Crowdsourcing user solutions: Which questions should companies ask to elicit the most ideas from its users?

Petar Vrgović

Ivana Jošanov-Vrgović

This is an Accepted Manuscript of an article published by Taylor & Francis in Innovation: Organization & Management on 08.09.2017., available online:

http://www.tandfonline.com/doi/abs/10.1080/14479338.2017.1356618

Corresponding Author: Petar Vrgović, PhD
Corresponding Author's Institution: Faculty of Technical Sciences, University of Novi Sad, Serbia
Corresponding Author's Email: vrgovic@uns.ac.rs

Co-author: Ivana Jošanov-Vrgović, PhD
Co-Author's Institution: Novi Sad School of Business, Novi Sad, Serbia
Co-Author's Email: josanov.vrgovic@gmail.com

This manuscript should be cited as:
Vrgović, P., & Jošanov-Vrgović, I. (2017). Crowdsourcing user solutions: which questions should companies ask to elicit the most ideas from its users? Innovation, 19(4), 452–462. https://doi.org/10.1080/14479338.2017.1356618

Abstract: When crowdsourcing users' ideas, some companies ask their users for any ideas they may have, whereas others present to their users specific problems they need help in solving. This paper explores whether different approaches elicit different quantities of ideas from such users. Two experiments in different organizations were conducted to determine which types of simple verbal stimuli are most effective in improving the users' ideation process. It has been shown that simple but specific problem statements presented by a company resulted in the highest number of relevant ideas being elicited from its users. Therefore, it is suggested that companies that look for inspiration and insight into users' needs make specific ideation challenges whereby users generate and share a larger number of ideas.

Keywords: Idea generation, ideation, open innovation, communication, experiment

1. Introduction

Although companies of all sizes strive for new ideas that may turn into successful innovations, the divergent steps of idea management through which companies influence end-users' idea generation have received little attention, and have mostly been developed in an 'ad-hoc' fashion (Flynn, Dooley, O'Sullivan, & Cormican, 2003). User ideation is often observed as "a mystical process outside the reach of managers" (Woodhead & Berawi, 2008, p. 5). Moreover, it is often implicitly assumed that ideas are spontaneously created and that a company's task is to merely collect them (Cooper, 2008). Even researchers focused on open innovation (OI) sometimes take the ideation process for granted; for instance, Dahlander and Gann (2010) have stated that "external knowledge is considered to be 'out there' ready to be harnessed by firms" (p. 707). To understand the microfoundations of individual action within OI practices, insight into various factors and the actions of external individuals' collaborations with firms are still needed (West & Bogers, 2017).

Motivated by a recent Dahlander and Piezunka's (2014) conclusion that "...it is crucial to better understand what organizations can do to cultivate (external) suggestions" (p. 825), this paper concentrates on end-users as an idea source and shows how companies may influence users' ideation processes actively and efficiently, and do so on a large scale.

When crowdsourcing ideas, companies frequently believe that it is enough to ask users to submit an idea through a form and hope that many users will submit ideas that have come about spontaneously. Many companies such as Ford, General Electric, Coca-Cola, Spectrum Brand's Hardware & Home improvement, The Northwest Energy Efficiency Alliance, Craftsman, John Deere, and 3M present a simple blank submission web form where end-users can share a short description of their idea, without any incentive from the company. Some companies such as Starbucks, Lear, Hershey's, Under Armour, Henkel, and Colgate-Palmolive suggest possible categories during idea submission, but then again it is the user who needs to define a problem and suggest its solution. In contrast, there are some companies that present specific problems before asking users to submit ideas. Procter & Gamble regularly post sets of 'current needs' that could be tackled by their users, while Dell engages its users with short-term storm sessions featuring specific problems that need to be solved in each 'storm'. In addition, Siemens and Philips both have a history of posting specific public challenges for innovation.

A clear example of companies that do not cultivate external suggestions to a large extent and thus fail to innovate is BP's 'Deep Water Horizon' challenge, where tens of thousands of collected ideas had little impact on managing the oil spill. Apart from issues regarding idea management, BP did not go into details of the problem when asking for help: only a dedicated website and a phone-line were used to collect ideas that contributors suggested. BP believed that the public had been informed sufficiently about the problem by the media, and provided no specific information about this complex problem that required a high level of technical knowledge to be solved. Another example shows a beverage company that failed to achieve expected results because of its unspecified long-term call for ideas; researchers struggled to explain why idea quantity did not lead to successful innovation, comparing their case with Dell's success, where specific 'IdeaStorm' challenges were consecutively conducted (Schemmann, Herrmann, Chappin, & Heimeriks, 2016).

