

# Preface

Disruptive technologies and their economic and social impacts have recently been frequently discussed. Nanotechnology is one of them and it is one that has wide range of implications: may be wider than economists and the business world recognize. Given this and the fact that developing countries, though equipped with an understanding of this technology, lag behind in the commercialization of such technology motivate this book. There are a variety of reasons, we ascertain, this is an issue: lack of a supportive institutional and legal structure, lack of vision, cultural idiosyncrasies and alike.

Specifically, the book intends to cover the reasons behind the entry barriers in the nanotechnology industry in these countries. Having done this due to the success of such entry in the United States, relative to the other developed countries, the study is benchmarked against the United States. Obviously this relatively new wave of major technological change is likely to have critical consequences for the developing as well as the developed world. As we suggest above, we naturally expect issues surrounding the development of the nanotechnology industry to be different, proposing completely new challenges for the developing world. In completing this task, we analyze the issue from several angles: ranging from cultural issues to capital markets and industrial clusters to government policy. We also describe the industry from a perspective where its strategic nature and its importance for consumer welfare and homeland security are laid out.

Our task is to give a cross-cultural account of the current developments in the nanotechnology industry based on the above issues and provide with policy suggestions. In doing this, we lay out the importance of knowledge transfer from universities to the market and hence emphasize the interface between science and its commercialization. The book lays out an institutional perspective in doing this. Precisely, we describe the characteristics of nanotechnology and its organizational interface between universities and the market in the context of developing countries. As such the book provides an unprecedented theoretical and empirical account of the developments in the nanotechnology industry in the developing world cautioning for the consequences of lacking a vision to cultivate the sector.

In the first chapter, the author intends to provide with a thorough account of nanotechnology as a science giving a vast array of examples to its nature in the research and product markets. In doing this the importance of the external environment in terms of the role of a vast array of institutions such as culture, the patent system, and universities is discussed. This is an introductory chapter that prepares a background for the entire book in terms of providing an understanding to the reader as to what issues concern this industry.

In the second chapter, authors intend to clarify the role of nanotechnology in effecting the development of other industries in different environments. The general aim is to study the effect of different economic approaches to the dissemination of such knowledge to the rest of the economy. Obviously not all economic approaches are conducive for the development and progress of such industry that involves a disruptive technology with the power to affect the rest of the economy in significant ways. The chapter provides with an understanding of how with the right approach nanotechnology can have a multiplier effect on the rest of the economy.

The third chapter focuses on the highly collaborative nature of nanotechnology in product and process markets accounting for the difficulty of attaining the stability of such collaboration due to the tacit nature of this technology. Given the background that is laid in the first three chapters this chapter adds an additional requirement to the development and progress of this sector: namely the ability of different institutions to collaborate at the research and development stage of any product that involves nanotechnology.

The fourth chapter defines the current situation in the developing countries in terms of their education, science and technology policies. The similarities and differences among different countries are outlined. The chapter lays a background to the country-specific accounts that follow in the rest of the book.

The fifth chapter focuses on the impact of culture and the role of the intermediary institutions among which clusters are discussed in cultivating the private market entry, innovation, and growth. In this chapter, the Turkish example is given mainly as it provides an interesting account as to how the ability to form clusters and the interface between the academia and research are curbed by cultural and institutional hang-ups.

The sixth chapter focuses on how important differentiation strategy has become for many countries to concentrate on. Given this and given the strategic nature of the nanotechnology sector along with the role that this sector could play in increasing the welfare of nations, knowledge assets and their importance in achieving and sustaining the economic development are discussed.

The seventh chapter analyzes the current situation of the Turkish nanotechnology industry by focusing on the legal framework, the scope of research in the universities and nanotechnology companies. The intention is to trace out the discontinuities among these bodies and to understand how far Turkey might be behind in the nanotechnology race and whether it is too late for the country to catch the ongoing nanotrend.

The eighth and ninth chapters focus on the policies related to nanosciences and nanotechnologies and current activities in the nanotechnology field in Latin

American countries. The aim of the chapter is to understand the challenges along with explaining the existing and potential obstacles for the development of the nanotechnology sector.

The tenth chapter focuses on the research and development activities, investment, and commercialization of nanoproducts and research publications of China in the nanotechnology field. This chapter intends to analyze the future potential of the country to develop itself as a leader in the global nanotechnology industry.

The 11th chapter focuses on the Iranian example. In developing countries, it is often observed that emerging technologies are discovered when the markets are already saturated with these products. Nanotechnology is an exception for Iran. Planning for the development of this technology started in the year 2001 at a time when Iran did not have any nanotechnology products. The results of such planning proved itself as successful. This chapter concentrates on the past progressions, adopted policies of the National Iranian Nanotechnology Initiative (NINI), the outcomes, and the critiques of this initiative. The chapter also includes the lessons learned from this experience for Iran and other developing countries.

The 12th chapter focuses on the research publications and research and development activities, investment, and commercialization of nano products of India in the nanotechnology field. This chapter intends to analyze the future potential of the country to develop itself as a leader in the global nanotechnology industry.

The 13th chapter focuses on comparing the social and ethical implications of nanotechnology in the global North and global South, including the unequal distribution of risk and benefit, on several dimensions: north–south, rich–poor, and by gender, ethnicity, and ability status.

The 14th chapter focuses on the origins of nanoscience and technology policies in the United States and, particularly, the approaches taken to coordinating research among the wide variety of federal government agencies and other institutions involved in funding, priority-setting, and performing research. This chapter helps us forming a well-informed perspective by comparing the US example with the developing countries, thereby completes the work.

The book ends with a chapter that ties all the above in a meaningful way and provides with the agenda for future work.

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