Incentivizing User Contributions in Idea Crowdsourcing through Quantitative and Qualitative Feedback : A Field Experiment

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Abstract

Crowdsourcing is a popular tool for firms to harness external knowledge and resources. One variation of crowdsourcing entails the use of corporate channels in social network services (SNS) such as Twitter to hold public idea competitions. This study examined the role of feedback interaction between participants of idea competitions. More specifically, the study examined the impact of incentives to provide feedback on other participants' ideas. We found that idea competitions where explicit incentives were introduced to elicit crowdsourced feedback in the form of qualitative comments resulted in improved idea generation performance-with more ideas generated overall, and more ideas generated through participant collaborations, through increased comment-posting activities. Based on the findings, implications for theory and practice are discussed.

Keywords : Crowdsourcing, Idea Generation, Quantitative Feedback, Qualitative Feedback

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1. Introduction

As competition in the global business environment has intensified and the life cycle of products has gotten shorter, firms are increasingly likely to seek innovative external ideas and solutions to internal business problems in order to improve firm performance. With the advancement of information communication technologies enabling direct communications with customers, companies are leveraging Internet-based platforms to collect innovative ideas from customers. As such crowdsourcing practices gain widespread acceptance, customers are increasingly recognized as a valuable source of innovation [Albors, Ramos, and Hervas, 2008; Enkel, Perez-Freije, and Gassmann, 2005; Füller, Bartl, Ernst, and Mühlbacher, 2006]. Users have long been recognized as a valuable source of innovative ideas for new product development [Von Hippel, 1998]. But, advances in technology have reduced the costs of this approach as more people have ubiquitous, mobile access to online crowdsourcing platforms launched by companies. Such platforms have been implemented by a large number of companies in diverse industries. Dell launched the IdeaStorm web site in order to invite the general public to suggest and vote on product ideas. Cisco launched the iPrize to invite all interested parties to submit ideas regarding future business opportunities. IBM hosted the first Innovation Jam in 2006 – a joint online collaborative brainstorming session amongst over 150,000 globally distributed participants to discuss ideas regarding innovative technology solutions. Such crowdsourcing initiatives are not limited to the high-tech industry. Starbucks hosts the My Star bucks Idea platform where a distributed community of participants interacts in order to submit and vote on ideas regarding service and product innovations.

In order to motivate the public to contribute to crowdsourcing platforms that are ultimately leveraged by for-profit companies in the pursuit of profitability, appropriate incentives are required. Motivation determines participation in idea competitions and is a critical success factor of crowdsourcing [Shao, Shi, Xu, and Liu, 2012]. Many crowdsourcing platforms provide economic incentives that award contributors of the best ideas in order to encourage participation from the public (e.g., www.cambrianhouse.com, www.innocentive.com).

Reliance on such economic incentives is based on the assumption that idea generation is largely a solitary activity – not allowing for the inherently social nature of crowdsourcing activities. Many crowdsourcing initiatives leverage social platforms such as online communities that foster social interactions between their members. Several studies have found that online social collectives are healthy only when participants are actively interacting and providing one another with feedback regarding their contributions [Nambisan and Baron, 2007; Sawhney, Verona, and Prandelli, 2005]. In short, participants in online crowdsourcing platforms may be demotivated from further idea contributions when their initial contributions do not generate any feedback from other participants. Economic incentives alone are not sufficient for sustaining contributions of participants in these platforms. As crowdsourcing platforms attract more and more participants, it becomes

almost impossible for firms to provide the needed social feedback to all participants. In such situations, it is important that other participants provide such feedback and thus foster the social environment conducive to sustained long term participation in idea generation activities. Hence, more research is needed to understand the collaborative process of idea generation in order to encourage ongoing idea contributions from participants.

Individual participants of crowdsourcing initiatives typically propose new ideas when they are provided with economic incentives. However, in such situations there is little incentive for participants to provide any feedback to other participants regarding their ideas. But, as discussed above, such social feedback processes are important in order to sustain the viability of the crowdsourcing platform over the long term. Therefore, this study investigated the impact of introducing incentives for participants to provide feedback on idea generation performance in crowdsourcing. We divided the feedback interaction into two categories : quantitative and qualitative - and an incentive was provided to motivate participants to rate others' ideas (quantitative feedback) and to provide comments on others' opinions (qualitative feedback), respectively.

