

# Chapter 11

## Attempts for an Effective Renewable–Energy Knowledge Transfer at Peruvian Universities

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### ABSTRACT

*Researchers at Peruvian universities are looking for opportunities to effectively interact with business enterprises and communities. They have also looked for government funding for these initiatives. These interactions are governed by the “triple-helix” concept of university-company-government interaction. Research groups in both the public and private sectors are trying to implement these links. In the present work, the authors evaluate a sample of Peruvian university research groups that study renewable-energy topics. The methodology considers case studies at five Peruvian universities. A model is proposed according the third academic revolution for accelerating interactions, research, innovations, and publications on the renewable-energy topic.*

### INTRODUCTION

University–company interaction in Peru has been few studied. Based on some experiences in recent years, it is possible to identify the barriers that university research groups have faced when interacting with companies. These must be overcome to facilitate the socioeconomic development of the country.

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In the knowledge society, the processes of knowledge socialization (tacit in tacit), outsourcing (tacit in articulated), combination (articulated in articulated), and internalization (articulated in tacit) allow knowledge to flow as expected in the spiral of knowledge, as advocated by Nonaka & Takeuchi (1997). These exchanges involve learning, technological-capacity building, technology transfer, and the opportunity to innovate through products and/or processes.

University–company interactions constitute an important source of new knowledge, because they not only offer investigation and academic improvement, but also proposals, implementations, and returns. Etzkowitz & Leydesdorff (1995) present a triple-helix model, consisting of the university, government, and company, with the precise aim of examining the dynamism of these interactions. Alvarez & Pompa (2018) have proposed the triple helix as the sum of small equivalent helices following which the physical metaphor is possible, since the power of a large helix would be equivalent to the sum of the powers of several small ones.

Authors suggest a analysis by means of sectoral microhelices with spatial intersections in the case of renewable energy in Peru. Our precise emphasis is on university–company interaction in the renewable-energy sector. Peru's national science, technology, and innovation policy does not contribute to this type of interaction, which belongs to the Third Academic Revolution (Etzkowitz & Leydesdorff, 1995); this makes it rather outdated, because it highlights research and publications without thinking about demand and utility.

On the other hand, the issue of renewable energy has been neglected by the governing body of science, technology, and technological innovation in Peru, called Concytec, and has not even been considered it in its national programs. The generation of renewable-energy knowledge aligns with the global trend to reduce CO<sub>2</sub> emissions and mitigate climate change.

The IRENA Report (2015) on RD&D for renewable-energy technology cooperation in Latin America and the Caribbean suggest a few best practices to support effective technology transfer, which are derived from the case of Denmark. The Danish wind industry exemplifies how dynamic clusters can collectively cooperate with all key stakeholders in a fruitful way (Kamp, 2002).

The present analysis of case studies of university–company interaction in renewable energies in Peru will allow better decision making, as well as the channeling of resources to implement R&D in a more efficient way. The problem identified is the scarce impact of university research on renewable energies upon communities and enterprises. Our research have a question: how can renewable-energy knowledge be effectively transferred from the university to society?

## **BACKGROUND**

According the International Energy Agency's Model of Short-term Energy Security, Peru has a high level of exposure (Yewell, 2010). 70% of the feedstock in its refineries uses imported oil. On the other hand, only one pipeline provides almost 50% of gas used countrywide. While the energy matrix has shifted from being based on hydroelectricity to being based on gas, there are plenty of both solar and wind resources, including sweet spots of both along the coast of the Pacific Ocean.

The knowledge-based economy is a new stage of economic development in which emphasis is placed on taking advantage of new structures under the influence of technological changes. In this context, renewable energies constitute a turning point for the development of a less-polluting energy, which is one of the development objectives of the Organization for Economic Cooperation and Development.

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