Community-Based Innovation Contests: Where Competition Meets Cooperation

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While the principle of competition has long been found to be conducive to innovation, community-based innovation contests additionally offer the possibilities of interaction and cooperation among participants. This duality makes innovation contests an interesting field for both academia and practice. However, a surge in practical implementations stands in contrast to a still restricted body of academic knowledge in the field. To close this gap, drawing on a boundary spanning perspective, we examine if and how cooperation in the competitive setting of innovation contests leads to innovativeness. Cooperative orientation of contest participants is explored within a community-based innovation contest run in 2009 at one of the largest universities in Germany. We analyse a complete set of data collected during the contest, data from a follow-up survey among individual participants ($n = 943$), as well as video and audio footage from four focus groups. Findings suggest that a very high as well as a very low degree of cooperative orientation result in a high degree of innovativeness, while a medium degree of cooperative orientation results in a low degree of innovativeness. Additionally, this research extends the concept of *boundary spanning* by identifying two subtypes: *proactive* and *reactive boundary spanning*.

Setting the Stage

The principle of competition can be found in various aspects of life: in the evolution of creatures as well as in sports, business, arts and science (von Hayek, 1971). It is the underlying principle of the free market economy and has been found to be a driving force for progress. Already in 1776, Adam Smith concludes that in a competitive environment, individuals' endeavour to maximize utility is conducive to societal welfare (Smith, 2009). Similarly, von Hayek (1971) sees competition as beneficial for the development of innovations and technological as well as societal progress.

In the field of innovation management, this principle is obviously realized in innovation contests which have recently emerged as a widely used innovation practice. These contests are used to stimulate innovation activities within a community of experts in the field of scientific problem solving. A good example is the *Google Lunar X-Prize*, promising US$20 million to the team that is able to 'successfully soft land a privately funded spacecraft on the Moon, rove on the lunar surface for a minimum of 500 meters, and transmit a specific set of video, images and data back to the Earth'. Likewise, contests serve as a common industry practice to foster innovation activities in user communities as in the case of BMW's *Motorrad Innovation Contest* or Samsung's *'How deep is your love?'* contest. While the principle of competition has long been found to be conducive to innovativeness, the latest community-based innovation contests seemingly contradictorily facilitate interaction and cooperation among participants (e.g., *Save Our Energy* or *LED Emotionalize Your Light*).

The combination of competition and cooperation as drivers for innovativeness makes innovation contests an interesting field for both academia and practice. It is surprising that the surge of practical use of innovation contests stands in contrast to a still restricted

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body of academic knowledge in the field. To close this gap, we focus on the question of whether cooperation in the competitive setting of innovation contests is correlated with innovativeness, and if so how. This study elaborates answers to this question based on the theoretical concept of *boundary spanning* (Tushman, 1977). It draws in particular on the notion of *cooperative orientation* (Obstfeld, 2005) to examine the correlation between the degrees of competition and cooperation among competing contest participants and the degree of innovativeness shown by them.

The empirical basis is a data set of a community-based innovation contest run in 2009 at one of the largest public universities in Germany (ca. 26,100 students, over 550 professors, and around 2,000 teaching staff members). Analyses have been run on the complete set of contest data (e.g., 224 submissions, 146,921 individual votes and 27,639 individual comments), data from a follow-up survey with individual participants ($n = 943$), as well as video and audio records of four focus groups.

The article proceeds as follows. First, based on a review of literature and practice, a synopsis of extant knowledge on innovation contests is presented. Second, the theoretical framework of boundary spanning is introduced and the principles of competition and cooperation as drivers of innovativeness in an innovation contest are illustrated. In the subsequent section, the two-step methodological approach is set up before findings are presented and discussed. The conclusion summarizes the paper and points to implications for practice.

Innovation Contests: A Review of Research and Practice

An innovation contest[1] is defined as a (web-based) competition of innovators who use their skills, experience and creativity to provide a solution for a particular contest challenge defined by an organizer (Piller & Walcher, 2006; Bullinger & Moeslein, 2010). To establish a common understanding of innovation contests, we first performed a systematic literature review (Creswell, 2002) – resulting in the identification of ten key design elements with respective attributes – and second a review of practice.[2] This review integrated innovation contests which scored highest in Google's page rank (as of December 2008) and met the following criteria: *online* innovation contest; provision of *rewards*; medium to very long-term *contest period* within the last four years; majority of organizers active in the *business-to-consumer* field; and public *announcement* of the contest. For six months, we continuously added contests until saturation was reached in September 2009 with 73 contests (Glaser & Strauss, 1967). The results of the systematic literature review, i.e., ten design elements of innovation contests with their use in practice, are as follows.

Organizers of innovation contests are individuals as well as firms, public organizations, and non-profit organizations, such as museums (e.g., Smith, Banzaert & Susnowitz, 2003; Ebner, Leimeister & Krcmar, 2010). In our sample of 73 innovation contests, we found a majority of 50 contests to be conducted by firms. Only nine non-profit organizers like the Advantan Foundation (running an idea exchange platform for entrepreneurs called *Ideablob*) could be identified. Concerning media choice, innovation contests can be run online, offline or as a mixture of the two (Boudreau, Lacetera & Lakhani, 2008; Brabham, 2009). Given the focus of our research, we examined 53 contests which are purely online and 11 which include offline elements, for example a presentation in front of a jury (e.g., *Sony Ericsson Content Award 2008*). For reasons of comparison, we integrated five contests without online realization (e.g., *Advertising & Circulation Idea Contest 2009*).