In particular, since smartphones have become popular, crowdsourcing has become closely connected to social networking service (SNS). An important characteristic of SNS is that it facilitates social interaction and feedback between participants. A good example is Twitter, which has received a lot of attention recently. This study investigates how feedback influences idea generation performance on the Twitter platform.

2. Literature Review and Hypotheses

2.1 Idea Generation and Incentive

Several studies investigated factors affecting knowledge sharing in virtual communities [Chiu, Hsu, and Wang, 2006; Hsu, Ju, Yen, and Chang, 2007]. As knowledge sharing in online communities is becoming increasingly important to companies conducting their business, companies attempt to collect innovative ideas by using a crowdsourcing approach via an Internet-based platform. Employing a crowdsourcing approach, a company conducts idea generation competitions and invites the general public or a target group of individuals to participate in a given subject within a given time. After a predetermined period of time, review committees evaluate the submitted ideas and finally select the best ideas [Leimeister, Huber, Bretschneider, and Krcmar, 2009].

Motivations for participation in ideas competitions are a critical success factor of crowdsourcing. A company has little control over the general public, which has no obligation to participate in its idea competition, regardless of what that organization may desire. Thus it is necessary for a company to provide appropriate incentives in order to motivate the public to participate in the idea competitions.

Incentives are important factors leading to knowledge sharing in virtual communities [Liu, 2012]. The expectation of extrinsic rewards, such as monetary rewards and promotion, influences individuals' intention to share knowledge [Bock and Kim, 2002; Kankanhalli, Tan, and Wei, 2005]. When compensated for their contributions, people

have a more positive attitude toward knowledge sharing. Therefore, extrinsic incentives can also have an important impact on idea competitions that are characterized by a crowdsourcing approach, and that encourage people to generate ideas.

2.2 Idea Productivity and Participation Rate

In this study, providing an incentive to participants is considered to be a factor leading to increased idea generation performance. Idea generation performance can be measured by idea productivity and participation rate. Idea competitions that target the general public might be considered brainstorming in a way of crowdsourcing. Osborn [1953] popularized the technique of brainstorming and suggested that generating a large number of ideas would stimulate the creation of excellent ideas. Likewise, within a crowdsourcing approach, it is important to have higher idea productivity, i.e. to generate more ideas, to improve the probability of higher quality ideas. In fact, brainstorming research has focused on idea generation performance as measured by the number of ideas generated [DeRosa, Smith, and Hantula, 2007; Hung, Durcikova, Lai, and Lin, 2011; Kohn, Paulus, and Choi, 2011].

One of the brainstorming rules suggested by Osborn [1953] was to combine and improve ideas, which he also explained as building on the ideas of others. Thus computer-mediated brainstorming can provide synergistic effects. If ideas are presented and stored in a computer, it is much easier to access or recall ideas proposed by others, and the likelihood of building on previous ideas is improved [Gallupe, Cooper, Grisé, and Bastianutti, 1994]. Kohn et al. [2011] suggested that idea combination can increase the quantity of ideas generated. Hence, for measuring idea productivity, this study considered the number of ideas generated as well as the number of ideas generated in collaboration.

Since the crowdsourcing approach requires the participation of a generally large group of people it would be important to measure how actively they participate and how many participants respond during an idea competition period. Such a participation rate could be used to evaluate the effectiveness of crowdsourcing. In this study, participation rate was analyzed by the number of tweets and comments.

2.3 Idea Generation and Feedback

Among various incentive designs for an idea competition, this study investigated the impact on idea generation performance when incentives were provided to encourage feedback interactions between participants in the crowdsourcing platform.

Previous studies have proposed that feedback plays an important role in community maintenance. Feedback is a response to a particular process or activity, and responsiveness has been associated with increased perception of cooperative intentions; thus, feedback is positively associated with community maintenance contributions [Dominick, Reilly, and Mcgourty, 1997; Norris-Watts and Levy, 2004; Park, Park, and Lee, 2007]. Since interactivity, which is defined as feedback between members in an online com-

munity, can be a social activity [Preece, 2001], it is an important element for the success of a community. Previous studies have primarily focused on the importance of feedback in sustaining community members' positive behaviors. However, few studies have examined the effects of encouraging feedback interactions amongst participants of crowdsourcing platforms on idea generation performance within these platforms. Therefore, this study investigated the role of feedback between participants in an online community created for crowdsourced idea generation. In this paper, we distinguished between two types of feedback between participants : quantitative and qualitative. We examined their influence on idea productivity and overall participation rate.

