

Analysis of the Technological Innovation Process: Determinants, Consequences and Efficiency

Cruz Cázares, Claudio

Abstract

Despite the great importance attributed to technological innovations as the main source of competitive advantages and as the driver of firm performance, a comprehensive picture of the techniques and approaches for understanding firms' R&D behavior has not yet emerged and several issues require further investigation. In this context, the aim of this dissertation is to analyze, in a broader sense, the technological innovation activities following a process-based perspective. Categorizing innovation as a process which embraces the phases of searching, selecting, implementing and capturing, this dissertation develops four empirical studies in order to capture and understand each of the innovation process phases. The first empirical Chapter accounts for the searching and selecting phases of the innovation process and aims at increasing our knowledge of firm innovative behavior by analyzing the factors that determine firm R&D strategy selection. Three R&D strategies are defined and represent the internal development of R&D (make), the externalization of R&D (buy) and the combination of internal and external R&D (makebuy). Contrary to previous studies, we consider the joint effect of firm internal resources, industry characteristics and appropriability conditions as determinants of R&D strategy selection. The second empirical Chapter also explains the determinants of the R&D strategy selection but with an emphasis on public R&D funding. The third empirical Chapter aims at ascertaining the effects of the different R&D strategies on firm innovative performance, which accounts for the selecting and implementing phases. In order to evaluate R&D's effects in a broader sense and looking for robust results, we consider different measures of product and/or process innovations as indicators of firm innovative performance. Finally, the fifth chapter accounts for the implementing and capturing phases of the innovation process. It proposes a new approach to tackle the innovation-performance relationship; its objective is to cope with the, so far, mixed and inconclusive results of studies analyzing this relationship. We argue that the indistinctly use of the innovation inputs or outputs in order to measure firm innovativeness is not trouble-free; they should be, rather, jointly considered from a productive perspective. All empirical studies are carried out using the Survey of Business Strategies of Spanish manufacturing firms which is a panel dataset from 1992 to 2005. Results show that the buy strategy is mainly selected by young firms lacking organizational resources and it is avoided by firms competing in uncertain markets and characterized by major technology shifts. Its effects on firm innovativeness are weaker and last less than that of any other R&D strategy. On the opposite side, the make-buy strategy is selected by firms possessing high technological resources and acting in highly uncertain markets. Regarding its effects on firm innovativeness, we observe that they are stronger and last longer. In addition, we find empirical support for our proposed argument that the effects of the R&D strategies on firm innovativeness are moderated by the technological intensity level. Finally, results of the last empirical Chapter support our arguments that the better measurement of outcomes of the technological innovations is through the efficiency whereby they are developed. Moreover, we test the moderating effect of the technological intensity level and firm size on the efficiency-performance relationship.