By showing that a larger number of innovative ideas lead to greater innovation results (Chandy, Hopstaken, Narasimhan, & Prabhu, 2006), previous research has advocated practical interest in stimulating user ideation. However, most of the experiments on stimulating ideation were conducted in isolated and rigorously controlled surroundings, without any commercial context and with respect to abstract problems that were not easily generalizable to companies and other practitioners. Stemming from the perspective of customer creativity psychology (Burroughs, Moreau, & Mick, 2008), the following research question was defined: What is the relationship between the way a company asks its users for ideas and the quantity of ideas shared by the users?

In the next section, we argue that companies may have significant interest in stimulating user ideation, which may result in more ideas that could be utilized by the companies. As there is at present a lack of quantitative research on problem formulation for 'coupled open innovation' (Piller & West, 2014), this research contributes by presenting results from two experimental studies in real organizations, with relevant conclusions and specific implications.

2. Theoretical background and previous research

Collaboration with end-users is often found to be a key area for successful innovations (McAdam & McClelland, 2002), and literature shows the important role of intermediate and consumer users as innovation collaborationists (Bogers, Afuah, & Bastian, 2010). A significant part of innovation and product development can be tracked to end-user involvement (von Hippel, 2005), and there is evidence of the end-user's role in service development (Edvardsson, Kristensson, Magnusson, & Sundström, 2012).

There is ample evidence to suggest that collecting users' ideas pays off significantly for companies, as long as they can stimulate users to engage in innovation activities (Kristensson, Magnusson, & Matthing, 2002). If a company wants to innovate incrementally, it should engage its typical customers: it has been found that a typical customer generates good incremental ideas which give a good insight into the customer's potentially hidden needs (Kokshagina, Gillier, Cogez, Le Masson, & Weil, 2016; Schweitzer, Gassmann, & Rau, 2014), and can often be easily implemented in small-scale improvements (Lilien, Morrison, Searls, Sonnack, & von Hippel, 2002).

Most companies observe ideation as a part of the transaction—between the two parties, namely the company and its customer—where it is important to understand only *when* and *why* users share their ideas with the company (Bogers et al., 2010). However, understanding *how* users approach ideation challenges and *how* they create solutions may allow companies to influence users to come up with a larger number of ideas. Observing ideation as an internal cognitive process limits companies' methodologies to observational techniques where users are considered simply to be knowledge owners (Natalicchio, Messeni Petruzzelli, & Garavelli, 2014).

An ideation process is highly dependent on the experience and the prevailing mind-set of the persons participating in it: functional fixedness often limits creative thinking by inhibiting the discovery of new uses for an object (Adamson, 1952), thus severely limiting the ideation process. Woodhead and Berawi challenge this perception of users as knowledge *owners*, by proposing that ideation be observed within "a

relationship between the mind and the world" (Woodhead & Berawi, 2008, p. 8). According to their alternative theory of idea generation, an idea is generated in an individual's mind, but not spontaneously; rather, an idea is a result of conscious insight into a specific situation that requires a solution —an idea is a reaction to a provocation. If companies observe users as knowledge *creators*, there is a chance (and a responsibility) for the companies to proactively influence the users' ideation process. Similarly, according to the bounded ideation theory (Briggs & Reinig, 2010), understanding the specific task of ideation is needed to generate good ideas copiously. Briggs and Reinig suggest that this effect is more likely to occur in the field than in a laboratory experiment, because companies—by proposing specific problems that users can relate to—can present relevant stimuli that reduce cognitive inertia by activating areas of the cognitive network, thereby helping people "think outside the box" (p. 140). These stimuli are the main actors for priming (Dennis, Minas, & Bhagwatwar, 2013); priming enables creation of new knowledge and the activation of knowledge that may be dormant (Nijstad & Stroebe, 2006). People normally do not tend to engage in deep exploration of their domain knowledge; therefore exposing them to specific challenges (priming) helps them generate more ideas (Rietzschel, Nijstad, & Stroebe, 2007). Thus, if many original ideas are desired, participants should be stimulated to take new directions in their thinking whereby they break their subconscious proclivity for functional fixedness.

