix Prize in 2009, was a team of researchers from different labs who were engaged in a situation of cooperation and competition. In addition to crowdsourcing platforms, the coopetition model provides an interesting framework to better understand sharing activities on social media

(e.g., Instagram). Second, the idea-generation process on the platform that we studied is based on idea contests offering a low level of rewards. As we emphasized in our results, the value of rewards is key to transforming competition from a destructive to a constructive process. From this perspective, coopetitive platforms offering higher rewards may result in oppositional interactions where individuals work to oppose or block the success of others. Third, we did not take into account the dynamic and changing aspects of user profiles over time. This question is not easy to address, given the complexity of dynamic graphs. Furthermore, although our research contributes to our understanding of the coopetition phenomenon, it also raises new opportunities for future research.

6. Conclusion

In this study, we analyzed user activities on idea crowdsourcing platforms. We used social interdependence theory to conceptualize coopetition from both structural and behavioral perspectives. Combining goal interdependence and means (resources) interdependence contributes to the collective achievement of the group, even as members pursue their individual goals.

7. References

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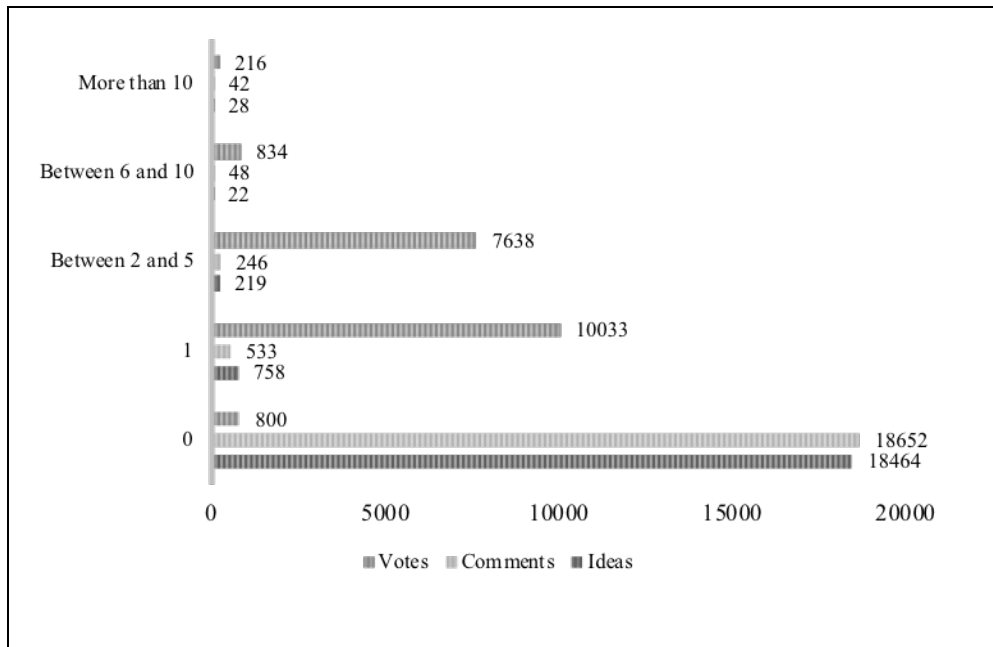


Figure 1. Frequency of User Contributions

	Competitive crowdsourcing	Cooperative crowdsourcing	Coopetitive crowdsourcing
<i>Competitive features</i>			
Rewards for a limited number of winners	X		X
Leaderboard/Public rankings	X		X
Rules and procedures	X		X
Control of interaction among users	X		
<i>Cooperative features</i>			
Mutual goals		X	X
Implicit rules		X	X
Distributed resources		X	X
Open communication		X	X

Table 1. Classification of social interdependent features of gamified crowdsourcing platforms

	Mean	S.D	Min	Max	Skewness
Idea count	0.12	1.71	0	140	45.41
In-degree _{VOTES}	1.46	40.99	0	3049	48.80
Out-degree _{VOTES}	1.46	1.76	0	108	20.20
In-degree _{COMMENTS}	0.08	0.84	0	35	21.17
Out-degree _{COMMENTS}	0.08	0.89	0	72	41.85

Table 2. Descriptive Statistics Qualitative study of users

	N	In- degreeVOTES	Out- degreeVOTES	In- degreeCOMMENTS	Out- degreeCOMMENTS	Idea Count
1	243	3.102	1.270	1.398	0.874	1.357
2	724	0.642	0.063	0.353	0.148	0.795
3	547	0.032	0.840	0.038	0.776	0.053
4	18002	0.000	0.793	0.000	0.000	0.001
<i>F</i> -value		672.72	738.05	4186.66	1503.33	1366.85
<i>p</i> -value		0.000	0.000	0.000	0.000	0.000

Table 3. K-means Clustering Analysis

	Nb. of ideas	Nb. of Comments	Nb. of votes	Nb. Of Winnings _{crowd}	Nb. Of Winnings _{jury}
Nb. of ideas	1.00				
Nb. of Comments	0.816**	1.00			
Nb. of votes	0.271**	0.316**	1.00		
Nb. Of Winnings _{crowd}	0.503**	0.468**	0.314**	1.00	
Nb. Of Winnings _{jury}	0.270*	0.258*	-0.049	-0.378**	1.00

$N = 62$

** $p < .001$

* $p < .05$

Table 4. Correlation Test

Appendix A: Respondents' Characteristics

Country	Occupation	Nb. of contests	Cluster	Country	Occupation	Nb. of contests	Cluster
France	IT Engineer	8	1	France	IT Engineer	9	1
Poland	Unemployed	11	1	France	Consultant	11	2
UK	Web Developer	11	1	France	CSR Manager	15	1
Israel	Consultant	17	1	France	IT Engineer	5	1
Israel	Engineer	7	1	France	Marketing Manager	4	3
USA	Employee	11	1	France	Marketing Manager	7	1
India	IT Engineer	11	1	France	IT Technician	11	1
France	Unemployed	2	2	France	Web Consultant	1	2
France	Employee	2	3	Belgium	Marketing Manager	1	2
France	-	1	3	France	IT Engineer	11	2
France	Consultant	4	1				