2.3.1 Feedback through Quantitative Rating

Idea competition within a crowdsourcing approach not only leads to a collection of many new ideas but also to the filtering and selecting of excellent ideas. During an idea competition, a company can potentially obtain a large number of ideas. To screen and select profitable ideas, it should spend a lot of time and resources.

However, if a crowd is involved in the process of assessment and selection of excellent ideas, the company can choose excellent ideas more easily and at lower costs. For example, istockphoto.com not only collects digital contents and through crowdsourcing but also solicits the public to screen submissions. In the case of Threadless (Threadless.com), T-shirt designs are created and chosen by customers. Since winning designs are selected based on average rating scores submitted by the community, it reduces the risks of new product development. This is considered to be an innovative profit model. Since the ideas that come from the customer crowds can reveal rich information about customers' preferences and concerns, using a peer voting score can help a company select the best ideas in a cost-effective manner.

Duan, Gu, and Whinston [2008] investigated the relationship between online user feedback and movie revenues. They found that the average of online review ratings did not have a significant impact on movie revenues, but the number of online postings had an influence on such revenues. This means participation by many people plays an important role in assessing the quality of a movie. A possible explanation related to idea competition and the crowdsourcing approach is that the more people participate in the assessment of ideas, the more accurate the quality assessment will be. Furthermore, such participatory assessment will lead to higher quality ideas.

Since incentives have an important role in sharing ideas [Bartol and Srivastava, 2002] and feedback within a group collaboration environment increases a group's idea generation performance [Jung, Schneider, and Valacich, 2010], this study investigated whether incentives to provide feedback in the form of quantitative ratings had an impact on participants' idea generation activity, i.e. idea productivity and participation rate. The hypotheses regarding incentives for feedback through quantitative rating are as follows :

Hypothesis 1a : Incentives to provide feedback in terms of a quantitative rating has a positive effect on idea productivity (the number of

ideas generated in total and the number of ideas generated in collaboration).

Hypothesis 1b : Incentives to provide feedback in terms of a quantitative rating has a positive effect on participation rate (the number of tweets and the number of comments).

2.3.2 Feedback through Qualitative Comments

Feedback in the form of qualitative comments plays an important role in a successful online community. Social interaction within an online community (e.g., feedback such as answers to a question or repeated interactions) has an impact on increasing the likelihood of the possibility of sustaining and encouraging repeated participation and helps ensure the long-term success of the community [Cho and Jahng, 2009; Moon and Sproull, 2008].

Some studies have examined the relationship between electronic brainstorming and feedback. Computer-based brainstorming results in improved performance in idea generation because the computer medium facilitates an adaptive response between the participants [Dennis and Valacich, 1993]. Michinov and Primois [2005] found that feedback is one of the most significant predictors of group productivity and creativity in electronic brainstorming.

As ICT technology has continued to advance, the idea management process, including idea creation, idea presentation, and idea distribution, has also expanded. In particular, Social Network Services (SNS) have become prominent venues for maintaining stronger relationships and making it easier to have real-time communication. Twitter is one of the popular social networking sites that allow registered users to post and read short text messages. Because of the instantaneity of communication on Twitter, it is a very powerful tool for interacting with others.

In the case of Twitter-based crowdsourcing, after ideas are posted, other participants can easily check, review, evaluate and discuss the ideas. Even though participants do not know each other, they still interact through active provision of feedback regarding the ideas that have been generated. According to Jung et al. [2010], the principle of providing feedback within a group collaboration environment should increase idea generation performance. Idea generation resulting from Twitter-based interaction —in particular within a competitive environment and through crowdsourcing—entails new mechanisms of collaboration.

Since facilitating collaboration through participants' feedback can be interpreted as numerous people participating and ideas being developed and integrated, incentives for providing qualitative comments to other participants might be needed to encourage participants to interact during the idea competition period. Therefore, this study investigated whether incentives to produce feedback may affect the contribution of qualitative feedback comments and how this may impact overall idea generation performance in the crowdsourcing platform. The hypotheses are as follows regarding the impact of incentives for providing feedback in the form of qualitative comments :

Hypothesis 2a : Incentives to provide feedback in the form of qualitative comments have a positive effect on idea productivity (the num-

ber of ideas generated and the number of ideas generated in collaboration).