Research shows that the number of ideas generated during ideation tasks increase when subjects are activated by some kind of verbal or contextual stimulation, such as other subjects' ideas (Aiken, Sloan, Paolillo, & Motiwalla, 1997), analogies with solutions to similar problems (Dahl & Moreau, 2002), problem context and additional verbal stimulus (Liikkanen & Perttula, 2010), specific task information (Valacich, Wheeler, Mennecke, & Wachter, 1995), areas for improvement (Coskun, Paulus, Brown, & Sherwood, 2000), or even random patents (Verhaegen, Peeters, Vandevenne, Dewulf, & Duflou, 2011). However, these findings were the results of experiments conducted in highly-controlled surroundings, with subjects who were not commercially involved in the innovation process, or where the problem was created just to provoke ideation, thus offering no specific information or context (such as 'what could people do with an extra thumb?', or 'how does one improve one's health?'). It remains unclear how to employ these results in a context relevant for companies.

Previous literature suggests that problem statements could be used as appropriate stimuli to elicit more ideas from users (Piller & West, 2014); ideas and problems are found to be intertwined and often inseparable (O'Reilly, 1983); moreover, problem solving has been found to be a good starting point to generate variable ideas (Titus, 2000). Hirschman (1980) even defines consumer creativity as "the problem-solving capability possessed by the individual that may be applied toward solving consumption-related problems" (p. 286).

Aiming to verify if these suggestions can be applied in a business concept, we propose Hypothesis 1:

H1: Compared to the number of valid ideas generated by end-users who are exposed to less specific queries, end-users who are given specific problem statements generate more valid ideas.

To test this hypothesis, experiments were designed and conducted in two organizations. Subjects in both studies were identified as 'the correspondents' and

‘the reflective practitioners’, meaning that they were customers in a real service context and had been in real-life value-creating situations; moreover, these customers had relevant past knowledge and experience in the same context (Edvardsson et al., 2012). They were therefore expected to supply the ‘use knowledge’ rather than ‘technology knowledge’.

The basic experimental design was a modification of experiments often used in similar ideation studies: usually, a control group produced ideas without any stimuli, while the control group received specific stimuli that were hypothesized to be beneficial for the ideation process (Paulus, Kohn, & Arditti, 2011; Verhaegen et al., 2011).

3. Study 1

3.1 Research methodology and experimental design

In Study 1, an experiment was conducted using three versions of printed idea-collection forms, and it involved students from a university in Serbia (with approximately 50,000 active students and 5,000 employees) as users of an educational service provided by a university. Every year, this university organizes different activities to gather innovative ideas for improvement from employees, partners, and students; this experiment was part of these activities in 2013.

Only students of the same major and degree were approached, because the minimisation of individual variation by recruiting homogenous subjects is frequently used in this type of research (Liikkanen & Perttula, 2010; Valacich et al., 1995). The sample for this experiment consisted of 98 undergraduate students, in the 2nd year of their Engineering Management studies. Only subjects aged between 20 and 22 years were observed. The subjects used in this research thus represent a cohort (Glenn, 2005), because there was an intention to control age, education, and relevant experience. This experiment was conducted over four days with groups of 23 to 25 students in a standard classroom; different experimental groups were separated from each other.

An experiment was designed comprising one control group and two experimental groups. The control group (CG) was given only general instructions to share ideas for improvements. The first experimental group (EG1) received a list of eight possible ‘areas of improvement’ (such as ‘environmental impacts’, ‘efficient time usage’ and ‘teaching quality improvement’). The second experimental group (EG2) received a list of eight specific ‘problems that the organisation wanted to solve’ (such as ‘students complain about receiving a lot of theoretical knowledge that isn’t easily applicable in real situations’; ‘during the classes a significant amount of time is spent on superficial activities’; and ‘the university’s paper usage per year is significantly higher than what is considered acceptable’). Both areas of improvement and specific problem lists were generated from previous interviews with the university management.

The students were randomly distributed to one of four scheduled groups, and within each group, each student received one of three possible questionnaires in printed form; these questionnaires were randomly assigned. They were asked to share any ideas they may have had, and EG1 and EG2 were informed that it was not obligatory to give ideas about every area or a specific problem. Students generated ideas for 30

minutes, and were not allowed to communicate with each other during the experiment. Participation in this experiment was rewarded with extra credits.

