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DISCUSSANT COMMENTS

ENVIRONMENT, ORGANIZATION, AND INNOVATION: HOW ENTREPRENEURIAL DECISIONS AFFECT INNOVATIVE SUCCESS

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The conceptual and practical importance of innovation is well-recognized. At least since the Nobel Prize winning work of Robert Solow, it has been acknowledged that innovation is a major driving force in economic growth and social development (Solow, 1957). Existing work has also shown relationships at the firm level between innovative inputs such as R&D or patents and profitability (e.g., Pakes, 1985; Hall, Jaffe, and Tratjenberg, 2005), outputs such as new product introductions and profitability (e.g., Geroski, Machin, and Van Reenen, 1993), and the frequency of innovation and the persistence of superior profitability (e.g., Roberts, 1999). In addition to contributing to industrial growth and benefiting society, innovation is an important source of competitive advantage.

Although a large body of research on innovation exists in industrial organization, organization theory, sociology, and strategic management, we still know relatively little about how innovative opportunities are identified or created. This commentary presents a simple conceptual model through which strategic entrepreneurship research may address this gap in the literature. This model links recent work that emphasizes the different processes used to recognize, discover, or create innovative opportunities (e.g., Littlechild, 1986; Sarasvathy *et al*., 2003; see also Miller and Alvarez and Barney in this volume) with a simple stimulus—response—consequence framework. The resulting outline may be used to tackle questions such as: How are innovative opportunities recognized, discovered, and created? What approaches are helpful in implementing and diffusing innovation? Once identified or created, how do organizations capture value by implementing or commercializing their innovations? Are particular types of organization more successful at managing particular stages of the innovation process?' Responses to these and similar questions promise to help us to understand why some entrepreneurial firms seem to be more innovative than others and how entrepreneurial managers' can enhance the probability that their firms create competitive advantage and economic value through innovation.

THEORETICAL FRAMING

Figure 1 presents a conceptual model that may be used to systematically consider how strategic entrepreneurship contributes to innovation research. The left panel captures aspects of the environment that affect prospects to recognize, discover, or create new innovations. The middle panel represents investments, tasks or organizational forms that may be chosen by managers or selected by the environment. The right panel indicates the innovative outcome

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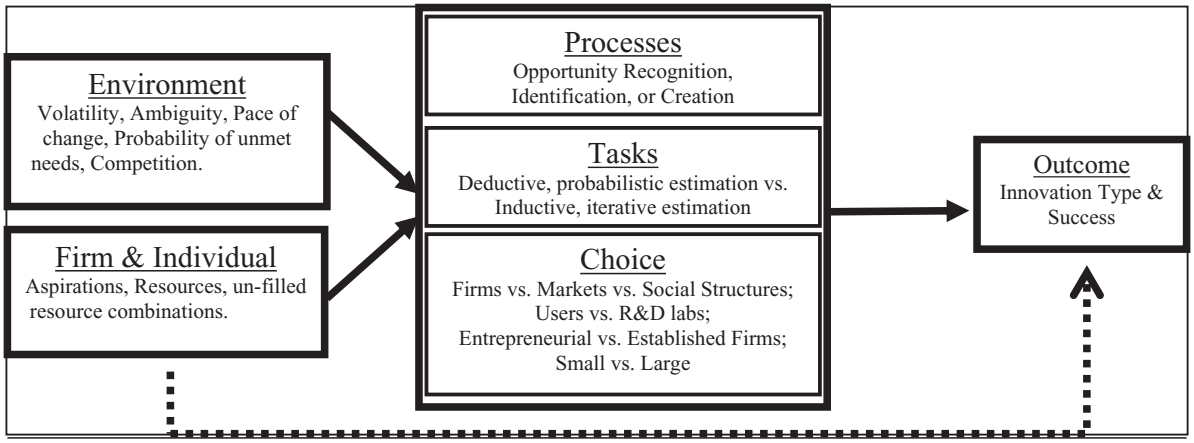

Figure 1. A conceptual model highlighting the role of entrepreneurship in the innovation process

that may be expected as a consequence of a particular set of decisions in a specific environment. Exemplars of potential attributes, decisions, or outcomes are listed at each stage. The solid lines suggest researchable assertions regarding the antecedents and consequences of particular managerial decisions or the specific selection of organizational forms. The dotted line serves as a reminder that the choice variables represented in the middle panel are not randomly assigned and the consequences of these variables are therefore susceptible to bias.

