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Does collaboration among participants lead to better ideas in IT-based idea competitions? An empirical investigation

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Abstract: Open innovation research shows that idea competitions are a promising approach for integrating customers and that most innovations are a result of intensive collaboration (Franke and Shah, 2003; Gascó-Hernández and Torres-Coronas, 2004; Nemiro, 2001; Sawhney et al., 2005). Thus, fostering collaboration among idea contributors might be a fruitful approach for unleashing the customers' entire creative potential and making idea competitions even more successful. This paper reports on a field study in which idea contributors could collaborate in an IT-based idea competition using the wiki technology. We tested whether user collaboration positively influences the quality of the submissions applying an in-depth analysis of idea quality. Our results show that user collaboration enhances idea quality and that inducing user collaboration is a viable design element for making idea competitions more effective. This contributes to a more successful design, implementation and operation of idea competitions, as well as to better outcomes. The article concludes with a discussion of customer groups collaborating in idea competitions (extrinsically and intrinsically motivated customers).

Keywords: idea competitions; collaboration; open innovation; crowdsourcing; toolkits; software development; user innovation; new product development; R&D.

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1 Introduction

In the 20th century, many leading industrial companies generated, developed and commercialised ideas for innovations in self-reliance. Nowadays, companies are increasingly rethinking the fundamental ways of managing their innovation activities. Thus, opening up company boundaries in order to utilise external resources for

innovation activities becomes more and more important. For this emerging competitive strategy of open innovation, customers are frequently seen as enormous potential for generating innovations (von Hippel, 2005; Enkel et al., 2005; Kristensson et al., 2002).

In literature and practice, idea competitions are discussed and generally acknowledged as being an effective practice for integrating customers into the early stages of the innovation process (Koufterous et al., 2005). Although holding idea competitions sounds like a familiar method to get access to customer knowledge, there is only limited research that has studied this customer integration practice in detail (Toubia, 2006; Ernst, 2004). Most available literature focuses solely on studying idea competitions from the perspective of social science, especially business administration. For instance, although Walcher (2007) has explored characteristics and motivations of participants of idea competitions, lacking are studies that address the design of internet-based platforms for idea competitions which typically address the domain of information science. As a first, research in this field has been conducted by Leimeister et al. (2009), who studied technical and organisational design elements of an idea competition in order to influence customers' participation. But thus far no research has been carried out on design elements for maximising the outcome of idea competitions that can be defined as the quantity and quality of the ideas submitted.

Generally, one way to enhance idea quality can be seen in offering the 'right' incentives to participants (Toubia, 2006). Another measure for enhancing idea quality could be fostering collaboration among idea contributors. Research shows that most innovations are generally not the result of a single inventor but rather of collaboration processes where many individuals contribute and combine their individual knowledge, experiences, and strengths (Franke and Shah, 2003; Gascó-Hernández and Torres-Coronas, 2004; Nemiro, 2001; Sawhney et al., 2005). Processes of intensive user collaboration can often be found in virtual communities where anecdotal evidence shows that some users breed high quality products in decentralised collaboration settings (von Hippel and von Krogh, 2003). These products often compete with products developed in traditional innovation processes. Examples comprise, e.g., the Wikipedia project or open source software (Giles, 2005; Lakhani and von Hippel, 2003). In such communities, initially developed ideas are picked up by other community members and are elaborated step by step. Each participant can not only contribute own ideas, but also connect with idea contributors that have submitted similar or complementary ideas, and then elaborate ideas in collaboration. Thus, the various teams collaboratively elaborate ideas that might be better, more meaningful, and more relevant than those that were initially submitted. Bretschneider et al. (2008) assume that ideas generated in this manner are often enriched with solution information for customer needs. Solution information represents not only the customer's needs and wishes but also customer based suggestions that describe how to transfer these ideas into marketable products (von Hippel, 1994).

