

Annual Report 2009-10

Planning Commission Chair and Unit, Centre for Development Studies, Trivandrum, Kerala

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Introduction: The Unit and the Chair was established in 1998. Since September 2005, Professor Sunil Mani was appointed to the Chair. The four year activities of the unit were subject to an external evaluation in June 2009. Subsequently the Planning Commission has recognized the unit as one working on issues related to technology and innovations in the Indian context.

During the under review (2009-10), the Unit focused *equally* carrying out research projects, teaching and training programmes under all the three focus themes, namely (i) measuring innovation using new indicators; and (ii) policy instruments for promoting innovation at the firm level; and (iii) Telecommunications industry. A second feature was that we were able to complete or initiate all the research mentioned under the work plan for 2008-09 in the current year. A third feature of the activity was collaborative training programme to bring the research results to the real world of innovation policy practitioners. Finally, the Unit has also been able to forge a number of collaborative research and training links with prominent institutions specializing in the economics and policy studies of technological change both in India and abroad. In the following we report the actual progress achieved with respect to the research and teaching programmes during the current year as against the work plan reported (in the annual report for 2008-09) for the year.

Research Papers Completed during 2009-10. Three research papers were completed during the year under reporting. These have already been published or going to be published as CDS Working Papers (after due external refereeing) or as chapters in books. The three papers are:

Theme 1: Measuring Innovation:

Has China and India become more innovative since the onset of economic reforms in the two countries? : China and India are definitely on a higher economic growth path, although the contribution of technology to economic growth is still not very clearly estimated. There is evidence to show that innovative activities in the industrial sector in both the countries have shown some significant increases during the post reform process. Knowledge content of both domestic output and exports are increasing in both the countries. The Chinese NSI is dominated by the SSI of the electronics and telecommunications industries and in the case of India it is led by the SSI of the pharmaceutical industry. In both the countries, increasingly much of the innovative activities are contributed by MNCs. In other words both China and India have become important locations for innovative activities. There is even some macro evidence to show that the productivity of R&D investments in India is higher than in China, although this proposition requires careful empirical scrutiny before firm conclusions can be reached. However continued rise in innovative activity is limited by the availability finance and of good quality scientists and engineers. Although the available supply appears to be very productive, its important that to sustain this on a long term basis and also to spread the innovation culture to other areas of the industrial establishment concerted efforts will have to be made to increase both the quantity and quality of scientific manpower. Fortunately the government is aware of this problem and has started initiating a number of steps towards easing the supply of technically trained personnel. The government still has to rethink its financial support schemes by reducing as much as possible the distortions that are currently in this area.

Publication status: Published as [CDS Working Paper 430 in May 2010](#)

Theme 2: Innovation Policy instruments:

The flight from defence to civilian space: Evolution of the sectoral system of innovation of India's Aerospace Industry: India is one among the few developing countries which have attempted to create a domestic sectoral system of innovation in a truly high tech sector such as the aerospace industry. The country is currently having one of the fastest growing aerospace sectors in the world: exports of aerospace products from India have grown at a rate of 82 percent per annum during the period 1988 through 2008. Although the sectoral system of innovation of the industry is almost five decades old, for much of that period both manufacturing and innovative efforts of the sector was geared solely towards the defence sector, but this orientation of almost entire defence and governmental hold of the sector started diminishing with the opening up of the sector to private sector actors in 2001. So the evolution of the SSI neatly falls itself into two phases: phase 1 is period, 1959-2001 when both the research and manufacturing were entirely geared towards the defence sector and phase 2 is period since 2001 when the government opened up the sector to private sector participation. In fact this radical shift in policy appears to have made the sector very dynamic in the sense that it has considerably enhanced the breadth and depth of its activities in both research and manufacturing in both the aeronautical and astronautic components of the aerospace industry. Historically speaking Indian public policy has been disproportionately directed towards the astronautic part than the aeronautical so much say that in terms of public expenditure intensity on space related activities (defined as expenditure on space as per cent of GDP), India is second only to the USA, but ahead of many other OCED and BRIC countries. Aerospace industry across the world is structured in the form of clusters. This is because at the centre of the cluster is a large aircraft manufacturer with a whole host of component manufacturers. In India, the southern city of Bangalore has emerged as one of the leading aerospace clusters in the country. This is essentially due to the existence of four major actors in the SSI of the sector, namely Hindusthan Aeronautics Ltd (leading manufacturer of aerospace products). The National Aerospace Laboratory (leading research facility on aerospace domain under the CSIR network of laboratories across the country), the Indian Space Research Organization (leading researcher and consumer of especially astronautics products from the country), and the Indian Institute of Science (leading centre for training of aerospace engineers) . The cluster development policy has received a fillip with the state governments of Andhra Pradesh, Karnataka and Gujarat establishing special economic zones (SEZs) for the aerospace industry.