The generated ideas were first screened for general compliance with the research goal. Because hypothesis H1 is related to idea quantity, it was necessary to determine the productivity of each group while counting acceptable ideas in their broadest definition: ideas need to offer a specific change, and they need to be relevant to the organization. All the other entries that did not meet these criteria were identified as 'invalid entries' (mostly irrelevant and abstract suggestions, or problem statements without any specific suggestions for improvement). The 'invalid entries' were eliminated by three independent evaluators (two undergraduate students and one researcher) and observed separately.

3.2 Results

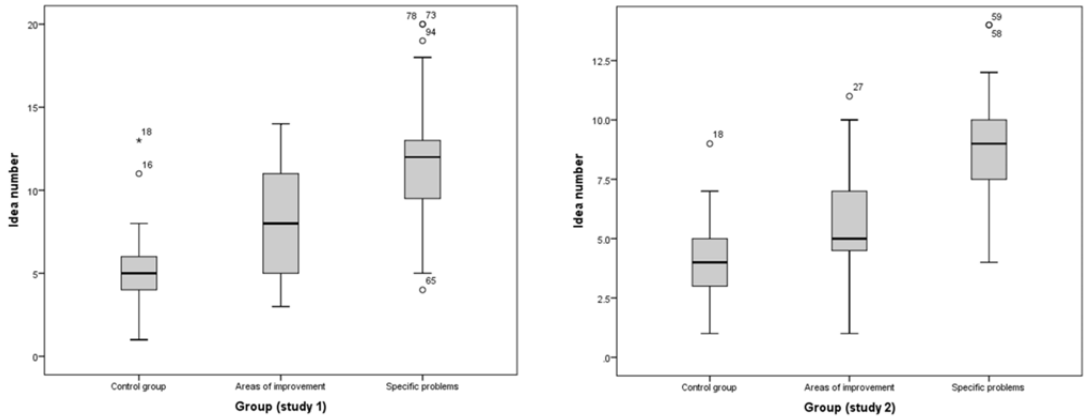
In both experiments, the number of ideas and invalid entries per user were first tested for the normality of their distributions and then the homogeneity of variance method to subsequently select the most appropriate statistical procedures. Therefore, analysis of variance (ANOVA) with Tamhane's T2 post hoc was used to test H1 (the number of ideas in each group passed normality tests, but their variances were not equal). The Kruskal-Wallis H non-parametric test was used to detect any significant differences in 'invalid entries' (the distribution was significantly different from normal).

The ANOVA analysis of the number of ideas per user showed significant differences between groups ($F=32.940$, $p=.00$). Post hoc analysis identified significant differences between the control group and the two experimental groups; significant differences between both experimental groups were observed as well. The experimental group stimulated with inputs on specific problems (EG2) generated the largest number of ideas per user. The experimental group stimulated with inputs on areas of improvement (EG1) was second; however, on average, the control group (CG) produced less than half the number of ideas per user than the EG2 did (see Table 1 and Graph 1 for more information).

The three groups also differed significantly in the number of invalid entries, with the Kruskal-Wallis H test showing significance of $p=.03$. Here, CG had significantly less invalid entries than the two experimental groups (Table 1), while EG1 and EG2 did not differ significantly in this regard.

Table 1: Descriptives for idea number per group, Study 1

Group	N users	Minimum ideas count	Maximum ideas count	*M*	*SD*	Invalid entries *M*	Invalid entries *SD*
CG	32	1	13	5.06	2.488	1.13	1.21
EG1	31	3	14	8.26	3.386	1.97	1.33
EG2	35	4	20	11.71	3.960	1.66	1.47



Graph 1: Box plots for idea numbers in both studies

4. Study 2

4.1 Research methodology and experimental design

Study 1 used a cohort group as a sample, but the target organization (a university) was a large system that offered a complex service (mostly related to education and research activities). Therefore, it was decided that a small enterprise with a relatively simple business model and tangible production activities be approached. An experiment was conducted using a simple, custom-built online platform to collect ideas to improve the business of a local small enterprise that manufactures whole-grain snacks. At present, this enterprise has 15 full-time employees, and produces around 500 kilograms of products every day, which include 15 different products; moreover, besides producing for the domestic market, it exports to three other countries.