Focusing on this aspect, this paper aims to explore collaboration as design element in idea competitions. We investigate whether user collaboration in idea competitions positively influences idea quality. We therefore conducted a field test in which a collaboration tool based on the wiki technology was implemented on an idea competition's online platform, after which we compared the idea quality of ideas elaborated collaboratively with that of ideas contributed without any collaboration.

This paper is organised as follows: In Section 2 we provide a literature review for describing the state of the art of idea competitions, as well as the complex constructs of idea quality. Section 3 presents the data collection, the design of the field test, the used

collaboration instruments, and the assessment of idea quality. In Section 4 our empirical findings on measuring idea quality in idea competitions and the effects of collaboration are given. In Section 5 the results are discussed and recommendations made for the design of idea competitions. Finally, Section 6 offers an outlook for possible future research areas.

2 Theoretical background

2.1 Idea competitions

An idea competition can be defined as an invitation of an organiser, namely, a firm, to the general public or a targeted group to submit contributions to a certain topic within a timeline. An idea reviewer committee evaluates these contributions and selects the winner (Ebner et al., 2009).

In conducting idea competitions, firms aim to integrate customers in the process of gaining and generating new innovation ideas in the early phases of new product development. By opening up the innovation activities to customers, more potential perspectives and ideas for creating innovation can be gained. Said another way, the amount of innovation potential that is poured into the innovation funnel is increased, and hence the likelihood of developing disruptive innovation rises. Thus, utilising the 'collective intelligence' or 'wisdom of crowds' of its own customer base is the underlying principle of idea competitions (Libert and Spector, 2008; Surowiecki, 2005). In order to leverage this potential, an inherent competition character is forced by awarding the best ideas: the participants' motivation, creativity, and efforts are encouraged, thus leading to submission of better quality (Piller and Walcher, 2006).

As research on idea competitions in the context of customer integration in innovation processes is limited, idea competitions can be described as a phenomenon of practice. Today, they are an elaborated method for active customer integration (Ebner et al., 2009) with prominent examples underpinning the enormous potential of this approach. In 2006 IBM invited its customers and employees to the 'innovation jam' idea competition. In the end, more than 140,000 participants contributed more than 46,000 ideas. The best ideas resulted in various projects as software applications and services for micro-finance institutions. Adidas (Piller and Walcher, 2006), Motorola, Henkel or Fujitsu Siemens are just a few examples.

Leimeister et al. (2009), as well as Ebner et al. (2009), have developed a broad framework for categorising idea competitions, and have revealed major trends in as well as best practices for running idea competitions. In general, tasks are kept generic, offering a large solution space to potential participants for targeting as many customers as possible. Submissions include a brief description of the idea, regularly limited to a maximum length of five DIN A4 pages. Incentives for customer participation often comprise remuneration of more than 1,000 EUR. The typical competition duration varies between four and 26 weeks. In practice, idea competitions are generally run via internet-based platforms based on the toolkit approach. After submission, the ideas are presented on the platform and can be regarded, discussed or even evaluated by other participants. For companies, internet technology facilitates the realisation of an idea competition, as the internet provides access for a larger group of customers and facilitates

submission of ideas for participants. To sum up, internet applications lower the efforts and costs for participants, as well as for organisers (Piller and Walcher, 2006).

2.2 Evaluating idea quality

Since all innovation begins with creative ideas (Kristensson et al., 2004), the evaluation of new ideas is strongly related to the assessment of their inherent creativity. But creativity and idea quality are both complex constructs. Due to their 'fuzziness,' a broad range of different evaluation methods for assessing idea quality in idea competitions is applied in practice. In general, the evaluation process is carried out by an independent expert jury, but the methods in use range from unstructured discussions to complex rating schemes based on consensual assessments of the referees.

Furthermore, there are many different rating criteria applied in idea competitions for assessing idea quality, and thus no real best practices can be deducted. However, assessing idea quality has been a subject for creativity, group support system and innovation researchers for years, and various metrics for assessing the quality of creative products and ideas have been discussed in the course of time. An extensive literature review reveals that most of these measures can be categorised into one of the four different dimensions: novelty, relevance, feasibility or elaboration (cf., Table 1).