Hypothesis 2b: Incentives to provide feedback in the form of qualitative comments has a positive effect on participation rate (the number of tweets and the number of comments).

3. Research Methodology

3.1 Participants

A total of 63 undergraduate business students from a university in South Korea volunteered to participate in the study in exchange for extra course credit. They were using or had used Twitter before. Before the actual experiments, participants completed a pre-session survey that gathered some background data. The demographic information on the participants is summarized in <Table 1>.

3.2 Research Design

An idea competition was conducted to generate ideas regarding which facilities ought to be included in the university's New Business Building, which was planned to be completed in 2014 at the participants' university. The students were allowed to freely contribute their ideas regarding the New Business Building's facilities through a newly created Twitter account of a virtual construction company.

This study involved a 2 (With/without incentive to provide qualitative feedback regarding others' ideas) X 2 (With/without incentive to provide feedback in the form of quantitative rating of the contributed ideas) between-subjects factorial design that assessed idea generation productivity and participation rate. An incentive was given to participants to rate others' ideas and/or to provide qualitative comments on others' opinions, respectively. Additional incentives were provided in the form of awards for the most active participant and the contributor of the best idea.

Participants were randomly assigned to one of the four experimental conditions depicted in <Table 2>. There were 14 participants for the

〈Table 1〉 Demographic Data of Participants

Item	Category	Frequency	Percent
Gender	Male	39	61.9
	Female	24	38.1
Age	20~25	43	68.3
	26~30	20	31.7
Experience using Twitter	Less than 6 months	26	41.3
	6 months~1 year	13	20.6
	Over 1 year	24	38.1
Medium used to access Twitter most frequently	SmartPhone	29	46.0
	Notebook	23	36.5
	PC	11	17.5
Frequency of posting tweets	Less than once a week	9	14.3
	More than once a week	31	49.2
	More than once a day	23	36.5

one condition, 17 participants for the other condition, and 16 participants in each for the remaining condition. No significant differences between subjects existed across the four experimental treatments in terms of their gender or age.

〈Table 2〉 Experimental Design

		Incentive to provide feedback in the form of qualitative comments	
		Without Incentive	With Incentive
Incentives to provide feedback in the form of quantitative ratings	Without Incentive	Group 1 (16)	Group 2 (16)
	With Incentive	Group 3 (14)	Group 4 (17)

Note : 63 subjects were randomly assigned to each of the four groups.

3.3 Procedures

The experiment was divided into idea generation and selection of the best idea. In the first part, participants were asked to generate ideas about the new business building's facilities. Before starting the idea competition, each group was given an explanation of the purpose of the study and of the incentives in their respective groups. In order to further motivate the participants, it was clearly stated that participants' ideas would actually be delivered to the new business building's construction committee, although the company was virtually established.

We followed the participants' accounts and posted tweets to their accounts regarding the topic and tasks of the idea competition. The idea generation was conducted for 24 hours.

For the idea selection part of the task, we created a twtpoll, a simple Twitter poll service. The votes were taken for 24 hours from May 19 at 9:00 am to May 20 at 9:00 am, and the students were asked to select the best of five ideas chosen by the Construction Committee from the ideas presented during the competition period.

3.4 Measures and Dependent Variables

3.4.1 Productivity

Quantity of ideas generated: A team of two construction experts reviewed the generated ideas. The number of presented ideas from each group was counted during the idea competition period. Ideas that were the same in each group were counted as one idea, and ideas that were unclear or were not relevant to the new construction of the building were excluded.

The number of ideas generated in collaboration: The tweets sent by the participants of each group were saved in an Excel spreadsheet. A team of two construction experts also classified which categories were conceptually related or unrelated. <Figure 1> shows the example of an idea generated during collaboration. The idea about an exclusive IT lounge, which was presented by Pjk***, was expanded with detailed ideas by other participants. <Table 3> presents the summary of the main categories of the ideas generated through collaboration by each group.

3.4.2 Participation Rate

Number of tweets: The number of tweets posted by the members of each group was calculated.

