D I S S E R T A T I O N P R O P O S A L

Ersin Korpeoglu

Innovation and Crowdsourcing Contests

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324 GSIA (West Wing)

In my dissertation, I study contests (also called tournaments) wherein a contest organizer (also called seeker) seeks solutions to a problem from independent agents. The seeker employs a subset of these solutions, and awards the best solution(s). For example, since 2012, Samsung has organized an innovation contest, called the Smart App Challenge, that invites independent programmers to develop novel apps. Samsung awards the best few apps, and uploads a larger number of apps to its on-line store. In three articles that I elaborate below, I provide managerial insights that can assist organizations like Samsung in designing an optimal contest.

In the first article, a seeker employs a single or multiple solutions, and the agents creating these solutions are called *contributors*. The contest literature focuses on single contributor (e.g., a logo design contest) or all contributors contests (e.g., a sales contest), but it fails to advise firms like Samsung with multiple (but not all) contributors. In this study, I attempt to close this gap. I construct a normative model wherein agents' solutions are unknown a priori due to uncertainties arising from problem solving and the seeker's subjective evaluation. I investigate how the uncertainty structure as well as the number of contributors impact the optimal contest design. I show that awarding only the best solution is optimal to the seeker for a large class (but not all) of distributions for agents' uncertain outputs. When the spread of the output distribution or the number of contributors is sufficiently large, a free-entry contest that does not restrict the entry of agents is optimal. Finally, I compare the seeker's payoffs under contests and contracts.

In the second article, I study a contest wherein agents with heterogeneous ability levels make efforts to develop solutions to a certain problem. Existing theories predict different outcomes about how agents will change their effort levels as more participants compete for a prize. Specifically, one theory prescribes that when agents are heterogeneous in their initial expertise, all agents will reduce their efforts with more participants due to increased competition. In contrast, another theory prescribes that when agents are heterogeneous in their costs of exerting efforts, high-ability agents may raise their efforts with more participants, while low-ability agents may reduce their efforts; but it does not provide an explanation for such a prescription. A recent empirical study corroborates the prescription of the second theory. This paper presents a unifying model that encompasses both types of heterogeneity in agents, and offers a precise explanation about agents' rational behaviors in response to more participants. We further examine how such behavior of agents will affect a contest organizer's decision on whether or not to conduct a free-entry contest (also called open innovation).

In the third article, a seeker delegates a large population of agents to create solutions to a problem (e.g., developing vaccines for pneumococcal meningitis) at the earliest possible time (i.e., minimum turn-around time). Agents have heterogeneous expertise levels that determine how close they are to creating a solution. The seeker minimizes the total turn-around time of the solutions he will employ by deciding on how to compensate agents. I establish that although the common practice in time-based contests is to offer fixed prizes, the seeker can do better by compensating agents based on turn-around times.