Table 1 Dimensions of idea quality

Novelty	(Amabile, 1996; Ang and Low, 2000; Barki and Pinsonneault, 2001; Besemer and O'Quin, 1986, 1999; Cady and Valentine, 1999; Dean et al., 2006; Finke et al., 1996; Franke et al., 2006; Horn and Salvendy, 2006; Im and Workman, 2004; Kristensson et al., 2004; Lilien et al., 2002; Lüthje, 2000; MacCrimmon and Wagner, 1994; Rochford, 1991; Walcher, 2007; White and Smith, 2001)
Relevance	(Amabile et al., 1996; Ang and Low, 2000; Barki and Pinsonneault, 2001; Besemer and O'Quin, 1986, 1999; Cady and Valentine, 1999; Finke et al., 1996; Im and Workman, 2004; Kristensson et al., 2004; Lilien et al., 2002; MacCrimmon and Wagner, 1994; Niu and Sternberg, 2001; Rochford, 1991; White and Smith, 2001)
Feasibility	(Amabile et al., 1996; Ang and Low, 2000; Barki and Pinsonneault, 2001; Besemer and O'Quin, 1986, 1999; Cady and Valentine, 1999; Dean et al., 2006; Finke et al., 1996; Franke and Hienerth, 2006; Horn and Salvendy, 2006; Im and Workman, 2004; Kristensson et al., 2004; Lilien et al., 2002; MacCrimmon and Wagner, 1994; Niu and Sternberg, 2001; Rochford, 1991; Soll, 2006; Walcher, 2007; White and Smith, 2001)
Elaboration	(Amabile, 1996; Besemer and O'Quin, 1986, 1999; Cady and Valentine, 1999; Dean et al., 2006; Finke et al., 1996; Franke et al., 2006; Kristensson et al., 2004; Lüthje, 2000; MacCrimmon and Wagner, 1994; Niu and Sternberg, 2001; Walcher, 2007; White and Smith, 2001)

Today, there is still no universal definition of creativity (White and Smith, 2001), but there is consensus that creative solutions are generally characterised as being new and useful (Amabile, 1996; Mayer, 1999; Niu and Sternberg, 2001; Plucker et al., 2004). Novelty is often defined as something being unique or rare. In this context, new ideas have not been expressed before (MacCrimmon and Wagner, 1994). A closely related trait of novelty is originality. Original ideas are not only new, but also surprising, imaginative, uncommon or unexpected (Ang and Low, 2000; Dean et al., 2006), and many researchers see originality as the most important facet of creativity (Besemer and O'Quin, 1999;

Runco and Sakomoto, 1999; Walcher, 2007). Another attribute of novelty is the paradigm relatedness (Besemer and O'Quin, 1986; Finke et al., 1996; Nagasundaram and Bostrom, 1994). This refers to an idea's transformational character, and describes the degree to which an idea helps to overcome established structures, i.e., how radical or revolutionary it is (Besemer and O'Quin, 1986; Christiaans, 2002). From a new product development perspective, an idea's paradigm relatedness refers to its innovativeness.

