Contest Among Contest Organizers

With the advancements in information technology and the Internet, organizations have started to look beyond their boundaries in their search for innovations (Chesbrough 2003). For example, 85% of top global brands have used crowdsourcing in the last ten years (Chen et al. 2018). A prominent way of crowdsourcing is the innovation contest. In an innovation contest, an organizer elicits innovative solutions to challenging problems from a group of agents, and gives awards to the agent who submits the best solution. Innovation contests have evolved into an industry where billions of dollars are awarded by contest organizers annually.

With the increased popularity of contests, crowdsourcing platforms such as InnoCentive and Topcoder now organize numerous contests, and generate $1 billion in revenue with an annual growth rate of 37.1% (Chen et al. 2018). For example, InnoCentive organizes around 200 contests annually for its customers in subject categories such as business and chemistry. These contests are often run in parallel, and InnoCentive members (agents) often participate in multiple contests to win cash awards ranging from $5000 to $1 million.1 Similarly, Topcoder organizes around 6000 software contests annually for its customers, and Topcoder members compete for awards around $10,000. Our interviews with practitioners have revealed that a platform either determines contest rules (such as awards given to winners) on behalf of its customers or instructs its customers in setting these rules. Also, a contest platform may encourage or discourage agents’ participation in multiple contests by setting its terms and conditions accordingly (e.g., via lenient or strict submission rules). This way, a platform aims to increase value created for each customer.

In addition to contest platforms, many organizations run multiple contests in parallel. For instance, Elanco, an animal healthcare company, organized five contests in 2016 that elicit innovative solutions to animal healthcare problems. Similarly, Gates Foundation has organized fourteen contests within the Grand Challenges Explorations initiative, where agents develop innovative solutions to challenging health issues. Most of these contests run in parallel, providing agents with several problems to work on. Yet, some of these organizations discourage agents’ participation in multiple contests. For instance, Gates Foundation allows submission to a single contest.

When agents can potentially work on multiple contests, practitioners need to make two impor-

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1Statistical analysis at InnoCentive reveals that in theoretical challenges (where agents develop theoretical solutions), on average, more than 57.4% of agents work on multiple contests in parallel (private communication).
tant decisions. The first decision is whether to discourage agents from participating in multiple contests, which may potentially induce each agent to exert more effort at each contest. Indeed, the literature on multiple contests assumes that each agent participates in only one contest (e.g., Azmat and Möller 2009). Yet, in practice, platforms such as InnoCentive allow agents to freely enter multiple contests. The second decision is how many contests to run in parallel, because running more contests may induce agents to split their efforts, potentially reducing the quality of solutions at each contest. In this paper, we advise practitioners about these decisions by answering the following research questions: (Q1) When should agents be discouraged from participating in multiple contests? (Q2) How does the number of contests affect an organizer’s profit?

To answer these questions, we develop a normative model of innovation contests where multiple contest organizers elicit solutions from a set of agents. After all awards are announced, each agent exerts effort to improve her solution at each contest she enters, where the quality of her solution also depends on an output uncertainty. Each agent chooses her effort at each contest by considering the cost of her total effort, and her total effort is subject to a capacity constraint. Following the economics and operations literature, we factor in two effects that determine the shape of an agent’s cost function: (i) each contest exhibits diseconomies of scale as it may be increasingly difficult for an agent to improve the quality of her solution at a certain contest (e.g., Mihm and Schlapp 2017), and (ii) there is a potential economies of scope across contests as exerting more effort at one contest may reduce the cost of effort at another contest (e.g., Panzar and Willig 1981).

We answer our first research question by comparing an “exclusive” case where each agent can participate in only one contest with a “non-exclusive” case where each agent can participate in multiple contests. We show that when agents face sufficiently large output uncertainty, an organizer’s profit in the non-exclusive case is greater than that in the exclusive case. The intuition is as follows. While an exclusive contest incentivizes agents to exert more effort, a non-exclusive contest attracts a larger number of agents, and hence benefits from a more diverse set of solutions. When agents face sufficiently large output uncertainty, the diversity effect outweighs the incentive effect. This result advises practitioners to run non-exclusive contests when they seek major innovation from agents, and to run exclusive contests when they seek low-novelty solutions. For example, InnoCentive may improve the outcome of theoretical challenges that seek major inno-
vation (e.g., finding solutions to increase the literacy of deaf children in developing countries) by encouraging agents’ participation in multiple contests. In contrast, Topcoder may improve the outcome of development challenges that seek low-novelty solutions (e.g., finding bugs in a software) by discouraging agents’ participation in multiple contests.

We next analyze how the number of contests affects an organizer’s profit. It is established in the economics literature that more intense competition has an adverse effect on competitors, yet we find that an organizer’s profit can increase up to an optimal number of contests. Interestingly, the intuition of this result depends on the agent’s output uncertainty. When the agent’s output uncertainty is large, as discussed above, running non-exclusive contests maximizes each organizer’s profit, and there is an optimal number of non-exclusive contests. This is because more non-exclusive contests benefit organizers due to the economies-of-scope effect, but also harm organizers because agents may split their efforts among more contests or may even refrain from participating in some of these contests. We further show, interestingly, that the optimal number of contests increases with the agent’s output uncertainty. This finding suggests that practitioners seeking major innovation may benefit from organizing multiple contests that exhibit economies of scope. When the agent’s output uncertainty is small, running exclusive contests maximizes each organizer’s profit, so we analyze exclusive contests. As each agent enters only one contest in the exclusive case, the economies-of-scope effect disappears, but a different trade-off arises. As the number of contests increases, the number of agents entering each contest decreases, thereby incentivizing each agent to exert more effort, yet reducing the diversity of solutions. The incentive effect outweighs the diversity effect, so running multiple contests improves each organizer’s profit when the agent’s output uncertainty is small (e.g., when seeking low-novelty solutions).

References