The sample for this experiment consisted of 76 people from the general population who identified themselves as end-users of the small enterprise's products. When arriving on the idea-collecting platform (which was propagated through the enterprise's social network pages), visitors first needed to state whether they were already using the product, as well as their age, sex, name and address, whereby they could be contacted if their idea won a prize. The subjects ranged from 18 to 61 years of age with a median age of 28, and were predominantly female (73.7%). This experiment was carried out over the first 8 days in June 2014, during which time the users could submit ideas and continue their work using the same identifiers. The majority of users (74%) registered within the first three days of this challenge, and posted ideas on at least two different days.

An experiment was designed comprising one control group and two experimental groups. The control group (CG) was given only a general instruction to share any ideas for improvements they might have had. The first experimental group (EG1) received a list of eight possible 'areas of improvement' (such as 'packaging alternatives', 'new products' and 'product availability'). The second experimental group (EG2) received a list of eight specific 'problems that the company wanted to solve' (such as 'some customers would like to purchase different products within one box', 'the package is not intended to be opened more than once, so people who do not consume the whole product at once have problems containing it' and 'customers wish to consume our products with other food, such as fruits'). Both the areas of

improvement and specific problem lists were generated from previous interviews with the management of the company.

After filling in the general information on the landing page, the users were redirected randomly to one of three web-forms that corresponded to the treatment groups. It was stated that all ideas would be evaluated by the company and the best idea would win an attractive prize. The users were asked to share any ideas they may have had, and subjects in EG1 and EG2 were informed that it was not obligatory to give ideas on every area or a specific problem.

The ideas were screened for general compliance with the research goals, as done in Study 1. Submissions identified as 'invalid entries' were observed separately.

4.2 Results

Identical to Study 1, ANOVA with Tamhane's T2 post hoc was used to test H1, while the Kruskal-Wallis H non-parametric test was used to detect any significant differences in the 'invalid entries'.

The ANOVA analysis of the number of ideas per user showed significant differences between groups (F=26.380, p=.00). Post hoc analysis identified significant differences between the control group and the two experimental groups, in addition to significant differences between the two experimental groups. The observed pattern was similar to the results from Study 1 (Table 2 and Graph 1): EG2 produced the largest number of ideas; EG1 was next in terms of the quantity of ideas generated, while CG produced the least number of ideas.

The three groups also differed significantly in terms of the number of invalid entries, with the Kruskal-Wallis H test showing a significance of p=.00. Here, contrary to Study 1, EG2 had generated less invalid entries compared to CG and EG1 (Table 2).

Table 2: Descriptives for idea number per group, Study 2

Group	N users	Minimum ideas count	Maximum ideas count	*M*	*SD*	Invalid entries *M*	Invalid entries *SD*
CG	25	5	9	4.08	1.730	3.12	1.69
EG1	24	1	11	5.96	2.579	3.21	1.28
EG2	27	4	14	8.63	2.420	1.33	1.27

5. Discussion, conclusion and limitations

The importance of integrating external knowledge into innovation processes is well documented, with compelling evidence that companies should be open to external suggestions because this might help companies gather novel ideas (Franke, Poetz, & Schreier, 2014). However, needs for fine-grained research on different knowledge

sources (Laursen & Salter, 2006), and for motivation of these external contributors—especially in cases where the collaboration is driven by non-pecuniary motivations (West & Bogers, 2014)—still persist. This paper aims to contribute to this topic with two quantitative studies.

A recently proposed model for 'coupled' open innovation projects (Piller & West, 2014) suggests that the first step companies should take when innovating, with their users, is to define a collaboration task; that is, they should formulate a specific problem to attract external contributors and stimulate collaboration. Numerous companies fail to do so, asking users to identify a specific problem on their own before submitting an idea. We argue that this approach renders the idea management process incomplete, because companies ignore their role in the divergent part of user innovation campaigns.