Literature underlines that the organizer designs a contest with regard to a certain topic. The topic indicates specificity of the task (ranging from low if the task is very open to high if the task is highly specific) and the desired degree of elaboration. The contest might call for simple textual descriptions of rough ideas, sketches, more elaborated concepts, or even prototypes and fully functional solutions (Smith, Banzaert & Susnowitz, 2003; Ebner, Leimeister & Krcmar, 2010). Our review of practice shows a near equal distribution of these attributes. In addition, there seems to be an interplay between the required degree of elaboration and possibilities of interaction offered to participants. We find a number of contests which call for ideas and sketches and enable communication among participants and thus community-building. For instance, the *SPAR Bag Design Contest* facilitates public discussion of submissions as well as private messages between participants. Some organizers also provide the possibility for collaborative design (e.g., *IT Services for Tomorrow's Data Center*).

By definition of topic and degree of elaboration, the organizer circumscribes the target group of participants. Literature identifies a distinction between a specified target group and an unspecified target group. Specification of the target group can limit participation, for example to a country or to specific (engineering) competences as in the *Google Lunar*

X-Prize (Brabham, 2009; Bullinger, Haller & Moeslein, 2009; Carvalho, 2009). Unspecified target group indicates participation that is open to everybody – for example, *Tchibo Ideas* requires only the ability to describe a household need. In addition, the organizer indicates whether participation is possible as an individual, in teams, or both (Smith, Banzaert & Susnowitz, 2003; Boudreau, Lacetera & Lakhani, 2008; Carvalho, 2009). Interestingly, whereas 38 innovation contests in our sample allow submissions by individuals, only nine focus explicitly on teams (e.g., *Google Lunar X-Prize*). In 22 contests, for instance the *A1 Innovation Days*, participation both as a team and as an individual has been accepted – this obviously has an impact on the degree of cooperation during the contest.

Participation in a contest is allowed for a limited period of time. Contest periods range from very short term (some hours to a maximum of 14 days), short term (15 days to 6 weeks) to long term (6 weeks to four months) or even very long term (more than four months/ongoing) (Boudreau, Lacetera & Lakhani, 2008; Bullinger, Haller & Moeslein, 2009; Ebner, Leimeister & Krcmar, 2010). In practice, long-term and very long-term contests (27 and 25, respectively) prevail. Innovation contests with a complex challenge which require a high degree of elaboration, such as the *BMW Motorrad Innovation Contest*, typically run for more than four months in each stage.

Motivation to contribute one's competences to an innovation contest is fostered by a reward system that is as much as possible adapted to the needs of the target group (Ogawa & Piller, 2006; Boudreau, Lacetera & Lakhani, 2008; Bullinger, Haller & Moeslein, 2009). Rewards are realized by monetary or quasi-monetary incentives (e.g., awards or job offers), non-monetary incentives (e.g., enjoyment), or by a mixture (Piller & Walcher 2006; Brabham 2009; Bullinger, Haller & Moeslein, 2009). Non-monetary incentives are often mentioned in combination with social motivation like positive community feedback, reputation among relevant peers and self-realization (Fueller, 2006). We identified 27 innovation contests based solely on monetary rewards (e.g., notebooks in Fujitsu Siemens' *IT Services for Tomorrow's Data Center* and a prize money of US$20 million in the *Google Lunar X-Prize*) while 36 contests combine both reward schemes. Non-monetary motivation was found, for example, in the *A1 Innovation Days*, where the (originally competing) winners are invited to jointly participate in a conference.

An increasingly observed design element is community functionality, e.g., a fanpage for the contest on facebook.com, messaging services and personal profiles (Piller & Walcher, 2006; Brabham, 2009). Community functionality integrates web 2.0 applications (O'Reilly, 2007), i.e., elements which foster interaction, information exchange, topic related discussion, community building, and – if allowed – collaborative design of products. In the actual competitive environment of contests, community functionality hence facilitates cooperation. It can be found in 40 of the cases in our sample. An outstanding example is the *SPAR Bag Design Contest*, which provides a set of social networking applications comparable to facebook.com. Concerning evaluation of submissions, extant literature lists three possibilities which also can be combined: self-assessment, peer review and evaluation by a jury of experts (Carvalho, 2009; Bullinger & Moeslein, 2010; Ebner, Leimeister & Krcmar, 2010). Subsequently, a ranking of submissions is compiled and contest winners are determined. Analysis of practice shows that the winning submission is predominantly selected by a jury of experts (44 innovation contests). Only rarely is jury evaluation complemented with peer evaluation, such as, for example, in *Iqons x Nike ID*. One prominent exception to the rule is *Threadless*, which is built completely on peer review (Ogawa & Piller, 2006). If peer review is allowed, community functionalities (e.g., commenting on the submissions of other participants), are typically used to a large extent by the community of participants.

