Chapter 49
The Turkish Biotechnology System:
Functioning or Malfunctioning?

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ABSTRACT

This chapter empirically examines biotechnology innovation system in order to present the concerns of developing countries. Even though it is not possible to create standard prescriptions across countries, this paper aims to develop a solid understanding of how biotechnology and institutions co-evolve that might shed light to innovation policy issues for biotechnology across developing countries. The immediate goal is the Turkish policy makers but it will surely have policy implications for developing countries in general. Through mapping innovation processes/functions over time, it is possible to develop insights of the dynamics of innovation systems. This mapping is carried out for the Turkish biotechnology system, and the findings are summarized.

INTRODUCTION

Without a doubt, countries that have capabilities in developing and using biotechnology increase their competitiveness and bring welfare to their society. The use of advanced biotechnology by developing countries might further help to upgrade their existing industrial systems and make them more valuable and competitive.

How can such a critical technology be developed and implemented in developing countries? It is known that many studies on national innovation systems (NIS) are conducted theoretically and empirically for more than 20 years, and a significant amount of innovation policies are drafted (Nelson, 2007). NIS is considered to be the microcosm of some new technologies including biotechnology, and many studies attempted to understand how nations have tackled with the creation and development of systems where new technologies are embedded (Niosi & Bellon, 1994). The literature offers a specific approach to understand a particular technology in-depth: 'technological innovation system' (TIS) that studies the

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development, diffusion and utilization of a specific new technology (Carlsson & Stankiewicz 1991). Theoretically TIS approach does not necessarily have a limitation based on a country since technologies might be developed in different countries, and there might be many interlinked agents operating in different national contexts. However, in practice, TIS approach is by and large implemented to analyze a particular country. Furthermore, both NIS and TIS based studies are concentrated on advanced countries, developing the theory specific to the problems and priorities of those countries.

This paper aims to fill the void by analyzing the Turkish biotechnology system, a technology in a developing country. To do so, the study will expand the idea of TIS by focusing on the processes of innovation systems (Jacobsson & Bergek 2006). The "functions of innovation system" approach helps to highlight the most important processes that need to take place in innovation systems in order to successfully lead to technology development and diffusion (Hekkert et al., 2007). After the detailed examination of key functions of the biotechnology system in Turkey, the paper will suggest policies to allow the system fulfill its functions and operate effectively and efficiently in order to both exploit and explore opportunities of biotechnology at the national level.

Even though it is not possible to create standard prescriptions valid for various countries, this paper aims to develop a solid understanding of how biotechnology and institutions co-evolve that might shed light to innovation policy issues for biotechnology across developing countries. Although the immediate goal is the Turkish policy makers, it will inevitably have policy implications for developing countries in general. The two key questions the study aims to investigate are: 1) the performance of the Turkish BT system, and 2) search for the weaknesses behind it so that the policy makers can be equipped with a broad perspective that will help to improve the performance of the Turkish BT system.

The paper is based on four sections. After this introduction, section 2 will briefly explain the methodology. Section 3 will present how Turkish biotechnology system functions, followed with a discussion section on the findings. Conclusion section summarizes the implications of the study for the actors of the Turkish biotechnology system, and then concludes the paper with suggestions for further studies.

METHOD

Due to the difficulty of reaching public data on technology based firms in Turkey, direct data collection through interviews is utilized. The starting point in identifying Turkish biotech firms was two previous biotechnology studies conducted in Turkey (Basaga & Cetindamar, 2000 and 2006). This study updates these former studies which identified 50 and 90 biotechnology-related firms, respectively. The update is carried out in 2010 by searching associations and Internet addresses of firms and newspapers. For example, Biotechnology Association has a database of biotechnology firms, but some of the firms in the list are not directly involved in biotech activities. Therefore, after a detailed analysis of each firm one-by-one, an updated list was formed involving 140 firms. The final list dropped to 120 when we called firms to get appointment for interviews and found that 20 of them went into bankruptcy.

We conducted interviews with the CEOs of 50 companies in the second half of 2010. Four of them were bankrupt firms, but the managers gave us valuable information on how the system worked or did not work. Five of these firms are not directly "dedicated biotechnology" firms; in other words, currently they have minor biotechnology activities but they have plans to invest in technology, so we included them in our study (OECD, 2009 and 2010). For example, an agricultural firm with 1,550 employees among which only 30 are working in biotechnology research for test purposes is also included in this study.