The results of both studies presented here confirm that if companies express only a general wish for users' unsolicited ideas, they fail to fully activate the cognitive potentials of their users, as there is a significant "difference between inviting general contributors and actually getting them involved" (Dahlander & Piezunka, 2014, p. 813). By confirming hypothesis H1, we have shown that introducing a few specific problem statements can double the amount of ideas received from a company's users. This increase is considerably more than the number of ideas elicited in scenarios where only categories of desirable ideas are presented, or scenarios where only the company's intent to receive ideas from users is expressed. User innovation is basically an interaction between a 'seeker' and many 'solvers' (Terwiesch & Xu, 2008), and our results show that a company should maximize its impact on users in order to avoid the low equilibrium trap. Given that striving for a greater number of ideas from many parallel ideators produces a relatively small redundancy of those ideas (Kornish & Ulrich, 2010), and because it was shown that ideators do not have to be from the same field of expertise to propose a winning solution (Jeppesen & Lakhani, 2010), investing in increasing the quantity of ideas generated sounds even more reasonable; this approach becomes even more tenable based on the fact that ideas from multiple subjects are not expected to overlap significantly.

Previous research has mostly been based on ideation experiments that were out of the business context, or were conducted using tools or software that were complex to adopt or hard to apply to a greater number of ordinary users; practitioners found the outcomes of this research hard to implement in real-life scenarios, especially on a wider scale, and so did most of the users. Our results are significant and highly valuable to firms, because they advocate investing in direct user stimulation to instigate the ideation processes: if a company chooses not to look for only users' ideas as creative outputs, but includes their initial engagement in its creativity potential, it can influence its users' ideation processes and therefore expect more ideas. Companies that look for ideas that are small but of precise value, ideas that are novel and hard to spot, should try to reach out for as many users as possible; through this approach, companies can find value and inspiration in many incremental ideas (Magnusson, 2009). This is especially interesting for firms in the low-technology or medium-technology industry, where contact with end-users is highly beneficial for successful innovations (Grimpe & Sofka, 2009). Presenting specific challenges will stimulate end-users to spontaneously create additional ideas they would not have otherwise; these verbal stimuli, which are easy to create and control, are accessible for many users and do not require specific conditions or complex priming.

It should be stated, however, that following this advice is not a guarantee for OI success, because idea quantity does not lead directly to successful innovations (Salter, Ter Wal, Criscuolo, & Alexy, 2015). Rather, presenting end-users with specific problems should be observed as one of the first steps in a firm's wider strategy.

This research adds to our knowledge by validating the alternative theory of idea generation (Woodhead & Berawi, 2008), and the bounded ideation theory (Briggs & Reinig, 2010), while confirming the importance of first steps in the 'coupled' open innovation projects model (Piller & West, 2014). This research also contributes to the ideation literature by presenting experimental results from a business context.

Different findings from these two studies concerning the number of 'invalid entries' show that the relationship between ideation instruction and proper understanding of a task may not be simple or linear. In the first study, the increase in the number of submitted ideas was followed with an increase in the number of submissions that were off-target or ones that were not even constructive. In the second study, subjects who were faced with specific problems submitted a larger percentage of constructive ideas. Relatively large numbers of 'invalid entries' for the 'areas of improvement' group in both studies might be explained with Reinig et al.'s (2008) remark that "Ideating under incomplete information or even a misunderstanding would be more likely produce bad ideas at first" (p. 417). These results suggest that companies must be very careful about their choice of words when asking for ideas: problem statements must be as specific as possible.

The first limitation of this research is that it did not include a medium-sized company or a large commercial company, which could have provided larger samples of both users and submitted ideas. Although paying users of a service or a product were observed in both the cases, we still believe that both these contexts are specific situations. Second, these results only count for users who are somehow motivated to give their suggestions; further research is needed to determine the relationship between users' motivation and stimulation effects. Third, although the experiments varied significantly with the time available for ideation, there might be a different relationship between the variables if users could create ideas over a longer period. Finally, this research did not control some variables that could significantly affect the observed effect, such as length of user's experience with the product or service, user satisfaction, and context in which ideas were produced. Further studies should include other relevant variables, more rigid quantitative analysis, and should collect relevant qualitative data that could help in understanding this mechanism more comprehensively.

References

Adamson, R. E. (1952). Functional fixedness as related to problem solving: A repetition of three experiments. *Journal of Experimental Psychology*, *44*, 281–291.

Aiken, M., Sloan, H., Paolillo, J., & Motiwalla, L. (1997). The use of two electronic idea generation techniques in strategy planning meetings. *Journal of Busines Communication*, *34*(4), 370–382.