Overall, our review illustrates the rich diversity of innovation contests in practice and summarizes their key design elements. Table 1 gives a synopsis of the ten key design elements of innovation contests and their attributes. Among the ten key design elements, community functionality stands out. Especially in more recent innovation contests, a relevant increase in its usage can be observed. This functionality is important for the facilitation of community building and cooperation among participants within the competitive innovation contests. Research and practice are thus confronted with challenging questions regarding the interplay of competition and cooperation in innovation contests. The study at hand begins to answer these questions by exploring if and how cooperative orientation in the actual competitive setting of innovation contests is correlated with innovativeness.

Competition and Cooperation in Innovation Contests

The Theoretical Framework: Boundary Spanning

To explore cooperative orientation (Obstfeld, 2005) in innovation contests, extant literature

Table 1. Ten Key Design Elements for Innovation Contests (Bullinger & Moeslein, 2010)

Design element *(synonyms)*: definition	**Attributes**					
1 Media (-): environment of innovation contest (IC)	Online		Mixed		Offline	
2 Organizer (-): entity initiating IC	Company	Public organization	Non-profit	Individual		
3 Task/Topic specificity (*problem specification*): solution space of IC	Low (Open task)		Defined		High (Specific task)	
4 Degree of elaboration (*elaborateness, eligibility, degree of idea elaboration*): required level of detail for submission to IC	Idea	Sketch	Concept	Prototype	Solution	Evolving
5 Target group (*target audience, target participants, composition of group*): description of participants of IC	Specified		Unspecified			
6 Participation as (*eligibility*): number of persons forming one entity of participant	Individual		Team		Both	
7 Contest period (*timeline*): runtime of IC	Very short term	Short term	Long term	Very long term		
8 Reward/motivation (-): incentives used to encourage participation	Monetary		Non-monetary		Mixed	
9 Community functionality (*community application, communication possibility, tools*): functionalities for interaction within participants	Given		Not given			
10 Evaluation (*ranking*): method to determine ranking of submissions to IC	Jury evaluation	Peer review	Self assessment	Mixed		

on boundary spanning provides a theoretical framework. Boundary spanners are 'individuals who are especially sensitive to and skilled in bridging interests, professions and organizations' (Webb, 1991, p. 231). Obstfeld states that these persons have a cooperative orientation, i.e., 'a predisposition to bring people together in collaboration' (2005, p. 111). Individuals with high cooperative orientation have contacts outside their social group and use these contacts to support access to new knowledge, for example by defining an issue in relation to the knowledge that needs to be involved (Hosking & Morley, 1991). They also introduce disconnected individuals (e.g., from other communities), facilitate cooperation between connected individuals, and link their community to its environment (Allen, 1977).

We define the behavioural approach of cooperation as 'interactive and relational behaviour that occurs between members of a work group and that is directed at task achievement in the group' (Chen, Chen & Meindl, 1998 as cited by Milton & Westphal, 2005, p. 192). Thus, cooperatively oriented individuals have a crucial role in creating 'linkages that integrate and coordinate across organizational boundaries' (Tushman, 1977; Beechler et al., 2003), i.e., across teams, tasks, projects and similar tightly coupled activities. Individuals with high cooperative orientation engage in boundary spanning activities.

For this study on cooperation and competition in innovation contests, boundaries are defined between competing contest submissions. Consequently, high cooperative orientation (displayed by many boundary spanning activities) describes the establishment of cooperation links between competing contest submissions. This can, for instance, be done by asking other participants for their opinion. On the other hand, low cooperative orientation in innovation contests leads to very few boundary spanning activities. These individuals act as lone fighters and focus almost exclusively on the innovative activities within their group. They perceive the environment as competitive as opposed to cooperative. The following sections present extant knowledge on these extremes of cooperative orientation in innovation contests.

Competition in Innovation Contests

The principle of competition can be found in different areas of life, e.g., in the evolution of species, in sports, between organizations, or in science (von Hayek, 1971). The relationship between competition and innovation has long been of interest to economists and management researchers (Greenhalgh & Rogers, 2006; Tang, 2006; Li & Vanhaverbeke, 2009). Adam Smith suggested as early as 1776 that in a competitive environment, individual endeavour to maximize utility leads to an increase in societal utility (Smith, 2009). Similarly, Friedrich August von Hayek (1971) stresses the importance of competition for technological and societal progress:

> 'As the individual knows little and in particular, because we rarely know who knows something best, we trust in the fact that independent and competitive endeavor of many will lead to things we will ask for once we see them' (1971, p. 38).