However, an idea's novelty is not sufficient for being unique and useful. Usefulness is the extent to which the idea responds to or solves a problem that is tangible and vital (Amabile, 1996; Dean et al., 2006). This dimension is also named as an idea's value or relevance (Dean et al., 2006; Kristensson et al., 2004; MacCrimmon and Wagner, 1994). In the scope of new product development, this refers frequently to an idea's financial potential (Cady and Valentine, 1999; Franke and Hienerth, 2006; Lilien et al., 2002; Rochford, 1991; Soll, 2006), the strategic importance in terms of enabling competitive advantages (Cady and Valentine, 1999; Lilien et al., 2002; Rochford, 1991), as well as the customer benefit that an idea endows (Piller and Walcher, 2006; Walcher, 2007). From the innovator's perspective, an idea's feasibility is another vital dimension of idea quality. This dimension captures the ease with which an idea can be transformed into a commercial product (Kristensson et al., 2004; Soll, 2006) and the fit between the idea and the organiser (Lilien et al., 2002; Cady and Valentine, 1999; Rochford, 1991). In this context, the fit is two-pronged: From an internal perspective fit, it refers to the organiser's strategy, capabilities and resources, and from an external perspective, to the fit between the idea and the organiser's image. Another trait of a high quality idea is its elaboration, which can be seen as the extent that it is complete, detailed and well understandable (Dean et al., 2006). Furthermore, this refers not only to an idea's description but also to its maturity (Franke and Hienerth, 2006).

3 Research methodology

3.1 Data collection

The data for this investigation was collected during the SAPiens idea competition. SAPiens was an internet based idea competition initiated by the ERP software producer SAP. The idea competition was run in the summer of 2008 over a period of 14 weeks, targeting users of SAP software. The invited SAP users were asked to submit ideas that improved the SAP software or that would bring out radical innovations in the scope of the SAP software. The idea competition consisted of two phases: in the first phase, ideas could be submitted on the online platform and picked up for collaboration; in the second phase, the ideas were evaluated by an independent expert jury. The ten best ideas were rewarded by monetary and non-monetary prizes of 6,000 EUR.

Ideas had to be submitted via an internet toolkit that was designed and implemented especially for the SAPiens idea competition, which could be visited only after registration. Each submitted idea, phrased in a maximum length of a DIN A4 page, was visualised in an idea pool, a separate section of the online platform that was visible for all visitors of the internet platform. In this idea pool all ideas could be examined, evaluated and picked up for further elaboration by the participants. Figure 1 shows the homepage of the SAPiens online platform.

During the competition 127 users registered on the SAPiens website. Of those users, 39 actively participated in the competition by submitting at least one idea. The contributors submitted 57 ideas in total. The rest of the 127 registered users participated by voting and commenting on other users' submissions, or they simply lurked. The average participant was male and young: 72% of participants were male and 78% of the participants were between 20 and 25 years of age.

Figure 1 Homepage of the SAPiens idea competition (see online version for colours)

3.2 Research design

In order to analyse the influence of collaboration on idea quality, the submitted ideas were categorised into two distinct groups. The first group (n = 36) solely contained ideas which were collaboratively submitted by a group of participants. The second group (n = 21) contained ideas that were submitted by only one participant. Group assignment did not take place randomly. Based on collaboration activities, there was a self selection of participants. In this quasi-experiment, idea quality served as independent variable and user collaboration as dependent variable.

3.3 Collaboration instruments

Collaboration among the participants was made possible by using the wiki technology. Wikis are not only a well-established and easy-to-use technology, but they also foster collaboration of many users, thus promoting the creation of social networks among formerly anonymous users. Every single user was able to pick up all other participants' ideas in the idea pool in order to make edits. Each idea description contained an 'edit this page' button that opened a wiki page for making amendments (cf., Figure 2).

Moreover, different communication tools and community functionalities were implemented for fostering collaboration. Every participant's contact details, e.g., including email address, skype nickname and phone number, were visible within the user profiles, which were accessible to all participants. In addition, each idea description could be commented on, enabling extensive discussions on the online platform.