Bogers, M., Afuah, A., & Bastian, B. (2010). Users as Innovators: A Review, Critique, and Future Research Directions. *Journal of Management*, *36*(4), 857–875.

Briggs, R. O., & Reinig, B. A. (2010). Bounded Ideation Theory. *Journal of Management Information Systems*, *27*(1), 123–144. Retrieved from 10.2753/MIS0742-1222270106

Burroughs, J. E., Moreau, C. P., & Mick, D. G. (2008). Toward a psychology of consumer creativity. In C. P. Haugtvedt, P. M. Herr, & F. R. Kardes (Eds.), *Handbook of consumer psychology* (pp. 1011–1038). Taylor & Francis.

Chandy, R., Hopstaken, B., Narasimhan, O., & Prabhu, J. (2006). From Invention to Innovation: Conversion Ability in Product Development. *Journal of Marketing Research*, *43*(3), 494–508.

Cooper, R. G. (2008). Perspective: The Stage-Gate® Idea-to-Launch Process—Update, What's New, and NexGen Systems*. *Journal of Product Innovation Management*, *25*(3), 213–232.

Coskun, H., Paulus, P. B., Brown, V., & Sherwood, J. J. (2000). Cognitive stimulation and problem presentation in idea-generating groups. *Group Dynamics: Theory, Research, and Practice*, *4*(4), 307–329.

Dahl, D. W., & Moreau, P. (2002). The Influence and Value of Analogical Thinking During New Product Ideation. *Journal of Marketing Research*, *39*(1), 47–60.

Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, *39*(6), 699–709. https://doi.org/10.1016/j.respol.2010.01.013

Dahlander, L., & Piezunka, H. (2014). Open to suggestions: How organizations elicit suggestions through proactive and reactive attention. *Research Policy*, *43*(5), 812–827.

Dennis, A. R., Minas, R. K., & Bhagwatwar, A. P. (2013). Sparking Creativity: Improving Electronic Brainstorming with Individual Cognitive Priming. *Journal of Management Information Systems*, *29*(4), 195–216.

Edvardsson, B., Kristensson, P., Magnusson, P., & Sundström, E. (2012). Customer integration within service development—A review of methods and an analysis of insitu and exsitu contributions. *Technovation*, *32*(7–8), 419–429.

Flynn, M., Dooley, L., O'Sullivan, D., & Cormican, K. (2003). Idea Management for Organisational Innovation. *International Journal of Innovation Management*, *7*(4), 417–442.

Franke, N., Poetz, M. K., & Schreier, M. (2014). Integrating Problem Solvers from Analogous Markets in New Product Ideation. *Management Science*, *60*(4), 1063–1081. https://doi.org/10.1287/mnsc.2013.1805

Glenn, N. D. (2005). *Cohort analysis* (Vol. 7). Sage Publications, Incorporated.

Grimpe, C., & Sofka, W. (2009). Search patterns and absorptive capacity: Low-and high-technology sectors in European countries. *Research Policy*, *38*(3), 495–506.

Hirschman, E. C. (1980). Innovativeness, novelty seeking, and consumer creativity. *Journal of Consumer Research*, 283–295.

Jeppesen, L. B., & Lakhani, K. R. (2010). Marginality and problem-solving

effectiveness in broadcast search. *Organization Science*, *21*(5), 1016–1033.

Kokshagina, O., Gillier, T., Cogez, P., Le Masson, P., & Weil, B. (2016). Using innovation contests to promote the development of generic technologies. *Technological Forecasting and Social Change*, *114*, 152–164.

Kornish, L. J., & Ulrich, K. T. (2010). Opportunity Spaces in Innovation: Empirical Analysis of Large Samples of Ideas. *Management Science*, *57*(1), 107–128.

Kristensson, P., Magnusson, P. R., & Matthing, J. (2002). Users as a Hidden Resource for Creativity: Findings from an Experimental Study on User Involvement. *Creativity and Innovation Management*, *11*(1), 55–61.

Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*, *27*(2), 131–150. https://doi.org/10.1002/smj.507

Liikkanen, L. a., & Perttula, M. (2010). Inspiring design idea generation: insights from a memory-search perspective. *Journal of Engineering Design*, *21*(5), 545–560.

Lilien, G. L., Morrison, P. D., Searls, K., Sonnack, M., & von Hippel, E. (2002). Performance Assessment of the Lead User Idea-Generation Process for New Product Development. *Management Science*, *48*(8), 1042–1059.