In contrast to these influential economic thinkers, a review of the economy and management literatures shows that the relationship between competition and innovation is not unambiguous (Li & Vanhaverbeke, 2009). Some studies even see a less competitive environment as conducive to innovation (Schumpeter, 1934; Grossman & Helpman, 1991). However, there is a large body of literature stating a positive relationship between competition and innovation (e.g., Arrow, 1962; Blundell, Griffith & van Reenen, 1999; Ernst, 2004). Research on creativity and innovation also found mixed results for the influence of competition. In a study of R&D departments, negative effects of competitive pressure within the organization, expectation of negative evaluation of ideas, and worrying about reward on employee creativity were found. On the other hand, reward itself, recognition, and regular constructive feedback had positive effects (Amabile & Gryskiewicz, 1987; Amabile et al., 1996). Amabile (1996) generally assumes a negative effect of competition within an organization, but a positive effect of competition with other organizations. Shalley and Oldham (1997) found that individuals in a competitive setting generate more creative ideas than individuals in a non-competitive setting. This applies in particular if the informational aspect of the competition outweighs the controlling aspect. Similarly, Amabile (1996) concludes that a controlling environment is detrimental to creativity while an informational or enabling environment is conducive. A competition is rather controlling if individuals feel manipulated and constrained. It is rather informational if it shows participants their competences in relation to others. This can challenge them and help them to improve their concentration, their focus, their creativity and finally their performance (Shalley & Oldham, 1997). In concurrence with these studies, we argue that innovation contests offer a competitive setting where the informational aspect is salient. Participants have great autonomy and do not feel strong constraints while they feel challenged and receive valuable feedback, for example comments from other participants. This perception of freedom and self-determination is expected to lead to a high degree of creativity and innovativeness (Amabile, 1996; Amabile et al., 1996; Oldham & Cummings, 1996; Tierney & Farmer, 2002).

There is evidence that an innovation contest is suitable to solve major research problems by generating (highly innovative) concepts from many, often unexpected sources. For instance, when Florence struggled in 1418 to erect the world's widest cupola on top of Santa Maria del Fiore, a competition was held to solve this technological challenge. The winning participant and later master builder of the cupola was

Filippo Brunelleschi. Originally a goldsmith, he had transferred his knowledge to win the architectural competition with a highly innovative solution (King, 2008). Similarly, a way to measure the meridian, a major question of the time, was identified 300 years later by means of a competition (Sobel, 1995; Betts, 2006). Nowadays, competitions are still used to solve complex scientific problems. For instance, on the innovation platform *InnoCentive*, scientific challenges are posted by organizations to be solved in a competition. Challenges range from business and entrepreneurship to physical sciences, where, for example, new approaches to implant a medical device into the heart are sought.

These examples illustrate that competitions have proved to be well suited for the solution of scientific challenges for many centuries. By awarding a prize to a very small set of participants, innovation contests thereby use their competitive character to drive innovation.

Cooperation in Innovation Contests

Literature identifies mainly positive effects of cooperation, interaction and communication on creativity and innovation. Referring to product development teams, Kratzer and colleagues state that

> 'since the core product of innovation activities is knowledge, and this knowledge can only be created through interaction between specialists with varying backgrounds of expertise, the cement of innovation activities is communication' (Kratzer, Leenders & van Engelen, 2004, p. 64).

It has been found that an increase in communication might foster the development of innovative ideas (Monge, Cozzens & Contractor, 1992). Similarly, Taggar (2002) observed that effective communication, involving others, and providing feedback positively influenced a team's creative performance. However, these findings go beyond teams. Several studies observed that contact with diverse others and communication of information and ideas generally have a positive effect on creativity (e.g., Kanter, 1988; Woodman, Sawyer & Griffin, 1993; Amabile, 1996; Perry-Smith & Shalley, 2003). Chen and colleagues (Chen, Chang & Hung, 2008) found that social interactions as well as network ties have a positive effect on the creativity of R&D project teams. Similarly, Perry-Smith and Shalley (2003) ascertained that individuals with a peripheral position in their social network and many outside ties were most creative. Persons who have ties across the boundaries of their social group have contact with a heterogeneous set of people and thus are more likely gain access to different perspectives (Perry-Smith & Shalley, 2003; Perry-Smith, 2006). This can initiate cognitive processes like flexible and divergent thinking and the ability to generate various alternatives (Coser, 1975; Granovetter, 1983; Kanter, 1988). It allows individuals to validate potential responses to a problem or a task against the implemented solutions of their contacts (Perry-Smith & Shalley, 2003). This facilitates cognitive recombinations and uncommon connections and thus increases creativity (Mumford & Gustafson, 1988; Simonton, 1999; Perry-Smith, 2006). Hence, sharing knowledge with others helps individuals to revise their own knowledge and to refine their ideas (Perry-Smith & Shalley, 2003; Swift, Matusik & George, 2009).

Evidence that interaction, communication and thus cooperation are positively related to creativity and innovativeness is provided by the increasing number of implemented community-based innovation contests. These contests offer the possibilities of interaction and cooperation among participants. Thus, community-based innovation contests build on and foster a community among participants, making cooperation an important element in innovation contests. For instance, the *LED Emotionalize Your Light* contest organized by Osram (subsidiary of Siemens), one of the three world leading producers of illuminants, invited participants to submit new and innovative ideas and designs for LED light solutions with a 'wellness or wellbeing' focus during a seven-week period. Overall, 572 LED ideas were submitted and 9,056 evaluations were cast. A total of 910 participants in all spent 260,100 minutes on the platform (about half a year). This intense activity has been enabled by a set of community functionalities that resemble facebook.com, encompassing, for example, personal profiles, direct messages, commenting of ideas and display of user activity. The *LED Emotionalize Your Light* contest illustrates the realization of web 2.0 community functionality. Competitors are thus enabled and encouraged to interact on account of contest submissions and to build an innovation community.