Number of comments: The number of tweets

that repeated, referred to, agreed with, or denied the tweets posted by others was calculated by analyzing the tweets in chronological order.

ID: Pjk*** Building an exclusive IT lounge
ID: KH*** An IT-friendly furniture arrangement would be good for the lounge, so that using a notebook computer is convenient.
ID: Jin*** Installation of a screen that shows the recent technology trend at the IT Lounge
ID: Sy*** Availability of state of the art devices, such as notebooks, tablets, and e-book readers, for rent in the lounge
ID: Ys*** It would be great if exclusive spaces were created to keep a notebook while moving between classes.

〈Figure 1〉 Example of Ideas Generated Collaboratively

〈Table 3〉 Summary of Ideas Generated Collaboratively by a Group

Group	Main Categories of Ideas Generated Collaboratively (number of ideas)
Group 1	Building an IT office (1)
Group 2	Installing an IT-exclusive lounge, installing a 24-hour seminar room, upgrading microphones for professors, arranging a space for academic conferences that can be hosted by students, installing ATMs of various banks, installing chargers for mobile phones, having TVs with Bluetooth connect-ability, arranging lecture rooms where world news and programs are available, operating a low-price coffee shop and lounge, installing an iPad, developing a mobile phone application for students in management (11)
Group 3	Installing a screen displaying news and newspapers in the lobby (1)
Group 4	Introducing an electronic absence checking system, arranging an open space where anybody can express his/her opinions, arranging a space for a rooftop garden, arranging rooms for taking naps, opening a convenience store, opening a Twitter account for the students of the Business School, renting IT devices such as notebooks and iPads (7)

4. Results

<Table 4> presents the total number of ideas produced and the participation rates of each group. A 2 X 2 analysis of variance (ANOVA) was conducted to evaluate the effects of the incentives to provide the two different types of feedback on idea production and participation rates. The test was conducted using SPSS for Windows at a 95% confidence level.

〈Table 4〉 The Total Number of Idea Productivity and Participation Rates

Categories	Group 1	Group 2	Group 3	Group 4	Total
Number of participants	16	16	14	17	63
Number of tweets	75	76	40	74	265
Total number of proposed ideas	55	70	41	79	245
Number of non-redundant ideas	47	48	40	61	196
Number of comments	0	19	1	15	35
Total tweets of each participant	4.69	4.75	2.86	4.35	4.12 (mean)
Total number of proposed ideas of each participant	3.44	4.38	2.93	4.65	3.85 (mean)
Number of ideas generated through collaboration	1	11	1	7	20

4.1 Idea Productivity

A 2(With/without incentive to provide feedback in the form of qualitative comments of others' ideas) X 2 (With/without incentive to pro-

vide feedback in the form of quantitative ratings) ANOVA on the number of generated ideas yielded a main effect for incentives to provide feedback in the form of qualitative comments ($F_{(1,97)}$ = 4.18, $p < 0.05$), but there was no significant main effect of incentives to provide feedback in the form of quantitative ratings on the number of ideas generated ($F_{(1,97)}$ = 1.02, *n.s.*). The groups with incentives to provide feedback in the form of qualitative comments generated more ideas (Mean = 3.1, SD = 3.25) than groups without incentives to provide feedback as qualitative comments (Mean = 1.8, SD = 2.49).

The ANOVA indicated a significant main effect of incentives to provide feedback as qualitative comments on the number of ideas generated in collaboration ($F_{(1,97)}$ = 20.13, $p < 0.01$), but there was no significant main effect of incentives to provide feedback as quantitative ratings on the number of ideas generated collaboratively ($F_{(1,97)}$ = 0.05, *n.s.*). The groups with incentives to provide feedback as qualitative comments generated more ideas collaboratively (Mean = 0.38, SD = 0.49) than the groups without incentives (Mean = 0.04, SD = 0.19). Therefore, H1a was not supported, and H2a was supported by the results.

4.2 Participation Rates

A two-way analysis of variance (ANOVA) revealed that there was no significant effect of incentives to provide feedback in the form of qualitative comments on the number of tweets ($F_{(1,97)}$ = 2.158, *n.s.*), and there was no significant main effect of incentives to provide feedback in the form of quantitative ratings on the number of tweets ($F_{(1,97)}$ = 0.01, *n.s.*).