Magnusson, P. R. (2009). Exploring the Contributions of Involving Ordinary Users in Ideation of Technology-Based Services. *Journal of Product Innovation Management*, *26*(5), 578–593.

McAdam, R., & McClelland, J. (2002). Sources of new product ideas and creativity practices in the UK textile industry. *Technovation*, *22*(2), 113–121.

Natalicchio, A., Messeni Petruzzelli, A., & Garavelli, A. C. (2014). A literature review on markets for ideas: Emerging characteristics and unanswered questions. *Technovation*, *34*(2), 65–76.

Nijstad, B. A., & Stroebe, W. (2006). How the Group Affects the Mind: A Cognitive Model of Idea Generation in Groups. *Personality and Social Psychology Review*, *10*(3), 186–213.

O'Reilly, C. A. (1983). The use of information in organizational decision making: A model and some propositions. *Research in Organizational Behavior*, *5*, 103–139.

Paulus, P. B., Kohn, N. W., & Arditti, L. E. (2011). Effects of Quantity and Quality Instructions on Brainstorming. *The Journal of Creative Behavior*, *45*(1), 38–46.

Piller, F. T., & West, J. (2014). Firms, Users, and Innovation: An Interactive Model of Coupled Open Innovation. In H. Chesbrough, W. Vanhaverbeke, & J. West (Eds.), *New Frontiers in Open Innovation* (pp. 29–49). Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199682461.003.0002

Reinig, B. A., & Briggs, R. O. (2008). On The Relationship Between Idea-Quantity and Idea-Quality During Ideation. *Group Decision and Negotiation*, *17*(5), 403–420.

Rietzschel, E. F., Nijstad, B. A., & Stroebe, W. (2007). Relative accessibility of domain knowledge and creativity: The effects of knowledge activation on the quantity and originality of generated ideas. *Journal of Experimental Social Psychology*, *43*(6), 933–946.

Salter, A., Ter Wal, A. L. J., Criscuolo, P., & Alexy, O. (2015). Open for Ideation: Individual-Level Openness and Idea Generation in R&D. *Journal of Product Innovation Management*, *32*(4), 488–504. https://doi.org/10.1111/jpim.12214

Schemmann, B., Herrmann, A. M., Chappin, M. M. H., & Heimeriks, G. J. (2016). Crowdsourcing ideas: Involving ordinary users in the ideation phase of new product development. *Research Policy*, *45*(6), 1145–1154. https://doi.org/http://dx.doi.org/10.1016/j.respol.2016.02.003

Schweitzer, F., Gassmann, O., & Rau, C. (2014). Lessons from Ideation: Where Does User Involvement Lead Us? *Creativity and Innovation Management*, *23*(2), 155–167.

Terwiesch, C., & Xu, Y. (2008). Innovation Contests, Open Innovation, and Multiagent Problem Solving. *Management Science*, *54*(9), 1529–1543.

Titus, P. a. (2000). Marketing and the Creative Problem-Solving Process. *Journal of Marketing Education*, *22*(3), 225–235.

Valacich, J. S., Wheeler, B. C., Mennecke, B. E., & Wachter, R. (1995). The Effects of Numerical and Logical Group Size on Computer-Mediated Idea Generation. *Organizational Behavior and Human Decision Processes*, *62*(3), 318–329.

Verhaegen, P.-A., Peeters, J., Vandevenne, D., Dewulf, S., & Duflou, J. R. (2011). Effectiveness of the PAnDA ideation tool. *Procedia Engineering*, *9*, 63–76.

von Hippel, E. (2005). *Democratizing Innovation*. Cambridge, Massachusetts: The MIT Press.

West, J., & Bogers, M. (2014). Leveraging External Sources of Innovation: A Review of Research on Open Innovation. *Journal of Product Innovation Management*, *31*(4), 814–831. https://doi.org/10.1111/jpim.12125

West, J., & Bogers, M. (2017). Open innovation: current status and research opportunities. *Innovation*, *19*(1), 43–50. https://doi.org/10.1080/14479338.2016.1258995

Woodhead, R. M., & Berawi, M. a. (2008). An alternative theory of idea generation. *International Journal of Management Practice*, *3*(1), 1–19.