Synopsis

The principle of competition in historical as well as in current innovation contests is adequate for participants with low cooperative orientation. Acting as lone fighters, they apply their individual expert knowledge to solve the challenge. From the perspective of the ten key design elements, competition is typically realized with the design element 'participation as'

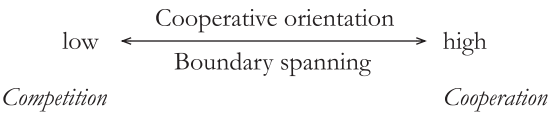

Figure 1. The Continuum of Cooperative Orientation and Boundary Spanning

being limited to individuals, while the design element 'community functionality' is typically not given.

On the other hand, extant knowledge on high cooperative orientation in innovation contests observes that these contests are designed to draw on the collective innovative capability of communities. Accordingly, the design element 'participation as' is realized by the attributes team or both, while the design element 'community functionality' is typically given.

Building on the degrees of cooperative orientation as conceptualized by Obstfeld (2005), we set for this paper that low cooperative orientation, i.e., very few boundary spanning activities, corresponds to competition, whereas high cooperative orientation, i.e., a lot of boundary spanning activities, corresponds to cooperation (see Figure 1).

From theory, we assume a correlation between competitive respectively cooperative orientation and innovativeness. Building on the continuum of cooperative orientation and boundary spanning as depicted in Figure 1, we interpret competition and cooperation as the extremes of a continuum measured by cooperative orientation. As we argue that both extremes are positively associated with innovativeness, we consequently assume that the degree of participants' cooperative orientation and the degree of their innovativeness stand in a non-linear relation. Along this line, we propose the following hypothesis:

> *The degree of cooperative orientation will have a U-shaped relationship with the degree of innovativeness: very high cooperative orientation or very low cooperative orientation leads to a high degree of innovativeness.*

The two-step research design to test the hypothesis is presented in the next section.

Methodological Approach

To address our hypothesis empirically, a two-step research design is used based on the complete data set of a community-based innovation contest run in 2009. The contest ran for eight weeks at one of the largest universities in Germany, built on team submissions, and was based on a web 2.0 innovation contest platform. The required degree of elaboration was at concept level, asking for visualizations. The resulting data set comprises 224 submissions by 214 contest teams (a team is composed of three to five members), 146,921 individual votes, 27,639 comments, and data from a follow-up survey with individual participants ($n = 943$).

The methodological approach encompasses a first exploratory step with four focus groups to gain in-depth insight into the cooperative orientation and cooperative behaviour of participants during the innovation contest. Second, a survey is used to better understand the relation between cooperative orientation and innovativeness in innovation contests (Dillman, 2000).

The four focus group sessions in research step 1 centred on cooperative orientation and cooperative behaviour of participants during the innovation contest, the influence of cooperative orientation on innovativeness, and the establishment of innovation communities. Participants were (a) the three winning teams (i.e., the top innovators) and (b) very cooperatively oriented participants. These were identified by their commenting behaviour. First, descriptive statistics of the 27,639 comments were analysed to identify participants who were the most comprehensive commentators (those five participants issuing the highest average length of comments) as well as the most active commentators (those five participants who wrote the largest number of comments). Second, qualitative content analysis (Mayring, 2008) of the comments issued by these ten participants was performed. This led to the elimination of four potential participants whose comments did not exhibit an intention to interact, i.e., did not show cooperative orientation. The remaining most comprehensive commentators took part in the focus group session; one of the most active commentators could not participate. From the group of top innovators, 11 were present in the focus group sessions. Each focus group session lasted more than two hours and was recorded both by video and audio.

A grounded theory approach (Glaser & Strauss, 1967) was used to analyse the data set of these focus groups. Each statement in the transcripts thus represents one 'incident'. Starting from the research question, a classification scheme for incidents was iteratively elaborated by two researchers independently. By constant comparison, we systematically compared each incident to former ones (Glaser & Strauss, 1967). This allowed assigning the incident to an existing category, modifying the category or adding a new one.

During research step 2, subsequent to the focus group sessions, a web-based survey among the individual contest participants was run to better understand the relation between cooperative orientation and innovativeness. The survey builds on the cooperative orientation scale by Obstfeld (2005) and uses two dimensions of innovativeness: novelty and usefulness (Amabile, 1996, p. 35), which are combined on the basis of their means (cf. Woodman, Sawyer & Griffin, 1993; Plucker, Beghetto & Dow, 2004). The survey was open for four weeks after the contest period and resulted in a return rate of 84% ($n = 943$). During analysis, teams were excluded if fewer than three members completed the survey, which leads to a data set survey comprising individual data from members of 177 teams. Then individual scores were averaged to compute values for the teams.

As we assume a U-shaped relationship between the degree of cooperative orientation and the degree of innovativeness, a non-linear regression model, i.e., a univariate quadratic regression, was tested.