This framework suggests at least three basic ways in which strategic entrepreneurship research may productively contribute to innovation research. Perhaps most importantly, it indicates the central importance of identifying and describing the different tasks and organizational structures associated with the opportunity recognition, discovery, and creation processes. As argued elsewhere in this volume, the discovery and creation processes represent distinct theories of entrepreneurial behavior (Alvarez and Barney) that employ different conceptualizations of risk and rationality (Miller). Ascribing different tasks and organizational forms to the processes used to recognize, discover, or create innovative opportunities will allow future work to generate refutable implications regarding the causes and consequences of these different forms. For instance, if one accepts that *recognition* of innovative opportunities is facilitated by analysis of the expected returns to alternatives, then one may expect to observe organizations focusing on this process to employ highly analytic individuals, to emphasize tasks that probabilistically estimate returns to investment, and to compare alternative investments based on these estimates. If one accepts that the *discovery* of innovative opportunities is facilitated by explorative search, then one may expect to observe organizations to employ individuals with diverse backgrounds, to craft tasks that allow individuals to informally interact, and to use networked organizational forms that facilitate explorative search. If one accepts that the *creation* of innovative opportunities is caused by the actions of imaginative individuals, then one may expect to observe organizations to employ more creative individuals and to use ongoing, iterative analyses (e.g., Bayesian statistics) to judge returns to a project. In sum, work that links specific tasks and organizational forms to the recognition, discovery, and creation processes is likely to contribute to innovation research.

The framework also suggests examining the particular circumstances under which the tasks and organizational forms identified above are most likely to be selected. Work in industrial organization holds that interrelationships exist between current market structure, expected (future) market structure, and the incentive to invest in innovative activity. This work traditionally assumes decision makers rationally assess opportunities based on their evaluation of expected payoffs as determined by a probability distribution over known possible states. However, other environmental-, firm-, or individual-circumstances may be associated with opportunity discovery or creation. For instance, competitive environments where the pace of technical change is high and/or consumer demand is highly fragmented are likely

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to be rife with unmet consumer needs or unfulfilled technological possibilities. In these settings, the explorative search tasks associated with the opportunity discovery process may be expected. Alternatively, the creation process may be more likely to be observed in pre-emergent markets or technological fields where firms exploring new ways to develop products or services are able to iterate through multiple experiments.

Finally, the framework suggests value in exploring the consequences of choosing specific tasks or organizational forms in particular contexts. Existing work describes how the use of particular leadership styles (e.g., Nadler and Tushman, 1990), heavyweight teams (e.g., Clark and Wheelwright, 1992), ambidextrous structures (e.g., Tushman and O'Reilly, 1996), and organizational processes (e.g., Bingham, Eisenhardt and Furr) may facilitate innovation. The notion that tasks and structures vary in their ability to support opportunity recognition, discovery, and creation suggests that additional work may clarify the contexts in which these and other strategies are more or less appropriate. Such work may address how context affects recognition, identification, and creation of value enhancing ideas, the implementation challenges that exist once a valuable opportunity is identified or created, and the conceptual and empirical challenge of separating out the influence of managerial choice on outcomes.

SOCIAL NETWORKS, USER COMMUNITIES, AND INNOVATION

The articles published by Adam Kleinbaum and Michael Tushman and by Sonali Shah and Mary Tripsas in this volume explicitly examine the identification and implementation of innovation. While both papers suggest tradeoffs in the use of particular mechanisms to manage the innovation process, they differ in the types of innovation that they examine and the organizational mechanisms used to identify and commercialize these opportunities. Kleinbaum and Tushman suggest that social networks provide an alternative (and superior) mechanism to formal organization for identifying interdependent innovations. They argue that brokerage relationships facilitate the creation of interdependent innovations and strong ties facilitate implementation of these opportunities. The implication of their work is that senior management influences the identification and implementation of interdependent innovations via project selection and the appointment of central actors. Shah and Tripsas focus on the role of user networks and examine how users facilitate the discovery of new solutions to existing, but unmet user needs. They use a detailed case study to suggest that user innovation is likely to be prevalent in market segments where there is heavy idiosyncratic appeal and describe how the unique adaptive and coordinative aspects of user communities may facilitate user innovation in these settings.

These papers offer clear insights regarding the framework outlined above. Kleinbaum and Tushman, note that the high levels of task interdependence associated with formal organizational structures are likely to hinder interdependent innovation and suggest that social networks provide a superior mechanism for generating this type of innovation. Shah and Tripsas describe how the use of (non-pecuniary) incentives and collective decision-making processes in user communities may affect access to market information and framing of problems. They suggest that the innovative activities performed within user communities are quite distinct from those performed in formal R&D labs, spinoffs, etc. The two papers also suggest circumstances where the two organizational forms are most likely to be observed. For instance, Shah and Tripsas suggests that the user entrepreneurship process is most likely in fragmented markets where products and services have high-levels of idiosyncratic appeal and users are likely to value invention for private, non-financial reasons. Finally, both papers consider consequences of choosing specific tasks or organizational forms. For example, Kleinbaum and Tushman provide a detailed description of the implementation challenges associated with the use of boundary spanning individuals to identify and create interdependent innovation opportunities and suggest that different types of networks (i.e., with strong ties) may be required to implement these innovations.

The framework presented in this commentary and the articles published in this volume suggest promising questions on which to focus new research that examines how innovative opportunities are recognized, discovered, created, and implemented. It is hoped that this work may spark additional research that considers the unique tasks and structures associated with the aforementioned innovative processes, the conditions in which each process is most often selected, and the consequences of these selections.

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