Figure 2 Editing ideas via the wiki technology (see online version for colours)

3.4 Assessing idea quality

Based on the literature review in Section 2.2, a suitable evaluation scale consisting of 15 items was developed (cf., Appendix). Each of the idea quality's distinct dimensions was operationalised by three different items (novelty consists of two dimensions). Subsequently, we evaluated the ideas using Amabile's consensual assessment technique (CAT) (Amabile, 1996), which has been severally used for evaluating customer generated new product ideas (Franke and Hienerth, 2006; Blohm et al., 2010; Piller and Walcher, 2006; Kristensson et al., 2004; Matthing et al., 2006; Walcher, 2007). Using this method, ideas are evaluated by a jury consisting of experts in the given domain. In our case, the jury consisted of seven referees, who were either university professors, or were employees of the initiator SAP or the German SAP University Competence Centres. For evaluation, the idea descriptions were copied into separate evaluation forms which contained the scales for idea evaluation as well. The evaluation forms were handed out to the referees in a randomised order. All judges were assigned to rating the ideas with the 15 different items on a rating scale from 1 (lowest) to 7 (highest). Each member of the

jury evaluated the ideas independent of the others. The referees did not know which ideas were edited collaboratively by the participants. In order to assess idea quality validly and reliably, we factor analysed the evaluation items. The results of this evaluation process were also used for identifying the winners of the SAPiens ideas competition.

4 Results

4.1 Idea quality in idea competitions

Initially, we performed an exploratory factor analysis with SPSS 17.0. Even the first iteration mirrored exactly the supposed item structure, and with novelty, feasibility, relevance and elaboration, four clearly interpretable factors could be identified. Further, it was checked whether the data was appropriate for explanatory factor analysis by calculating the measures of sampling adequacy (MSA) for the whole data structure as well as for individual items. As all MSA values were above 0.6, exploratory factor analysis was applicable and no items had to be eliminated (Malhotra, 2007). However the items N6, R1, C3 and F3 showed high factor loadings on other factors as well. Due to this ambiguity, these items were excluded. The reliability of the factors was checked using Cronbach's alpha. Alpha should be higher than 0.7 for indicating an acceptable value for internal consistency (Malhotra, 2007). With alphas of at least 0.841, this criteria was met.

Table 2 Factor analysis of idea quality

Item	*Factor*				*Cronbach's α*	*Individual item reliability*	*Composite reliability*
	Novelty (1)	*Relevance (2)*	*Elabo-ration (3)*	*Feasibility (4)*			
N3	*0.96*	0.17	0.11	–0.05	0.96	0.94	0.96
N4	*0.89*	0.26	0.16	–0.10		0.88	
N1	*0.85*	0.26	0.24	–0.09		0.85	
N2	*0.84*	0.22	0.21	–0.06		0.83	
N5	*0.71*	0.21	0.16	–0.28		0.60	
R3	0.28	*0.91*	0.10	–0.08	0.84	0.79	0.95
R2	0.36	*0.85*	0.10	–0.15		0.88	
C2	0.28	0.02	*0.85*	0.20	0.89	0.76	0.91
C1	0.21	0.18	*0.85*	0.22		0.90	
F1	–0.24	–0.19	0.14	*0.91*	0.77	0.32	0.34
F2	–0.06	–0.03	0.23	*0.76*		0.23	
Eigenvalues	5.58	2.37	1.12	0.77			
Variance explained	50.78%	21.57%	10.17%	7.03%			

Notes: KMO criterion = 0.773; Bartlett-test of specificity: $\chi^2 = 605.88$ p = 0.000; principal component analysis; Varimax-rotation; n = 57. The italic values indicate the attribution of the variables to one of the three factors.

Subsequently, we tested these factors applying confirmatory factor analysis using Amos 17.0. The factors novelty, relevance and concretisation showed very high composite reliabilities and high values for the average variance explained (AVE), so that convergent validity can be assumed (cf., Tables 2 and 3). Values of 0.6 regarding the composite reliability and 0.5 for the AVE can be seen as minimum values for indicating a good measurement quality (Bagozzi and Yi, 1988). The factor feasibility did not meet the minimum requirements for convergent validity, and thus we eliminated this factor from further analysis.

The discriminant validity of the remaining factors was checked by using the Fornell-Larcker criteria which claims that one factor's AVE should be higher than its squared correlation with every other factor (Fornell and Larcker, 1981). Table 3 depicts that discriminant validity can be assumed for the three factors mentioned above. For the remaining factors, all Individual Item Reliabilities exceeded the minimum threshold of 0.5 (Bagozzi and Yi, 1988). Hence, good reliability based on Cronbach alpha is confirmed.