Findings on Competition and Cooperation in Innovation Contests

Analysis of the focus group sessions of research step 1 led to a dual set of results. Focus groups centred on cooperative orientation and cooperative behaviour of participants during the innovation contest and the influence of cooperative orientation on innovativeness. As first results, details on participants with low cooperative orientation were identified. Second, the data shows the need for a more nuanced perspective on boundary spanning. Thus, two subtypes of boundary spanning among participants with a high cooperative orientation can be distinguished: proactive and reactive boundary spanning. These subtypes extend the body of literature in the field by identifying a set of drivers of boundary spanning.

Low Degree of Cooperative Orientation

The focus groups led to the interesting insight that one of the winning teams, i.e., the top innovators, had a low cooperative orientation. They focused on their submission without taking into consideration any external feedback. Interestingly, their focus was so intense that they even ignored the comments they had received. One participant stated:

> 'We have not even read the comments [on our submission]. I once scanned them, but to be honest, I didn't think it is worth the time checking them. We knew what we wanted to do anyway' (ID 517).

Submission of a concept according to their team-internal agreement was thus most important to participants with low cooperative orientation. This might be in part due to the fact that participants refined their concept until they were convinced of the quality and thought it sufficiently elaborated to win the competition:

> 'We submitted our concept late – we have not been satisfied with the quality before. But when we submitted it, we thought it would be good enough to win, and well – in the end it was' (ID 718).

Focus group discussions hence strengthened our hypothesis: some of the winning, i.e., highly innovative participants showed a high degree of competitive orientation (which corresponds to a low degree of cooperative orientation, see Figure 1). Very low cooperative orientation is hence supposed to lead to a high degree of innovativeness. These participants did not engage in boundary spanning activities, but focused on elaborating their concept. The data furthermore strengthens our proposition to equal a low degree of boundary spanning with competitive orientation. Participants only submit when they assume their concept has a chance to actually win the innovation contest.

High Degree of Cooperative Orientation

The data shows that participants with a high degree of cooperative orientation follow two paths to span boundaries. From the focus group discussions, we distinguish proactive and reactive boundary spanning. Next we present this more nuanced perspective on boundary spanning in a community-based innovation contest.

Proactive boundary spanning is described as (a) active monitoring and reviewing of the flow of action – submissions, comments and other feedback – taking place during the innovation contest. In addition, participants with this kind of cooperative orientation (b) actively search for and establish links between organizational boundaries as stated by Beechler et al. (2003). Our data analysis shows three types of individual drivers for proactive boundary spanning: curiosity, support and assertion.

The first driver, *curiosity*, can be described as a general interest in the work of competitors. Participants driven by curiosity enjoyed reviewing submissions and comments of others and felt triggered to express their opinion thereon:

> 'I thought it was interesting just to see all the other submissions and how they had done it and I enjoyed watching and commenting it' (ID 488).

Curiosity is identified to be rather dichotomous: participants emphasizeded that they preferred to explore and link to submissions which had previously received very good or very bad feedback as well as submissions without any previous comments:

> 'I [. . .] checked those submissions without evaluations. [. . .] I wanted to know what could be the reason for this' (ID 431).

The second driver, *support*, can be described by an individual's desire to value and to reward outstanding work by other participants.

> '[. . .] so I had so many suggestions here. [. . .] well, because I wanted to reward him for his decent work and good effort' (ID 606).

The third driver, *assertion*, is particularly interesting. First, participants expressed a general preference to review and comment submissions which they judged to be of low quality. The expression of disagreement with such submissions or with previous comments seemed more satisfying compared to identifying and commenting on some minor aspects for improvement in an already well-elaborated submission. In this case, highly cooperative participants stated that they really wanted to contribute to the competing submission by providing justified and constructive critique:

> 'First, I watched the video, considered different criteria [. . .], and then I tried to comment in a way that explains my point of view. And then, of course, I tried to make a suggestion for improvement' (ID 488).

Second, the driver assertion was in many cases characterized by very comprehensive and constructive comments as participants intended to adequately express, explain and justify their opinion:

> 'That's why I made it a bit longer sometimes, so they can't question my opinion that much. I really wanted to clarify why I think like that' (ID 67).

Reactive boundary spanning was realized by positively receiving boundary spanning activities from others, for example by reading comments on the own and competing submissions. Thus individuals critically reconsidered their own work and learned from their competitors. The driver for reactive boundary spanning is hence *improvement* of the own work.

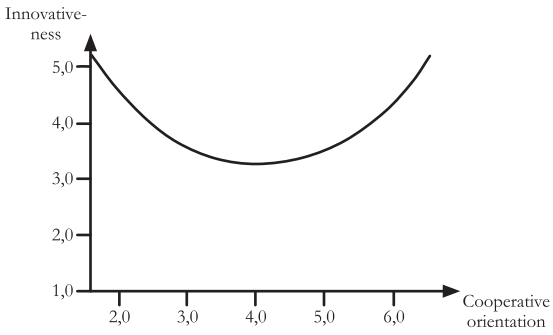

Figure 2. Quadratic Relation between Innovativeness and Cooperative 0rientation

> 'I had a look at the comments we received and was actually of the same opinion' (ID 123).

> 'Well, we have only received three negative comments and these were issues [. . .] we had already thought of. That was quite satisfying' (ID 433).

