

## Chapter 9

# The System of Innovation With the Case of USA

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### ABSTRACT

*Science, technology, and innovation (STI) are directly linked with prosperity in today's global, competitive, fast-paced, and knowledge-based economy as they are not critical for the industrial development only, but also have a direct impact on the living standards. Therefore, a properly functioning innovation system is the key to permanent progress, from the perspective of both economic growth and development. This chapter lays out the national system of innovation (NSI) approach and accentuates the role of the government within that regard. As an example for a successful model, the U.S. innovation ecosystem is examined with an historical background both from the public policy perspective and at the institutional level through practical applications, particularly within the concept of university-industry collaboration. Also in the light of today's swiftly growing digital technology and global competition, the system of innovation is revisited to make assessments for future sustainability.*

### INTRODUCTION

In the literature, the system of innovation was brought first into consideration by the German-American economist Friedrich List in the first half of the 19<sup>th</sup> Century. In the following time, his National System of Innovation (NSI) concept has become the fundamental framework to the system approach, and was discussed by the American industrialists after the 1910s. Especially, in the period following World War I, U.S. industrialists' efforts to link the universities and the industry, was observed very prominently in practice. This trend has been defined as the action of integrating the science knowledge and the industrial applications. Later, in the 1960s, the system approach was followed by many policymakers around the globe. (Godin, 2010).

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In essence, the system approach has also been discussed, analyzed, and further developed by the Organization for Economic Co-operation and Development (OECD) starting from their early works on the system of innovation, science & technology, and the government's role therein. In 1958, a report prepared by the European Economic Cooperation (OEEC), the predecessor to the OECD, stated that, unlike the United States, Europe has been slow in converting scientific-based research into the marketplace and exploiting technology. Later, in the early 1970s, the studies of OECD about the analysis of the research systems suggested that, scientific and technological research systems were based on political, economic, social, and cultural factors. Therefore, it was concluded that there is no single model to show success for every case, and each country should develop its own unique model, which shall assist in their needs. (Godin, 2009).

In the same context, it has been emphasized that the boundary between fundamental and applied research was vague since science and technology were so much linked together. Virtually, the fundamental research of science requires the attention of talented and skilled workforce, whereas success in applied research depends on the strong integration of the industry and the universities.

In the same OECD studies, it has also been argued that scientific research was a continuous process and that it cannot be confined only to universities (Godin, 2009). This statement emphasizes the contribution of corporate research in industrial development besides the university-industry collaboration.

The framework of system approach and the concept of national innovation system was literally elaborated and brought into the modern literature by Freeman, Nelson, and Lundvall in the period onward from the early 1970s through the early 1990s. The system approach briefly defines the innovation system as a big system with various components such as the government, university, and industry. Also, it suggests that the degree of success depends on the relationships between the system's institutions. In the same context, success can be measured in relation to the system's fundamental goal, which can be described as the capacity to create innovations (Godin, 2009, 2010).

Hereby, the government has been emphasized as the key institution to create the significant impact on the outcomes as it holds power and authority to influence the system through public policies. From another standpoint, as the system approach entails integrating institutions, it can be argued that the same should apply for the policies. Therefore, instead of fragmentation, the integration of science, technology, education, economic, social, military, foreign and aid policies are needed for a productive innovation system. In this regard, the efficient coordination of the government offices becomes essential (Godin, 2009).

The system approach highlights the positive correlation between technology and the economy. It implies, how technology is among the critical factors for achieving national prosperity. It then refers to the working principles of an optimum innovation system that produces breakthrough technologies and converts them into economic value in the most efficient way.

In history, many countries have successfully utilized their innovation systems to gain economic growth and development. However, each of them has developed a unique model that is based on its own potential and priorities.

The United States has been the world leader in industrial-based growth since the beginning of the 20<sup>th</sup> Century and later, also the frontier in the information & communication-based technologies after the World War II period, besides its another pioneering role in bioscience, electronics, aerospace, material science, automotive and digital technologies to name a few. The close collaboration between the strong manufacturing industry and the highly productive science, research & development (R&D) ecosystem has resulted in an unprecedented pace of breakthrough technology production. The American Innovation Ecosystem has been very successful and quick in transforming scientific innovations into modern

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