Table 3 Discriminant validity of the factors

	AVE	*Squared multiple correlations*		
		Novelty	*Relevance*	*Elaboration*
Novelty	0.83			
Relevance	0.90	0.04		
Elaboration	0.83	0.08	0.02	

Finally, we checked the global fit of our model by conducting a chi-square (χ^2)-test (cf., Table 4). The χ^2-test was significant: the measure between χ^2 values and degrees of freedom (df)-ratio was 2.43, well below the upper threshold of 5.00, which indicates an adequate fit (Wheaton et al., 1977). Furthermore, global fit measures suggested adequate fit as well: goodness of fit index = 0.82 (GFI; $\geq$ 0.9), adjusted goodness of fit index = 0.76 (AGFI; $\geq$ 0.9), normed fit index = 0.90 (NFI; $\geq$ 0.9), comparative fit index = 0.94 (CFI; $\geq$ 0.9) and standardised root mean square residual = 0.04 (SRMR; $\leq$ 0.5) (Browne and Cudeck, 1993; Bühner, 2008). Thus, the instrument was successfully validated using both exploratory and confirmatory factor analysis.

Further, we checked the inter-rater reliability of the judgments by calculating intra-class-correlation (ICC) coefficients as recommended by Amabile (1996). According to Amabile, ICC coefficients have to be higher than 0.7 for indicating a sufficient degree of inter-rater reliability. In our case, most ICC coefficients were >0.7 or slightly below (cf., Table 5). Interestingly, only the items that were excluded in the course of the explanatory and the confirmatory factor analysis failed to meet this required minimum inter-rater reliability significantly. Thus, the CAT can be seen as a very appropriate method for evaluating idea quality in idea competitions.

Table 4 Global fit measures

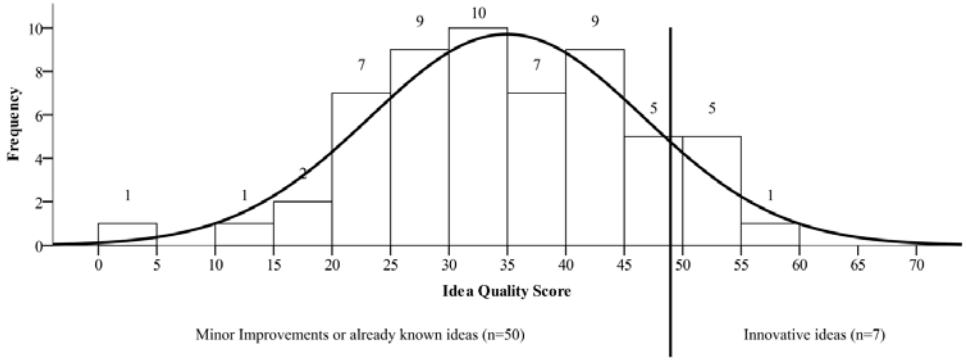
p	*χ2/df*	*GFI*	*AGFI*	*NFI*	*CFI*	*SRMR*
0.000	2.43	0.82	0.76	0.90	0.94	0.04

Table 5 ICC coefficients

Label	*Item*	*ICC-coefficient*
N1	Novelty	0.666
N2	Uniqueness	0.635
N3	Surprise	0.708
N4	Revolutionarity	0.641
N5	Radicality	0.664
N6	Trendyness	0.524*
F1	Technical feasibility	0.503*
F2	Economic feasibility	0.239*
F3	Image	0.532*
R1	Customer benefit	0.603*
R2	Market potential	0.631
R3	Strategic advantage	0.637
E1	Accuracy	0.616
E2	Maturity	0.630
E3	Communication	0.557*

Note: *excluded during factor analysis

Figure 3 Distribution of idea quality scores



We constructed a quality index reaching from 0 to 100 and that was checked for normal distribution by conducting a Kolmogorov-Smirnov-test. The result was not significant, with p = 0.785. Thus, normality of the data can be assumed (cf., Figure 3).