The focus group discussions strengthened our hypothesis because, among the winning participants (i.e., highly innovative participants) were a set of persons with a very high degree of cooperative orientation. Very high cooperative orientation is supposed to lead to a high degree of innovativeness. Participants with high cooperative orientation did engage in two kinds of boundary spanning: proactive boundary spanning and reactive boundary spanning.

Building on the findings from qualitative research, our assumption that both very low and very high degrees of cooperative orientation lead to a high degree of innovativeness is strengthened. This assumption was tested during research step 2.

Analysis of the survey data from research step 2 led to a confirmation of our hypothesis. As shown in Figure 2, the degree of cooperative orientation and the degree of innovativeness have a non-linear relation, more specifically, are quadratically related. This result supports our hypothesis.

The overall significance of the regression is tested using the F-test ($F = 7.877$; $p = 0.001$). Adjusted R^2 is 0.083. Therefore, the explained variance is fairly low. However, this is not surprising, as previous research has identified a variety of potential influencing factors on innovativeness.

The U-shaped relation between cooperative orientation and innovativeness is interpreted that both a very low and a very high degree of cooperative orientation result in a high degree of innovativeness. A medium degree of cooperative orientation, however, seems to be less

promising. This is in line with the extant literature on the relation of innovativeness to both competition and cooperation. As data from the focus groups shows, teams which focus solely on their submission can be highly innovative. Given the short time span of the community-based innovation contest we examined, coordination and collaboration within the team is already challenging. For participants with a low degree of cooperative orientation, spanning any more boundaries does not seem to hold any attraction. They might prefer to bundle resources in terms of time and attention and focus on the task.

On the other hand, again in line with the findings from the exploratory research step 1, there are teams which profit from a high degree of boundary spanning. They actively monitor the activities of others or review critique of their own submissions, thus assimilating many different perspectives. These teams might even forego an internal harmonization and simply draw on their capability to integrate innovative concepts from beyond their boundaries. Integration of external knowledge can thereby play an important role both at the ideation stage and during further development of the submission.

The bottom of the U-shaped curve, however, indicates that a medium degree of boundary spanning is related to a considerably lower degree of innovativeness. We suppose that this is partly due to the fact that teams which try to internally align their interests and concentrate on their work while at the same time listening to others and trying to integrate external knowledge are overstrained.

Cooperation Meets Competition: Discussion of Findings

The main objective of this study is to investigate if and how cooperative orientation in the competitive setting of innovation contests is correlated with innovativeness. By examining both aspects, it goes beyond extant studies that tend to focus on either the competitive or the cooperative aspect.

The results of this research first contribute to the body of knowledge on open innovation (e.g., Chesbrough, 2003; Piller & Walcher, 2006; Neyer, Bullinger & Moeslein, 2009) by showing that an innovation contest can deliver highly innovative solutions if it is designed for participants with a very high cooperative orientation and with a very low cooperative orientation. Design of an innovation contest, however, should not target participants with a medium degree of cooperative orientation as these participants show only a low degree of innovativeness. The U-shaped relationship of cooperative orientation and innovativeness that we identified will now be discussed in more detail.

First, very low cooperative orientation, i.e., high competitive orientation, is related to a high degree of innovativeness. The empirical evidence echoes the existing literature (e.g., Amabile, 1996; Ernst, 2004; Li & Vanhaverbeke, 2009) which suggests that a competitive set up (like an innovation contest) encourages users to participate, inspires their creativity, and increases quality of submissions. Given the correspondence of very low cooperative orientation and a high degree of innovativeness, it is interesting to investigate the underlying reasons for this orientation. From the data set of this paper, we found that competitively oriented participants are not willing to cooperate as they are mainly interested in defeating other competing participants. For these participants, winning the reward has been identified as a main driver. Going beyond empirical evidence, we suppose that in addition to competitive orientation, there might be other reasons why participants are not willing to engage in boundary spanning. In concurrence with the study of Bullinger, Haller and Moeslein (2009), we propose that participants with low cooperative orientation might simply be indifferent towards other participants. They thus participate in the innovation contests focusing only on their own submission. Bullinger, Haller and Moeslein (2009) speak in this context of an innovation contest populated by an *innovation mob*, i.e., a set of participants which focus solely on submission but are not willing to interact with other participants. In addition to the lack of willingness to cooperate, we suppose that some participants with low cooperative orientation do not perceive a benefit of boundary spanning. Expert participants might be convinced that their competencies are higher than the expertise of others and accordingly expect that boundary spanning activities will not pay back the investment. It is furthermore likely that also opportunism could reduce the perceived benefit and thus lead to low cooperative orientation. If participants are interested in satisfying their curiosity, watching the submissions and comments of others would be sufficient. Summing up, this research has shown that low cooperative orientation is in line with high competitive orientation. Future studies should further explore the possible reasons for low cooperative orientation.

Second, this research has also shown that very high cooperative orientation corresponds

to a high degree of innovativeness. Highly cooperative individuals are able to integrate knowledge from outside into their work as well as balance cognitive distance and cognitive proximity in groups (Nooteboom, 2000). The results confirm existing studies on cooperation in open innovation and crowdsourcing which identify a positive relationship between cooperation and innovation (Chesbrough, 2003; Lakhani & Wolf, 2005; Howe, 2008; Neyer, Bullinger & Moeslein, 2009).

