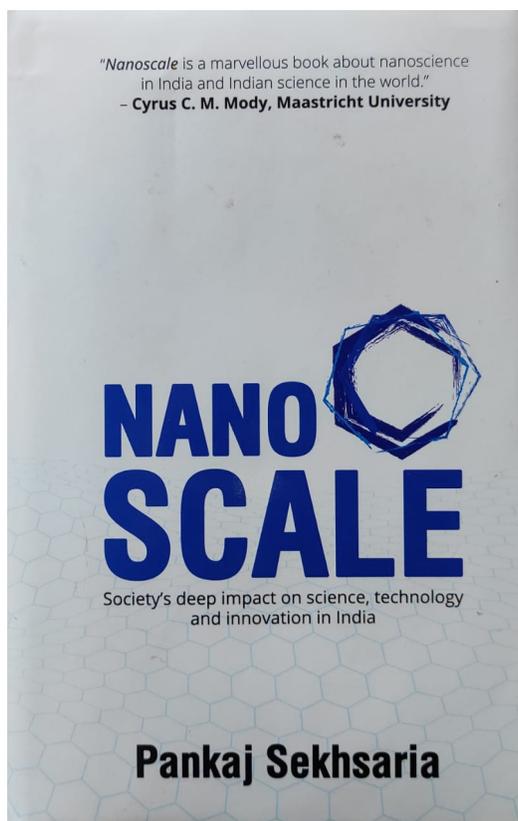


## Nano Scale: Society's Deep Impact on Science, Technology and Innovation in India



**Nano Scale: Society's Deep Impact on Science, Technology and Innovation in India; By Pankaj Sakhsaria; Authors UpFront, Greater Noida, 2020, 163 pages, Hardbound, ISBN: 9789387280700**

Pankaj draws upon a rich repository of research materials, engaging with wide cross-disciplinary researchers, and dives deep into the theoretical underpinning of Science and Technology Studies (STS) to develop a thesis that makes us think and introspect. This book is a valuable resource for researchers engaging themselves with STS and innovation studies for researchers at large and have some useful suggestions for policymaking pertinent to India and relevant global context.

The book is presented in six chapters with an annexure covering notes and references. The presentation is lucid

in a storytelling form of narrative. It draws from rich empirical material with the analysis incisive and bringing the counterfactual arguments in the discussions. How the story would unfold in the chapters is presented in the first Chapter, aptly titled 'setting the stage'. As we see later, the various dimensions of nanotechnology engagements raised herein become an important referral for later chapters.

Chapter 2 talks about the making of the key instrument scanning tunneling microscope (STM) in India, a highly capital intensive and sophisticated instrument that can be cited as one that revolutionized the field of study of surfaces and particularly opened up the possibility and promise of the field of nanotechnology. Bringing out the journey of a scientist in making this instrument through ingenious ways and inculcating this passion among his students, the challenges of a laboratory and its interaction with the outside world brings out the flavor and importance of STS. This underpins later chapters also, which makes this an influential book for

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researchers in this field. Herein, the perspective Pankaj brings on Juggad is refreshing and enriches the debate on this. Creating a compelling argument of the need for drawing meaning of this construct based on conceptual and empirical engagement to its role in addressing resource constraint and deprivation among others, the author rightly makes the argument that Juggad “It is a value that is lost upon a number of critics...dismiss Juggad on various counts”.

Chapter 3 makes a surprising detour to examine the linkages of the Indian ancient knowledge system Ayurveda with nanotechnology. There have been various claims and counter-claims on Ayurveda and its linkage with nanotechnology. However, this has been more in a perfunctory manner with no serious study as such in my knowledge wherein the researcher engagement has been captured and meaning drawn from it. The institutionalization of this research with dedicated researchers in an institute of repute, an eight-decade old Agarkar Research Institute, also shows the diversity of nanotechnology engagement in India. Positioning STS among researchers and their recognition of the value of this in their constant interactions of Ayurveda with nanotechnology makes it compelling reading. We learn how disciplinary diversity, collaborative research, and application-oriented work bring new insights when one explores this type of interface, i.e., with an ancient knowledge system with an advanced contemporary research field. One of the aspects that captured nanotechnology’s imagination for societal impact has been the possibility of nanotechnology-based interventions for addressing the huge problem of unclean water. A reputed Indian laboratory, the International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), efforts to develop a water filter based on nanotechnology intervention and its journey from the laboratory to the market is highlighted in Chapter 4. The case study brings together the challenges of an entrepreneur and an attempt to understand the causality behind a product’s failure in the market that apparently meets many of the conditions for a successful technology product and meets an unmet need.

Chapter 5 is a case study of nanotechnology intervention for retinoblastoma treatment, a malignant eye tumor mostly affecting children. The importance of examining this with the lens of STS research is underscored as it brings in the social and cultural factors that are typically ignored in the discussion of technology and its interventions. The critical introspection of this disease’s social impact for a girl child, the struggle of a doctor and a patient, makes this a very useful research and has significant implications.

Wrapping up this book by putting together from the perspective of within the story drawn from the four case

studies and aptly giving the last Chapter the title Epilogue is promising and enriching. It underlines salient aspects that form the book’s core thesis and leaves for the readers to ponder the nanotechnology interventions in society at large.

### Final Remarks

The book is an excellent study in the ethnography of a technology that has transformative potential. It scores on drawing from the narratives the key arguments that frame how nanotechnology engages with society. It takes us from the laboratory and the highly advanced science and technology that constructs this field to engage society. The study draws from the Indian context, but it epitomizes to a large extent, the engagement this technology has in developing countries and even in the developed country context.

Important issues are raised that have high contemporary relevance. The neglect or, more appropriately, the lack of recognition of ‘instrument making’ as intrinsic to the whole process of research, evaluation of researcher based on a limited set of indicators, need to engage instrument making in the pedagogy of science, among others are raised. The critical introspection Pankaj makes on Juggad discussing the interpretations that follow from key research works in this area is useful for researchers who work on innovation.

The missing link between technology development and market, the need to understand user perception and needs that call for the development of institutional mechanisms that can strengthen these interactions, is highlighted. The book opens up the debate on commercialization. The meaning of translation is not framed within the narrow, myopic view of commercialization, which is one of the key lessons of this book. One of the key arguments that underscore the thesis is the crucial role of instruments. This analytical discussion brings in the context within which one has to discuss and think of Juggad.

The author discusses nanotechnology interventions with issues of development and impact on society by examining a case study of nano-enabled water filter and treatment of retinoblastoma, engagement with ancient knowledge of Ayurveda, and important the various arguments the author makes on ‘translation’ not typically discussed. However, one aspect that would have been useful and interesting for readers at large would be to open the ‘black box’ of nanotechnology further. How this field has evolved and what makes it a transformative technology would have brought more clarity and insights. The author has touched on this briefly, but it does leave readers who are not conversant with sketchy ideas of the field.

Overall, the book is one of the most exciting narratives of scholars from a wide cross-disciplinary field as well as for technology intervention and would be very useful for policymakers.

**Reviewed by**

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**DOI:** 10.5530/jscires.9.3.44