Chapter 18

Employment in Innovation Performance: Comparison of Turkey and EU Countries

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ABSTRACT

This study aims to determine the innovation performance of Turkey and EU countries in terms of human resources and employment indicators. Firstly, 28 EU countries’ and Turkey’s innovation efficiency is analyzed with Data Envelopment Analysis (DEA) technique. An output-oriented DEA model was used with 4 inputs (government R&D % of GDP, at least upper secondary educational attainment, science and technology graduates, employment in knowledge-intensive service sectors) and 4 outputs (high-tech patent applications to the European Patent Office, high-tech exports as a share of total exports, UNDP Human Development Index and WIPO Innovation Index). DEA helps to determine where to look to improve DMU efficiency, but it is not possible to rank the efficient DMUs through DEA. Consequently, efficient countries and innovation indicators with respect to their impact on performances are ranked with Gray Relation Analysis (GRA). As a result of GRA, Sweden has been the first ranked country among efficient countries. Most important performance indicator has been found to be human development index.

INTRODUCTION

Over the last centuries, capability to develop technology has led to reduced production costs, increased quality and accelerated globalization. Due to globalization, levels of competition increased dramatically both in domestic and foreign markets. In today’s highly competitive technological markets, innovation plays a substantial role in countries’ strategies as it is the most important factor for sustainable development and competitive superiority.

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Innovation has been defined as creating economic value by introduction or improvement of a new product and production process (Nafziger, 2006). The notion of innovation here addresses not only technological innovation that may be defined as new product and services of ‘technological nature of economics’, but also organizational and institutional non-technical innovations (Ünlükaplan, 2009). Innovation is an important driving force that boosts the productivity of both physical and human capital. Successful implementation of creative ideas and innovation are essential for countries to sustain economic development and improve competitive advantage.

The more efficient innovation activities are conducted, the more innovation output will be obtained. Innovation efficiency can be defined as the ability to translate innovation inputs into innovation outputs. (Hollanders & Celikel-Esser, 2007). The key to designing effective policies with the purpose of a positive influence on a country’s technologic innovation performance is to explore which are the factors that have an impact on innovation.

Research in innovation efficiency may aid policy makers in understanding how innovation, information technology, new business practices and intangible organizational investments can lead to higher profits, economic growth and a greater standard of living. (Brynjolfsson & Saunders, 2009). The concept of innovation efficiency may be a useful tool for guiding policy decisions (Hollanders & Celikel-Esser, 2007), as one of the key interests of policy makers is the return on investment of public funding for science & technology for the good of society. (Litan, Wyckoff, & Fealing, 2012).

This chapter aims to assess the innovation performances of European Union (EU) countries and Turkey to determine prominent drivers that affect the innovative activity of innovation efficient countries. Moreover, authors rank the efficient countries among themselves, detect where to implement performance improvements and suggest that the factors that play a major role in innovation performances of efficient countries are mainly related to human capital and labor market.

As mentioned in the methodology section of the chapter, a Data Envelopment Analysis (DEA) model is used first to measure innovation efficiency of countries with a combination of commonly used inputs and output variables in literature. Then Grey Relational Analysis (GRA) is applied to rank both the countries that are found to be efficient and to the factors that affect innovation performances of countries. Results show that human capital and employment related drivers (human development index, educational attainment, graduates in science & technology and employment in high and medium-high technology manufacturing and knowledge-intensive service) are the factors that foster innovation efficiency the most on a cross country level compared to research and development (R&D) expenditure, intellectual property rights, application, infrastructure and environmental indicators, within most innovation efficient EU countries.

There are numerous studies that measure innovation efficiency of countries by using DEA method, and there is one study in literature that applies GRA together with DEA to provide cross-national innovation policy analysis for leading innovation efficient countries. Most of the studies comparing the efficiency of countries do not focus on the weight of efficiency determining factors. Others that test the relationship between innovation drivers and innovation do not take into account efficiency on a country level in general. They are either firm-based or regional studies. Differently than most of the prior ones, this study ranks the efficient countries and also identifies factors that are affecting innovation the most, within parameters taken into account.
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