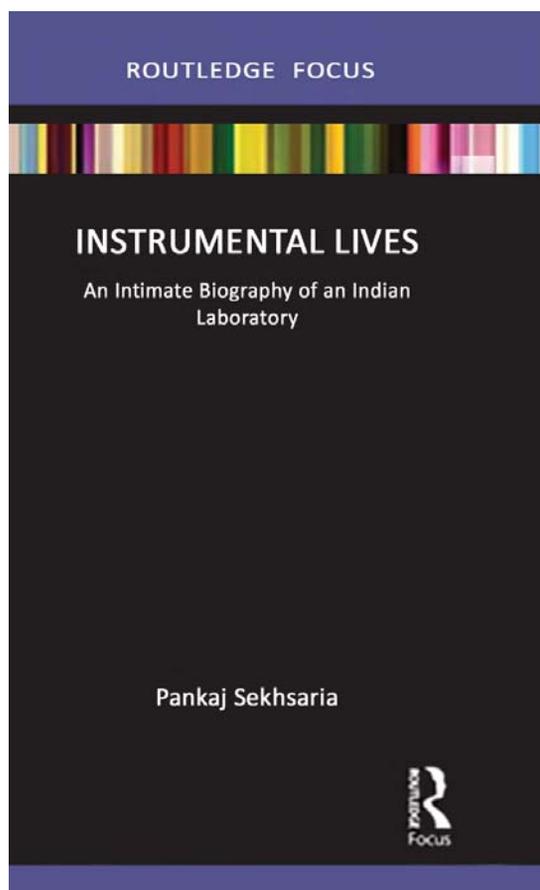


Book Review



Instrumental Lives: An Intimate Biography of an Indian Laboratory by Pankaj Sekhsaria, Publisher: Routledge (Taylor and Francis Group), Special Indian Edition Price Rs. 695/-; Pages XX + 126. ISBN 978-0-367-85629-8.

This is an interesting book. The interest begins with the title of the book and continues till its very end. Could one ever imagine that a biography of a laboratory could be written? The book is centred around a story of instrument making, specifically a range of sophisticated instruments known as scanning tunnelling microscope (STM) and scanning force microscope (SFM), in the physics laboratory of Sabitribhai Phule University in Pune. The story revolves around a scientist C.V. Dharmadhikari and his team, their challenges and determination to build

an instrument with limited resources, controlled manpower and inadequate facilities which can any day compete with a contemporary machine built with cutting-edge technology. The author Pankaj Sekhsaria spent a significant time in close interaction with the scientist and his teammates, observing carefully their way of working to understand the intricacies of instrument making and also to comprehend their mode of mobilization of limited human resources and intelligence for a remarkable output.

Building an instrument from scratch was very much a scientist's way of life at the beginning of modern science in India. The first recognition of modern Indian science by the West came in nineteenth century when Jagadish Chandra Bose demonstrated his epoch making work on microwaves using an instrument made entirely by himself with commonly available materials, utilising the skills of local tinsmiths and others. C.V. Raman also did his experiments building instruments with limited resources. This book reminds me of my own research days at Bose Institute in the sixties when we built our own instrument based on our need with meagre funds, collecting materials from the local market, or even from scrap market (dealing with old goods), yet producing results that were comparable to others and publishing papers in esteemed international journals. This tradition continued for quite some time but slowly faded away with the demand for quick results, high number of publications, the impact factor of the journals and also with increasing disrespect for the contribution of time and effort by scientists in building instruments.

After independence, Jawaharlal Nehru was focused on building science and technology institutions for creating a scientific spirit in the country which would ultimately, although not immediately, help in the overall development of science and technology (S&T). Indira Gandhi believed that self-reliance in technology would help India take a self-reliant position in the world. It was during her time that an attempt to link S&T with economic planning was made for the first time, but this was soon abolished. It was realized during Rajiv Gandhi's time that tight control over the import of equipment and foreign technology impeded the development of science and technology. Rajiv Gandhi was of the opinion that if India wanted to compete globally in science and technology then India could not

afford to spend time in building instruments in the name of self-reliance but had to import instruments as and when necessary. With the change in government policies and liberalization of foreign exchange, scientists found foreign made instruments more convenient around the late eighties/ beginning of nineties. I think Dhramadhikari is one of the last breed of scientists in India who spent about 25 precious years, starting from 1980, in building a range of sophisticated instruments indigenously.

The book has been written with two distinct objectives. The first one is to apprise the readers in minute details of the instruments made by Dhramadhikari and his team with limited financial resources and the other one is to discuss the politico-historical context of the S&T enterprise in modern India with a discussion on innovation in context to the work of our scientists.

When a scientist develops an instrument in a laboratory he does it for his own research. Many a times a prototype is made which is used for pure research for years. Innovation being the commercial and industrial application of something new requires a different kind of mindset and a driving force which is not expected from a scientist. It also requires substantial support and incentives within the policy framework. If the government is serious about using the output of basic science towards commercial application, it is important to establish a direct channel between the research laboratory and industry. At one time Council of Scientific & Industrial Research (CSIR) took the initiative of encouraging their scientists working in laboratories to apply for patents of their research work and a huge number of patents were granted during that period. But how many of these patents finally passed the feasibility test to become a product to be commercialized is an open question. We all know that Einstein had more than 50 patents on his inventions but none of his patents turned out to be commercially successful for various reasons.

A substantial part of the book deals with *juggad*. There is no synonym for *juggad* in English and it is also very difficult to define it. It has different meanings and connotations in different cultures and in different places. It is a kind of innovation developed as a survival strategy in a situation of poverty, deprivation or availability of limited resources. A typical example of *juggad* as presented by the author is that of an automobile, made by assembling different parts from scrapped or used motors or pumps,

tyres, wooden planks, steering etc., seen in rural Bengal and other places to carry agricultural products. *Juggad* is mostly a crude form of innovation; sophistication and many essential features are compromised in most cases. Calling STM, that is built in a laboratory, a *juggad* is an understatement as the instrument is quite sophisticated and produces results that are comparable to those obtained with standard instruments made otherwise. In India *juggad* is a way of life; it is embedded in its culture. In many situations *juggad* technology did not receive proper recognition because of rigid government policies or obstructed by legal regulations and therefore failed to sustain. The author raises some serious questions: “If this technological *juggad* inhabits a space that is coloured grey from the legal point of view, what role does the state or certain arms of the state play?” “Does the state allow *juggad* by turning a blind eye or because it is short on certain resources itself?” Or “Is it possible that the state can, and in some cases, even choose to facilitate *juggad*?” Answers to all these questions are important.

India government is now focused on innovation by converting knowledge from scientific research into wealth and/or value for sustainable and inclusive growth in the society. A policy framework under the title Science Technology and Innovation Policy (STIP) was released by our erstwhile Prime Minister Dr. Manmohan Singh in January 2013. With the change of crown, India Technology Vision 2035 was prepared by an autonomous body, Technology Information Forecasting and Assessment Council (TIFAC) under the Department of Science and Technology (DST). Implications of these innovation policies have been discussed in the book in detail.

My kudos to Pankaj Sekhsaria for his untiring effort for about a decade to come up with the ethnography of an instrument making laboratory which will attract many scientists. Ethnography is no longer limited to anthropologists only but has stretched much beyond it. This is not only a story of instrument building but much more. It goes deep inside the social, political and cultural elements of instrument making, analyzing them and presenting an ethnography for science and technology studies. This book is distinctly different in nature which will satisfy many ravenous readers for a new realization. □

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