More two-way ANOVA analyses found that there was a statistically significant main effect of incentives to provide feedback as qualitative comments on the number of comments ($F_{(1,97)}$ = 7.91, $p < 0.05$), but there was no significant main effect of incentives to provide feedback in the form of quantitative ratings on the number of comments generated ($F_{(1,97)}$ = 0.05, *n.s.*). The groups with incentives to provide feedback as qualitative comments generated more comments (Mean = 0.71, SD = 1.75) than the groups without incentives (Mean = 0.02, SD = 0.14). Therefore, H1b is not supported, and H2b is partially supported by the results.

We did not develop explicit hypotheses regarding the effect of the incentives to provide feedback in the form of qualitative comments on the number of participants that participated in the voting process for the best idea. But, to better understand participants' motives for active participation, a one-way ANOVA was conducted to assess the differences across the groups. There was a statistically significant main effect of the incentives to provide feedback in the form of qualitative comments on the number of participants in voting for the best idea on ($F_{(1,41)}$ = 23.56, P = 0.00). The groups with incentives to provide feedback as qualitative comments participated more in voting (Mean = 2.6, SD = 1.14) than the groups without incentives to provide feedback as qualitative comments (Mean = 1.09, SD = 0.9). Results of the ANOVA tests are provided in <Table 5>.

〈Table 5〉 ANOVA Results

Variable		F	Sig.
Quantity of ideas generated	Qualitative comments	4.18	0.04
	Quantitative rating	1.02	0.32
The number of ideas generated in collaboration	Qualitative comments	20.13	0.00
	Quantitative rating	0.05	0.83
Number of tweets	Qualitative comments	2.158	0.15
	Quantitative rating	0.01	0.92
Number of comments	Qualitative comments	7.91	0.01
	Quantitative rating	0.05	0.816

5. Discussion

This study aimed to investigate the role of participants' feedback within crowdsourcing. Some hypotheses were not supported by our empirical study. Incentives to provide feedback as qualitative comments and quantitative rating had no significant main effect on the number of tweets. Since the maximum length of a Twitter message is 140 characters, some people would post an idea with several tweets of short phrases that could be combined into one message. Due to Twitter's requirements and users' tweeting behaviors, it was almost meaningless to measure simply the number of tweets or to compare this number between the two groups.

When an incentive was provided for eliciting feedback as qualitative comments, more ideas were generated, more ideas were generated collaboratively, and comment-posting activity increased. However, in the case of providing incentives to elicit feedback in the form of quantitative ratings, such as participation in voting for an excellent idea, there was no significant main effect on the number of generated ideas, the number of ideas generated collaboratively, the number of tweets, or the number of comments. It seemed that such a result was caused by the fact that providing an incentive for participation in voting after the idea competition period did not provide any motivation during the idea competition process. Finally, for the collection of ideas through crowdsourcing, it is more important to provide incentives to the public so that they may interact with each other during the period of idea generation and refinement. This study offers a different perspective on the relationship between feedback and idea generation, and contributes to the study of crowdsourcing.

This study also offers insight to practitioners who are interested in implementation of a crowdsourcing strategy. Although this study focused on idea competitions taking place on the Twitter platform, it may be extended or applied to other platforms. Nonetheless, Twitter has the advantage of mobility, it facilitates conversational interaction, and it enables faster, easier collaboration between participants at any time. Moreover, Twitter is a free application and allows for the possibility to gain access to a wider public for crowdsourcing. This study shows that it is important to generate ideas through encouraging interaction amongst participants and the provision of feedback to others. Providing incentives in consideration of Twitter's characteristic of facilitating easy collaboration could be more effective to aid the active generation of ideas. If collaboration is vigorously pursued, it could certainly lead to many people participating in idea gen-

eration and screening. Therefore, a high degree of collaboration means a high possibility of producing high-quality ideas.

Certain limitations should be considered when interpreting our results. First, we hypothesized that external motivation is activated by external incentives. However, intrinsic motivation, such as personal fulfillment, fun, and self-satisfaction, may also affect outcomes-but was not tested. Second, our dataset consists of university students, which may restrict the generalizability of the results. In addition, crowdsourcing has become a popular tool for idea generation and for eliciting external knowledge contribution. However, it has also resulted in increased concern for the lack of quality control of the ideas. Future studies should examine the quality of the generated ideas.

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