Note that a medium degree of cooperative orientation leads to a low degree of innovativeness. This could result from the fact that individuals who are medium innovative and divide their time between focused work on their own idea and some boundary spanning activities with competitors can neither draw on the benefits of concentration nor on the positive effects of interaction. Given the relatively short runtime of an innovation contest, this effect is expected to be even stronger than, for example, in a long-standing organizational setting. In contrast to an R&D team which works together for months or years, an innovation contest does not offer the possibility to adjust individual behaviour and limits the possibilities to learn due to the time constraints. While this research represents one of the first attempts to understand how cooperative orientation is correlated with innovativeness in a competitive setting, comparison of results within an organizational setting seems an important aspect to examine in the future.

The second strand of results of this research contributes to the body of knowledge on boundary spanning by showing that high cooperative orientation can take the form of proactive boundary spanning, i.e., active monitoring of the flow of action as well as active establishment of links across boundaries, or reactive boundary spanning, i.e., positively receiving boundary spanning activities from others. This more finely grained concept of boundary spanning extends the body of literature in the field (e.g., Tushman, 1977; Beechler et al., 2003; Obstfeld, 2005). Our findings suggest that observing the type of boundary spanning activities can help to identify participants especially supportive of community building. Proactive boundary spanners are strong community-building innovators, i.e., deliver highly innovative submissions and simultaneously support competing participants. An example of pro-active boundary spanning can be found, for instance, with the *Save our Energy* contest. In addition to innovative solutions for energy efficient cities, the establishment of a cooperative community is successfully supported by a set of community functionalities. However, research is still needed to find ways to identify proactive boundary spanners, for example by a semi-automated content analysis of comments in a previous innovation contest.

The results should be considered in the light of several limitations. Of particular concern is that the quadratic regression explains only 8% of the variance. This is little surprising as we operated with only one independent variable. However, as we did not target development of a complete model, but rather aimed to identify whether or not a high or low degree of cooperative orientation results in a high or low degree of innovativeness, this is acceptable. Future research can explore additional factors assumed to influence innovativeness in addition to cooperative orientation. Further, we argue that given the surge of community-based innovation contests in practice, there is a need to better understand individual skills, abilities and goals of cooperating and competing participants. Cooperative orientation – as studied in this article – is one aspect, identification and weighing of further factors can be explored in future studies. Finally, a comparison of our study across several innovation contests would allow for stronger generalization of our findings.

Conclusions

This article explores if and how cooperative orientation in the actual competitive setting of innovation contests is correlated with innovativeness. Building on social network theory, we begin to answer this question with the help of a unique data set from a community-based innovation contest.

The first strand of findings centres on the U-shaped relationship between cooperative orientation and innovativeness. This quadratic relation suggests that both extremes, very low and very high cooperative orientation, result in a high degree of innovativeness. However, a medium degree of cooperative orientation results in a lower degree of innovativeness. From our findings on cooperative orientation and innovativeness, we derive first managerial implications. Setting up an innovation contest with the strategic goal of collecting highly innovative solutions, participants with very high and very low cooperative orientation are suitable for participation. Thus, depending on the strategic intentions, an organizer can design an innovation contest along three avenues. First, supporting participants with a very high degree of cooperative orientation, the contest will result in highly

innovative outputs and a community of participants will be established (see *LED Emotionalize Your Light*). It has been shown that the deployment of the design element 'community functionality' is particularly suited to support participants with very high cooperative orientation (Piller & Walcher, 2006; Brabham, 2009). Second, if the organizer is interested mainly in highly innovative submissions of single persons, the contest should be designed to support persons with a very high degree of competitive (i.e., a very low degree of cooperative) orientation. Expert contests such as the *Virgin Earth Challenge*, for example, need little community functionality, as submissions are typically not available to other participants. Third, if an organizer is interested in both highly innovative submissions and community building among the participants, both very low and very high cooperative orientation should be supported. This might be realized by accepting both individual and team submissions as in the case of *Netflix Prize.*

As a second strand of findings, this research has extended the concept of boundary spanning by identifying two subtypes: proactive and reactive boundary spanning. Findings in this field lead to the second set of managerial implications. We propose that if proactive boundary spanning is desired by the organizer, the individual drivers need to be adequately represented in the design of the contest, for example by a preview of the submission which triggers curiosity.

In sum, this article provides a first foundation for research and practice to further explore the relation between cooperative orientation and innovativeness in innovation contests.

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Notes

1. The term 'innovation contest', rather than alternatives such as 'idea contest' (Piller & Walcher, 2006), 'ideas competition' (Leimeister et al., 2009) or 'design contest' (Brabham, 2009), illustrates 'that a contest is suited to cover the entire innovation process from idea generation to selection and implementation' (Bullinger & Moeslein, 2010).
2. Details of both the systematic literature review and the review of practice have been published elsewhere (see Bullinger & Moeslein, 2010). Subsequently, only pertinent articles are referenced and relevant contest examples are used for illustrative purposes.

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