



When publications lead to products: The open science conundrum in new product development



Simcha Jong^{a,*}, Kremena Slavova^b

^a University College London, Department of Management Science and Innovation, Gower Street, London WC1E 6BT, United Kingdom

^b Middlesex University Business School, Department of International Management and Innovation, The Burroughs, London NW4 4BT, United Kingdom

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ABSTRACT

This paper examines interdependencies between firms' activities in the realms of open science and commercial product development. We present a theoretical framework that outlines when a firm's involvement in academic communities enhances its innovative performance in terms of new products in development. We argue that the disclosure of more, valuable R&D work in quality scholarly publications and collaborations with academic partners positively affect firm innovation. We further hypothesize a differential effect of adopting open science strategies on the innovation type, being more pronounced for radical innovations than for incremental innovations. We empirically analyze a unique panel dataset containing information on the product innovation performance and R&D activities of 160 UK therapeutic biotechnology firms over the period 1998–2009. Our results from count data models on the number of new products in development provide empirical support for our hypotheses.

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1. Introduction

A growing number of firms in knowledge-intensive sectors participate in open science, a system of cumulative knowledge production that facilitates the disclosure of scientific discoveries through publications in academic journals (Dasgupta and David, 1994; Ding, 2011; Gittelman and Kogut, 2003; Mukherjee and Stern, 2009). In fact, prominent firms have developed into core hubs for scientific knowledge exchange in several fields. Whereas in 1975 none of the 25 most-cited articles in Science were (co-) authored by researchers affiliated with firms, in 2009 there were 6.¹ Comparative research on the extent to which products and processes build on academic science across different sectors highlights that this development has been particularly potent in the life sciences sector (Mansfield, 1995, 1998). A single biotechnology firm, Genentech published 5038 articles in scientific journals over the period 1976–2008, of which 249 in Science or Nature.²

Despite success stories of firms like Genentech, significant variation remains in the extent to which individual firms embrace open science strategies, with some firms adopting more open R&D

models and others opting to adhere to more traditional, closed R&D models. Scholarship suggests that the imprint left by founders plays an important role in shaping corporate R&D strategies in general and firms' willingness to adopt open science practices in particular (Ding, 2011; Jong, 2006; Murray, 2004; Powell and Sandholtz, 2012). Although the importance of organizational imprinting for firms' varying strategies in interacting with academic communities is well understood, the dynamics governing the interdependencies between firms' activities across the realms of open science and commercial product development remain less clearly defined.

Existing studies highlight a range of benefits for firms that participate in open science, including the opportunity to learn from academic collaborators (Almeida et al., 2011; Cockburn and Henderson, 1998; Liebeskind et al., 1996; Zucker et al., 2002), to enhance firms' absorptive capabilities (Cohen and Levinthal, 1990; Fabrizio, 2009; Fleming and Sorenson, 2004), to attract and retain high-quality scientists (Stern, 2004), and to signal the possession of strong scientific competences to external parties (Luo et al., 2009; Polidoro and Theeke, 2012). However, other studies highlight potential drawbacks for firms' involvement in open systems of knowledge exchange because of the conflicts that exist between the institutional logics governing the realms of science and technology. For example, Gittelman and Kogut (2003) point out that the production of high-profile scientific papers actually harms the production of high-value patents.

Our research aims to explore boundary conditions that govern the benefits of firms' involvement in academic communities. Specifically, we examine the impact of publishing better scholarly research and collaborating with university scientists on firm

* Corresponding author. Tel.: +44 02076793693.

E-mail addresses: s.jong@ucl.ac.uk (S. Jong), k.s.slavova@mdx.ac.uk (K. Slavova).

¹ Source: Web of Science, Science Citation Index Expanded, accessed 8 June 2012.

² Source: Web of Science, Science Citation Index Expanded, accessed 8 June 2012.