The three validated factors explain about 82% of the original variance. The first factor novelty explains about 51%; thus, high quality ideas captivate first and foremost through being new. The second important factor is the ideas' relevance, accounting for 22%. Elaboration shows only a minor explanatory content for idea quality, and explains only about 10% of the items' variance. The fourth factor feasibility was eliminated during the confirmatory factor analysis, but this factor would have stated only for 7%. Thus, this elimination was insignificant for measuring the submitted ideas' quality.

Overall, the initiator was very satisfied with the submissions quality. Of the 57 submitted ideas, seven were completely new to the initiator and considered as being 'high

quality ideas.' This ties in with current research on customer integration in which about 10 to 20% of customer generated new product ideas are labelled as new and valuable (Bartl et al., 2004; Kristensson et al., 2004; Walcher, 2007). The other ideas were either described as minor improvements of current products or were already known. Ideas reached quality scores between three and 56. The winning idea described an innovative strategy for acquiring new customers who do not use SAP solutions, as they prefer to rely on free-of-charge open source software.

4.2 Effect of collaboration on idea quality

In the first instance, the arithmetic mean of the idea's quality in both groups (collaboration/no collaboration) was calculated. A comparison shows that there is practically no difference between the two groups. Whilst group 1 (collaboration) contains ideas with an average quality score of 34.5, the second group's (no collaboration) average quality is 35.2. Based on this data, no positive influence of collaboration can be found.

However, this finding could be the determined methodologically. According to Reinig et al. (2007), the quality of an ideation session is not completely reflected by averaging the ideas' quality scores. The quality of an ideation session should rather be calculated by counting the ideas exceeding a previously defined minimum quality as being bad or already known as ideas that are worthless for the initiator. The advantage of this approach can easily be described with a small example: If one compares two groups, it could be possible that the first group contains more good ideas than the second does. But contemporaneously, there could be many more low quality ideas in the first group, so that the second group contains ideas of a higher average quality.

Based on this good idea count, idea quality was compared in the two groups again, and five out of the seven good ideas were edited collaboratively. In order to test whether a positive impact of collaboration could be determined based on this finding, the ideas were grouped again. Group 1 contained the best five collaboratively compiled ideas. Every collaboratively compiled idea was submitted by at least two idea contributors at the SAPiens internet platform. Group 2 comprised the best five ideas submitted by a single participant. This group rearrangement led to an amplification of the mean differences between the two groups. Group 1 (collaboration) had an average quality score of 53.58 and group 2 (no collaboration) one of 47.65. A two-tailed t-test showed that this difference is significant with $p = 0.017$. Thus, a positive impact of collaboration of participants on idea quality could be determined.

5 Discussion

The original purpose of this empirical study was to explore the effect of user collaboration on idea quality in idea competitions. In this context, an in-depth analysis of idea quality was performed. The present investigation is the first study that provides sound empirical data on idea quality and user collaboration in idea competitions.

Several central lessons can be learned from our field test. First, our research has shown that idea competitions are effective means for gaining new and valuable ideas for generating innovations. Second, our research suggests that user collaboration in idea competitions is a viable design element for positively influencing idea quality. Our data

indicates that collaboration enhances the quality of the submissions, albeit this effect has to be approved in a bigger sample.

