

Book Review

Technology and Innovation Policy: An International Perspective

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Technology and Innovation Policy: An International Perspective
2021 by Edward Elgar Publishing, Inc.
ISBN 978 1 78990 288 4
150 pages
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As innovation management has expanded dramatically in the recent decade, this book conducts discussions on diverse issues and practices in this field across the globe. The book series “New Horizons in Innovation Management” selects best theoretical and empirical research findings with contributions to fundamental principles, rigorous evaluations of existing concepts and competing theories, historical surveys and future visions. From an international perspective, this book studies technology policy and innovation policy, particularly focusing on the policies in the USA and the UK. The significance of these policy areas and the relationship among them, is a consistent theme throughout the text, and the relationship is demonstrated using an integrating policy framework.

Private sector and public sector investments in research and development are usually presumed to be the relevant target variables for technology policy. A variety of academic literature has begun to explore the societal impacts of technology policy by researchers from many different discipline (Fini, Rasmussen, Siegel, & Wiklund, 2018; Fisher, 2005; Schillo & Kinder, 2017) s. A study finds that most innovation policy attention seems to be focused on the capacity to innovate and on input factors such as R&D investment, scientific institutions, human resources and capital (Yawson, 2009). A recently published handbook inspects alternative concepts and approaches to the dominant economic or industrial theories of innovation in detail (Grillitsch, Hansen, & Madsen, 2021). A new study addresses the question of how to orient the efforts of science, technology, and innovation policy actors to enable transformations (Ghosh, Kivimaa, Ramirez, Schot, & Torrens, 2021).

In this book, the authors propose approaches to provide more effective incentives together with suggestions on how effective these incentives have factually been. The authors consider the unintentional consequences of technology policy, and specially emphasize the environment where technology policy is adopted and the relation between the environment and an innovation ecosystem

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worldwide. The authors regard innovation policy as a result of technology policy, and therefore review the innovation policies of various countries to support this viewpoint.

Throughout this book, it is discussed that technology policy and innovation policy, two areas of policy emphasis, are related and deserve to be described separately as well as relatedly due to their distinct foci. The publication is divided into eight concise chapters. Each chapter centers on an essential aspect of technology/innovation policy. Readers are clearly guided through this field step by step following the authors' train of thought, from basic concepts and methodologies, algorithms, applications, real-world case analysis, to future development. No single chapter is not worth perusing, because not only professional knowledge but also novel ideas as well as innovative inspiration will be acquired upon completion of reading the whole text.

The introductory chapter sets the stage for the theme of this publication: technology and innovation policy. At the very beginning, the difference is and made clear between the definitions of "technology" and "innovation" as in the book title. The reason why the authors emphasize this difference is that a lot of policy makers hardly mention the term technology policy and treat it as a subtype of innovation policy, which can be noticed from their personal statements and business reports. The definitions of four fundamental terms "science", "technology", "innovation" and "policy" together with other key terms are presented in this chapter as a starting point for the topics covered in the remainder of the book, although the definitions of these terms within academic literatures are not uniform but similar. This chapter is devoted to these seemingly simple terms not just for clarity purposes but also for emphasis on how the authors view technology policy and innovation policy. The authors believe that technology policy and innovation policy are distinct stages in the so-called process of "lab to market". To the question "What was the genesis of emphasis on innovation policy which led to the association between innovation and economic growth?", this chapter gives a contemporary answer that relates to the common productivity slowdown in most industrialized nations at the beginning of 1970s.

Chapter 2 focuses on technology policies to enhance private-sector research and development (R&D). The primary tools of technology policy that effect private-sector R&D spending are tax incentives and direct R&D subsidies. The authors first describe private-sector R&D investments across countries and over time. Then, the primary technology policy tools are discussed from a theoretical perspective as well as from a cross-country application perspective. The question is raised why a country needs a technology policy to enhance its private-sector's investments in R&D, and this chapter answers that question in terms of the economics concept of market failure. An economics argument is set forth to justify private-sector R&D spending as the target variable for technology policy. In this chapter, the authors also emphasize both direct and indirect incentives by the government to encourage firms to investment more in R&D. The discussion is continued in the next chapter.

In an exploratory way, Chapter 3 studies the effectiveness of technology policies to enhance private-sector R&D. A relevant policy question is asked in this chapter. The question is: How effective have tax incentives and direct subsidies been to increase private-sector R&D spending. The empirical findings from a cross-country analysis of data are that both tax incentives and direct subsidies do matter but direct subsidies matter more in an absolute sense of increasing private-sector R&D spending as well as in a statistical sense. Some descriptive empirical insight is provided into the effectiveness of the two technology policies that are discussed in the previous chapter: tax incentives and direct subsidies. At the end of this chapter, a framework is proposed for explaining the role of investments in R&D and the role of technology policy and innovation policy in the economy as well as the relationship between the two policies.

