

Frank T. Rothaermel

Georgia Institute of Technology
Atlanta, GA 30332-0520, USA

Andrew Hess

Georgia Institute of Technology
Atlanta, GA 30332-0520, USA

**Innovating Within a New Technological Paradigm: The Role of Individual, Firm, and Network-level Effects
In Building Capabilities**

Abstract

Our overarching research question is how do firms build capabilities when confronted with a new technological paradigm? Following the dynamic capabilities perspective, we suggest that antecedents to innovation can be found at the individual, firm, and network level. Thus, we challenge two assumptions common in prior research. First, significant variance exists at the focal level of analysis, while other levels of analysis are assumed to be homogeneous. Second, the focal level of analysis is more or less independent from other levels of analysis. Accordingly, we advance a set of hypotheses to assess the effect of individual, firm, and network-level antecedents on innovation output. We then investigate whether a firm's antecedents to innovation lie across different levels. To accomplish this, we propose two competing hypotheses. We juxtapose the propositions that the individual, firm, and network-level antecedents to innovation are substitutes versus complements. We test our multi-level theoretical model using an unusually comprehensive and detailed panel dataset that documents the innovation attempts of global pharmaceutical companies within the new biotechnology paradigm over a 23-year time period. We find evidence that the antecedents to innovation lie across different levels of analysis and can have compensating or reinforcing effects on firm-level innovative output.

Key words: dynamic capabilities; innovation; multi-level theory; longitudinal panel data; pharmaceutical and biotechnology industries