Artefacts of usage on the online platform, as well as the results of extensive observations, give a clear impression of the motivation for collaboration in the SAPiens idea competition, of the personal benefit for the users, and of the role that incentives play. Generally, it can be assumed that there are different types of participants in idea competitions that can be activated by different measures. On the one hand, there are people who are highly intrinsically motivated and do not need direct compensation as incentive for participation. These idea contributors are activated due to social motives such as identification with the initiator and the participants' community, altruism, further developing one's skills, as well as the motives of intellectual stimulation and fun (Leimeister et al., 2009; Walcher, 2007). On the other hand, there are more extrinsically motivated idea contributors who participate for the sake of the competition's prizes, the career options offered at the organiser for the winner, etc. Our field test shows that implanting collaboration tools in idea competitions is a first step towards activating both customer groups with different measures. The customer group striving for direct compensation can be motivated to participate by offering attractive incentives. The more intrinsically motivated group can be motivated by building a virtual community for innovations around the idea competition, as these participants can be activated through means fostering and guiding social interaction. Thus, implanting collaboration instruments such as the wiki technology is a viable measure for activating these customers.

But in this context, we need to bear in mind that the majority of participants are motivated by a mixture of intrinsic and extrinsic motives. Thus, collaboration and competition might partly be exclusive design elements. Collaboration seems less likely to occur in very competitive situations in which many participants compete for few, very attractive prizes. In such situations, many potential collaborators will not collaborate, as the activation of the extrinsic motives of direct compensation outweighs the intrinsic one. This situation can frequently be found in sport events. For instance, Franke and Shah (2003) revealed that the extent of collaboration among members in sporting communities decreases with the extent of inherent competition. Thus, a misleading incentive structure will hamper intensive collaboration among participants.

6 Conclusions

The SAPiens idea competition has turned out to be an effective way to integrate customers into innovation processes. This study explored the relationship of collaboration among idea contributors in idea competitions and idea quality in detail.

For the purpose of new product development, gaining as many high quality ideas as possible is the main objective of idea competitions. Our findings can benefit the design of organisational and technical structures of idea competitions in order to reach that goal, as these open innovation systems consist not only of IT-based platforms, but also demand adequate organisational values, norms, and rules (Prahalad and Ramaswamy, 2004). Thus, initiators of idea competitions should implement collaboration functionalities on the platform and foster collaboration through suitable incentives for motivating participants to collaborate. For example, organisers could incentivise collaboration directly. Another incentive structure in idea competitions could be handing out prizes to

teams rather than to single participants. Doing so, teams would collaborate internally and compete externally – and the benefits of both the design elements collaboration and competition could be combined.

Our findings show limitations regarding the small sample size. Future work should develop theoretical foundations to give underpinning to these findings. Researchers should also aim at giving further empirical support to these findings in other samples as well as to the motives of collaborating idea contributors. Detailed knowledge about collaboration processes of the evolving virtual teams have to be gained in order to enhance the design of idea competitions, especially the activation and motivation of the participants (Leimeister et al., 2009). Ideas competitions need also to be researched from the marketing and human resource perspectives, as participants generally show a high identification with the initiator and its brand (Walcher, 2007; Soll, 2006). Furthermore, using more mechanisms to support and harvest the wisdom of crowds is a prosperous area for future research. For instance, the expert evaluation in the scope of this field test accounted for about 60 hours in total and revealed an enormous potential for collaborative filtering. Developing valid rating mechanisms for user-generated content, other users, and organisers is a promising starting point for supporting incentives and activation in open innovation activities in general, and in idea competitions in particular. Moreover, there is a conceptual gap between the generation and selection of ideas and their transformation into innovations. We need to explore further methods, concepts and tools to support the processing of ideas to innovations, also using the wisdom of crowds or collective intelligence.

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Appendix

N1 the idea is novel

N2 the idea is unique or at least rare

N3 the idea is imaginative, uncommon or surprising

N4 the idea is revolutionary

N5 the idea is radical

N6 the idea is trendy

R1 the idea has a clearly described customer benefit

R2 the idea enables the initiator to realise an attractive market potential

R3 the idea enables the initiator to build up strategic competitive advantages

F1 the idea is technically feasible

F2 the idea is economically feasible

F3 the idea fits the initiator's image

C1 the idea is precise, complete and exactly described

C2 the idea is mature

C3 the idea's utility is clearly described.