Chapter 24
Exploring the Impact of University–Industry Linkages on Firms’ Innovation: Empirical Evidence from Mexico

Noé Becerra Rodríguez
Metropolitan Autonomous University, Mexico

Gabriela Dutrénit Bielous
Metropolitan Autonomous University, Mexico

ABSTRACT
This chapter explores the impact of University–Industry Linkages (UIL) on the innovative performance of Mexican firms. Due the diverse nature of universities and public research centers, it examines the effect of those UIL separately. Using original data from a survey of 382 firms, the outcomes of Logistic regressions indicate that UIL have significant but mixed effects on firms’ innovation. While links with universities seem to enhance product innovations, interactions with PRC seem to foster process innovations. The results confirm the major impact formal Research and Development (R&D) has on innovation projects. Regarding technological intensity, a significant influence on product innovation was found, but not on process novelties with high-technology firms performing better than those from the low technology and services sectors. Conversely, size and age have notable influence on process innovation but not on product novelties, with larger and younger firms innovating more than small and older ones. Finally, some political implications are discussed.

INTRODUCTION
Nowadays the ability to develop and introduce innovations has become crucial if firms aim to survive within an increasingly global and competitive economy. The productive sector uses a variety of sources of knowledge in order to improve its capacity for innovation and solve technical problems. In this context, research from universities and public research centers (PRC) has been recognized as an important
Exploring the Impact of University-Industry Linkages on Firms' Innovation

A wellspring of knowledge for firms. Dealing with this topic, a wide body of literature has analyzed the university-industry linkages (UIL) from the view of firms in order to improve our understanding of this interaction in the framework of the National Innovation System (NIS).

This research thread has tackled several topics related to UIL. Aiming to grasp the dynamics of interaction between firms and universities, a number of studies have examined the drivers of UIL for firms ((Adams, Chiang, & Jensen, 2003; Arvanitis, Sydow, & Woerter, 2008; Dutrénit, De Fuentes, & Torres, 2010; Eom & Lee, 2009; Giuliani & Arza, 2009; Hanel & St-Pierre, 2006; Laursen & Salter, 2004; Segarra-Blasco & Arauzo-Carod, 2008; Tether & Tajar, 2008; Torres, Dutrénit, Becerra, & Sampedro, 2011), and the modalities of UIL as a function of structural and behavioral factors (Bekkers & Bodas Freitas, 2008; Cohen, Nelson, & Walsh, 2002; De Fuentes & Dutrénit, 2012; Eom & Lee, 2010). Other scholars have focused on barriers or benefits for the interaction between firms and academic organizations (Arza & Vazquez, 2010; Bruneel, D’Este, & Salter, 2010; D’Este & Patel, 2007; Dutrénit & Arza, 2010; Fernandes et al., 2010; Hall, Link, & Scott, 2001).

Regarding developing economies, and particularly some Latin American countries, we are now aware that firms have different motivations for interacting with universities and PRC and that both agents receive various benefits from this type of collaboration (Dutrénit & Arza, 2010; Albuquerque, 2015).

All these studies have shown that one critical element for industrial innovation is the pool of scientific understanding generated in the universities and PRC. Therefore, these institutions are a valuable source of research outcomes for firms’ innovation projects. Following this idea, several researchers have analyzed the use that firms make of scientific knowledge created within universities (Cohen et al., 2002; Grossman, Reid, & Morgan, 2001; Mansfield, 1991; McMillan, Narin & Deeds, 2000).

There is a broad body of literature regarding the impact of UIL on firms’ innovation (Beise & Stahl, 1999; Feller, Ailes, & Roessner, 2002; Kaufmann & Tödtling, 2001; Klevorick, Levin, Nelson, & Winter, 1995; Segarra-Blasco & Arauzo-Carod, 2008). Although these scholars have recognized that universities and PRC are key agents in the innovative performance of firms, there is not yet a clear understanding about the impact of these NIS agents on firms’ innovation.

Along a similar vein, a number of studies have tried to trace empirically the direct effect of UIL on firms’ innovation by analyzing specific sectors such as biotechnology and the textile industry (Klevorick et al., 1995). Other scholars have investigated the impact of engineering research centers on technological innovation in industry, considering the technology area, R&D intensity, and size of firms (Feller et al., 2002). It has been also found that firms which develop product and process innovations have a higher propensity to engage in R&D cooperation agreements, not only with universities but with other firms (Segarra-Blasco and Arauzo-Carod, 2008).

There are also previous studies that have focused on the role of R&D activities as the key driver of industrial innovation; however, as Santamaría et al. (2009) remarked, many activities that lead to innovation outcomes are not based directly on R&D tasks. Furthermore, R&D accounts for barely a quarter of the total expenditure aimed at achieving product innovations (Kleinknecht, Van Montfort, & Brouwer, 2002), therefore formal R&D activity does not necessarily lead to a higher level of product or process innovation (Tödtling, Lehner, & Kaufmann, 2009). Therefore, it is relevant to inquire deeper into the determinants of firms’ innovation. This analysis not only could improve the understanding about the dynamics of innovation but also might bring about some policy recommendations to invigorate the operation of the NIS.