

**Changing Profile of the Indian Vaccine Innovation System.** Kunal Sinha. Segment Books, New Delhi. 2017. 332 pp. Price: Rs 1495.

Innovation system study has been one of the popular streams which evolved in the Western context and spread across the globe. Scholars have looked into different key economic sectors mainly from the national, regional and sectoral systems perspective. This has led to the understanding of innovation and learning environment at different levels in the system. Initially the focus was more on developed economies and scholars have observed the matured systems of innovation in those contexts. However, more recently, the focus has shifted towards exploring and understanding the innovation systems of the developing countries across various sectors. In this context, the book under review is an important contribution, more so as it is authored by an Indian scholar. This book explores the health sector by looking into biotechnology innovation system in general and vaccine innovation system in particular. It looks into the processes of development of various vaccines and explores the external shocks and endogenous developments in the system.

The book is divided into seven chapters and the introduction chapter presents the background of the study. It highlights the biotechnology innovation system in India with focus on pre-independence and post-independence scenario in vaccine innovations and sets the tone of the book. Further, it puts forth the analytical framework of the research and lists out various components of the vaccine innovation system in India.

The second chapter 'Issues in vaccine innovation system in India' is a theoretical discussion on innovation systems and starts with its definition. It further discusses different models of innovation system and gives a detailed account of

six generation models of innovation, which are helpful in understanding the innovation processes. The theoretical discussion is followed by conceptualization of biotechnology innovation system and case studies from various countries. This is an important segment with focus on different possible components and issues in the biotechnology sector in general. The chapter has covered many issues such as pharmaceutical industry, role of vaccine, key actors and issues and policy imperatives for this sector.

The third chapter focuses on preventive diseases and vaccines and gives the global status of vaccine innovations. This chapter further narrows down the discussion to the Indian context and presents the historical sketch of vaccine innovations within the country. Three specific diseases namely Influenza, Polio and Hepatitis B have been discussed in detail. The discussion on international level innovations in vaccines at the end of this chapter makes it interesting and relevant.

The fourth chapter is devoted to the discussion on intellectual property rights (IPR) and vaccines access issues. IPR is one of the important institutions considered in the innovation system and health sector is perhaps the most benefited from such institutions. The discussion in this chapter has posed certain questions relevant for vaccine sector in India. This makes reader comfortable in understanding the context of IPR and pharmaceutical industry. The fifth chapter is on networking in a given system, which is again another important component, especially in vaccine innovation system. This highlights on public-private, private-private and informal networks in the vaccine innovation system. For instance, the Department of Biotechnology has been facilitating various networks within the system. It has created collaborations among different actors and outcomes of such networks are highlighted in the debate.

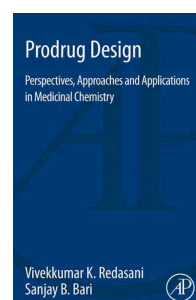
The most important assumption of the system of innovation is that it is not a static system, but is dynamic in nature and vaccine sector is not devoid of it. This is the main theme of the sixth chapter. It explores the changing trends and patterns in the vaccine innovation system in India. This dynamism is due to continuous interaction of different actors and institutions in a complex manner. The cases of several vaccine R&D related firms and institutions have been dis-

cussed to corroborate the argument. Lastly the seventh chapter presents the concluding remark and policy implication of this study.

Therefore, the book has focused on a relevant sector and the way the author has used the system of innovation and contextualized it for vaccine innovation system in India is commendable and inspires researchers to look into other sectors. The discussion on theoretical framework is simplified and situating the case in the context has made it more thought-provoking. The language is lucid and one can easily grasp the meaning and nuances the author wants to communicate. The book is a rich source in terms of data and helpful to the scholars, industry, enthusiasts and policy makers working in the field of biotechnology and vaccine innovations in and outside India.

HEMANT KUMAR

*Centre for Studies and Research in Science,  
Technology and Innovation Policy,  
School of Social Sciences,  
Central University of Gujarat,  
Gandhinagar 382 030, India  
e-mail: hemant@cug.ac.in*



**Prodrug Design: Perspectives, Approaches and Applications in Medicinal Chemistry.** Vivekkumar K. Redasani and Sanjay B. Bari. Academic Press, An Imprint of Elsevier, 125, London Wall, EC2Y 5AS, UK. 2015. x + 73 pp. Price: US\$ 49.95.

Prodrugs are gaining importance in drug development and delivery. Several of the unwanted properties present in the lead molecule are overcome by their conversion into a prodrug. Though the art of synthesizing prodrugs is becoming important now, several molecules have existed earlier as prodrugs. A classical example is methyl salicylate.

This book covers the history, concept and details about accepted prodrugs in the market or clinical trials. It consists of