Titled "Unanticipated consequences of technology policy", Chapter 4 continued to explore dimensions of the effectiveness of US direct subsidies to R&D. It is well accepted that all public-sector and private-sector policies have both anticipated consequences and unanticipated consequences. By observing data collected from American Small Business Innovation Research (SBIR) program which is an American R&D subsidy technology policy program, it is noted that some firms funded from public moneys through the SBIR program have sold the access to their SBIR-funded developed

technologies to foreign organizations. These behaviors, although maximize the profit to the firms, is still considered an unanticipated consequence from the SBIR program. This chapter also makes an estimation of the magnitude of the social loss resulted from this type of unanticipated consequence.

The central topic of Chapter 5 is technology policy environment. It is pointed out that two essential technology infrastructures supporting the environment where technology policy is legislated are a country's patent system and an incentive structure in place for firms to engage in collaborative R&D. This chapter describes the historical origin of each of these two infrastructural elements, discusses the theoretical benefits from each element is discussed, presents cross-country use of each element, and finally analyzes the technology policy environment in which private-sector investments in R&D occur.

Technology policies to leverage public-sector R&D are discussed in Chapter 6. The technology policies that the authors are interested in focus on R&D performed in the academic sector and R&D performed in national laboratories. These two categories of public-sector R&D spending merit being leveraged by technology policy because private-sector R&D is directly and indirectly affected by each. University-base science parks are also discussed because they are an infrastructure that links public-sector research support back to private-sector firm R&D spending. This chapter also puts emphasis on policies that provide incentives aimed at the public sector's efforts to encourage knowledge transfers from universities and national laboratories to the private sector.

The theme of Chapter 7 is global innovation systems. In this chapter, characteristics of the strengths of a number of country's innovation systems are described. From these descriptions, the argument is made that underlying each aspect of an effective innovation system is a country's effective innovation policies, and those innovation policies indirectly are indirectly related to the country's technology policies. Ultimately, the strength of a country's innovation system rests on its foundation of R&D. This chapter summarizes key findings from Organization for Economic Cooperation and Development reports on the innovation policies in various countries in an effort to identify common characteristics, and thus to give construct validity to the framework developed in the earlier chapters.

The last chapter, titled "Toward a technology/innovation policy ecosystem", offers concluding observations about technology and innovation policies across countries. The focal themes of the book are summarized in this concluding chapter. An important policy question is raised: Why do countries differ in the effectiveness of their innovation policies as reflected through the effectiveness of their technology policies? The answer given to this question is that countries differ in these dimensions because of differences in the effectiveness of the actors who are charged to implement innovation and technology policies. When these actors are considered, it is suggested that the technology environment that affects technology policy be more broadly thought of in terms of a technology policy ecosystem that contains policies as well as aspects of human capital. Chapter 8 also includes a discussion of a technology policy ecosystem in which actors play a critical role in the development and implementation of technology policies reflected in the technology policy environment.

This book contains the elements of a considerable number of prior approaches to the research on technology policy and innovation policy. Emphasis is put on appropriate context in which technology policy and innovation policy should be made and adopted and also assessment and evaluation perspectives related to technology policy and/or innovation policy. A wide range of readers are believed to greatly benefit from this publication, including academic researchers, senior scientists, innovation and technology policy makers, and graduate students.

This book has received acclaims from several experts in the industry. Sara Amoroso, with European Commission, Joint Research Centre in Spain commented on this book "A must-read, this book opens the discussion on the important differences between the purposes of technology policy and innovation policy. It walks the reader from the definitions of innovation and technology, to concrete exploration and reflections on how technology policy influences innovation policy." Cristiano Antonelli, with University of Torino and Collegio Carlo Alberto in Italy, reviewed this book.

"This book raises a key problem. Why is technology policy more effective in some countries than in others? And it provides an articulated reply: the effectiveness of technology policies depends

upon their ability to implement a “Technology policy ecosystem” that empowers the interdependence of the different elements of each system and their sequential interaction in the innovation process. Scholars, students, managers and policy makers should read it carefully.”

This publication is definitely a wonderful introduction for starters who have hardly any experience or have just launched their studies on technology and innovation policies. For readers with related background foundation or expertise and who want to extend their professional knowledge in this field, this publication must be an ideally enlightening resources and will serve as an inspiring guide for future explorations. Overall, this book will significantly help the readers gain a profound comprehension of the relationship between technology and innovation policies from an international perspective.

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