

## Chapter 8

# Efficiency Assessment of University–Industry Collaboration

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### ABSTRACT

*Today, in addition to teaching and research roles, universities are one of major drivers of economic development and technological progress in society. To propagate technological innovation and industrial development, to implement output of academic research in practice universities should be in close cooperation with industry. University-industry collaborations have various benefits both for universities and industry. Universities gain additional funds for academic research, apply academic knowledge to industry; industry benefits from skilled human resources, new applications, and technological advances. Since university-industry collaborations have great mutual benefits for all partners, it is important to administer these operations effectively. Therefore, it is central to develop some efficiency indicators and efficiency measurement methods so that productive projects can be selected and funded more. This study aims to outline a framework on determinants of university-industry collaboration efficiency and construct a benchmark model to evaluate it using data envelopment analysis.*

### INTRODUCTION

In today's world, the mission of universities is threefold: teaching, research and public service. The very first role of the universities is teaching, to provide skilled professionals. Later, research became the second consideration of the universities in the 19<sup>th</sup> century (Seppo & Lilles, 2012; Brockliss, 2000). The outcome of research efforts is generally communicated via refereed articles published in academic journals (Seppo & Lilles, 2012). Over time, in addition to their conventional roles, which are teaching and research, universities turn out to be major drivers of economic development and technological progress in society. To accomplish this public service, universities need to be in close relation to industry and launch new practices to share results of their efforts, especially in the domain of research and innova-

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tion. To propagate technological innovation and industrial development, universities should be in close cooperation with the industry so that output of academic research can be implemented in practice. As a result, increasing number of science parks, technology transfer offices, continuing education programs, patenting efforts become the main means of university-industry collaborations to propagate influence of them to society and technology (Rybnicek & Königsgruber, 2019).

Efficient university-industry collaborations have various benefits both for universities and industry. Universities gain additional funds for academic research, apply academic knowledge to industry and get access to industrial equipment, develop new research agenda, and generate licensing and patent income, on the one side. Likewise, industry benefits from skilled human resources, new applications and technological advances, gets opportunity to employ research capacity of universities and increase productivity (Lee, 2018; Ankrah & AL-Tabbaa, 2015; Lee, 2014; Myoken, 2013; Lee, 2011; Lee et al., 2010; Barnes et al., 2002).

The mutual gains of university-industry collaborations are realized both by institutions and universities extensively. Therefore, considerable efforts are allocated to achieve successful university-industry collaborations. Research universities pioneer these collaborations in the world. For instance, in Turkey, ODTU Technopark (Middle East Technical University) and ITUNOVA Technology Transfer Office (Istanbul Technical University) are two of the several bodies aiming to generate, commercialize, and disseminate outputs of science and technology projects; channel academic research and development projects to industry effectively and timely; and present an interface between academicians and industry experts to support projects conducted through university-industry collaborations. Also, Council of Higher Education awards successful university-industry collaboration projects to promote technological progress and its diffusion to society. Similarly, Massachusetts Institute of Technology spends a great effort to encourage and support university-industry collaborations and becomes one of the best practice examples in the world.

As for the successful implementation of university-industry collaborations, a different discussion might be posed why some universities or countries are not as efficient as desired in executing these collaborations. A technical report prepared by Guimón (2013) shed some light on this issue from the developed and developing countries perspective and stated that developed and developing countries have different expectations and motivations with respect to university-industry collaborations. In developing countries, due to the low education quality, the insufficient financial resources accessible by universities, the lack of prolonged and determined effort to achieve university-industry collaborations, the lack of experience and administrative competency in collaboration projects, and the difficulties related to social and structural dynamics of public, efficient university-industry collaborations cannot be generated excessively or it takes much time to produce fruitful and productive output from these collaborations. Therefore, it is important to know success factors of university-industry collaborations and create a resourceful environment to fix the problems faced and execute efficient collaborations, especially for developing countries.

The report prepared by Healy et al. (2014) for European Commission provided that there are eight types of university-industry collaboration. These are collaboration in research and development, commercialization of research and development results, mobility of academics, mobility of students, curriculum development and delivery, lifelong learning, entrepreneurship, and governance. Collaboration in research and development includes joint research and development efforts, contract-based research, consultancy in research and development, innovation, collaborative publications, joint supervision of graduate study theses and joint supervision of student projects. Commercialization of research and development results, on the other hand, deals with the output of research and development efforts so

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