The basic objective of my study is to understand and map out the sectoral system of innovation of India's aerospace industry and its performance. Since the sector is almost entirely located in one geographic area, namely at the city of Bangalore, I argue that the sectoral system of innovation of India's aerospace industry and the Bangalore Aerospace Cluster (BAC) are one and the same. In very specific terms I am interested in identifying and analyzing the major actors in this sector or cluster, research and manufacturing as well and identifying the linkages that these actors have with each other especially in the generation of new technologies. In keeping with these objectives the study is structured into four sections. The first section traces the historical evolution of the sectoral system of innovation of India's aerospace industry and then maps out in detail the structure of the sector. The second section discusses in detail the three building blocks of the sector in terms of: (i) lead actors; (ii) the knowledge or technology domain; and (iii) the demand. The third section discusses the performance of the sector in terms of certain summary measures. Two

dimensions of performance are considered: inter-temporal and inter-spatial. Finally the fourth section summaries the main findings of the paper:

Publication status: Published as [CDS Working Paper 428 in April 2010 2010](#)

Theme 3: The Telecommunications Industry

India's Information and Communications Industry: The Information and Communications Technology Industry (ICT) is one of the fastest growing industries in India and it has attracted considerable amount of both national and international attention. The industry is a heterogeneous one consisting of two broad groups: Information Technology (IT) and Communications industries. Each of these two has in turn a manufacturing and services component. An interesting point is that in both IT and in Communications, services are more important than manufacturing. In short it is not incorrect to state that that the Indian ICT industry is very much dominated by ICT services and the ICT manufacturing industry is still small although its share is on the increase over the last few years. Of the two ICT services industries, the computer software and the telecommunications services industries, a disproportionate amount of time has been devoted to the understanding of the former. So in my present paper I will focus more on the telecommunications services industry although I will summarise the main issues which have come up for in depth examination in the case of the computer software industry. The paper is, therefore, structured into two broad sections. In section 1, we devote ourselves to a review of the various issues that have been analysed in the context of the computer software industry and in section 2 I focus myself on analyzing certain issues wrt the telecommunications services industry. The idea is to confront certain hypotheses that has been expressed in the literature with respect to the growth performances of these two industries with fresh empirical evidence and then to see if these propositions still hold good.

Publication status: Being published as Chapter 7 in, Ishigami, Etsuro and SatoTakahiro eds., *Economy of Contemporary India and the South Asia*, Kyoto: Minerva World and Regional Economies Series (*expected to be released in September 2010*)

On-going research projects during 2009-10

Ongoing project 1: Globalisation of Innovation: Its manifestation, determinants and implications for the emerging economies of China and India (*Abstract already reported in 2008-09*)

- Sponsor : IDRC, Canada
- Other members (if any) : Professor Rakesh Basant, Indian Institute of Management-Ahmedabad and Professor T Jayaraman, Tata Institute of Social Sciences, Mumbai
- Date of commencement: April 1 2009
- Expected date of completion : March 31 2011

- Publication plan (in the form of a report or/and research articles):series of journal articles
- Seminar/workshop plan (if any): A joint India-China workshop in January 2011.

Ongoing project 2: Advancing knowledge-intensive entrepreneurship and Innovation for Economic Growth: Case of India (AEGIS project) (*Abstract already reported in 2008-09*)

- Sponsor: European Union
- Date of commencement: April 1 2009
- Expected date of completion : March 31 2011
- Publication plan (in the form of a report or/and research articles):series of journal articles

Seminar/workshop plan (if any): Planning for a seminar in January 2011 on Knowledge – intensive entrepreneurship in India

Publications during 2009-10

- **Book**

Malerba, Franco and Sunil Mani (eds.), 2009, *Sectoral Systems of Innovation and Production in Developing Countries: Actors, Structure and Evolution*, Cheltenham, UK and Northampton, Mass., USA: Edward Elgar.

- **Journal Articles:**

International: Mani, Sunil (2010), ['Financing of industrial innovations in India: How effective are tax incentives for R&D'](#), *International Journal Technological Learning, Innovation and Development*, Vol.3, No: 2

National: Mani, Sunil (2009), ['Is India becoming more innovative since 1991?'](#), *Economic and Political Weekly*, Vol. 43, No: 4, pp. 41-51.

- **Chapter in books :**

(i) Mani, Sunil (2009), 'Why is the Indian pharmaceutical industry more innovative than its telecommunications equipment industry ?', in Malerba, Franco and Sunil Mani (eds.), 2009, *Sectoral Systems of Innovation and Production in Developing Countries: Actors, Structure and Evolution*, Cheltenham, UK and Northampton, Mass., USA: Edward Elgar, pp. 27-56.

(ii) Mani, Sunil (2010), 'The performance of India's telecommunications industry, 1991-2009', Nacahane, Dilip M (ed.), *India Development Report 2010*, Delhi: Oxford University Press.

(iii) Mani, Sunil (2010), '[Growth of knowledge-intensive entrepreneurship in India, 1991-2007](#)', in Szirmai, Eddy, Wim Naudé and Micheline Goedhuys (eds.), *Entrepreneurship and Innovation in Developing Countries*, Oxford: Oxford University Press, Chapter 10.

Forthcoming Publications in 2010-11

- (i) Diffusion of new technologies and productivity growth in Indian agriculture
Natural Rubber vs. Coconuts (with V Santhakumar), *Economic and Political Weekly* (forthcoming)
- (ii) Editing a special issue of the journal, *International Journal of Technology and Globalization* with Professor Sudip Chaudhuri of IIM-Calcutta. The details of the issue are as follows:

Int. J. Technology and Globalisation, Vol.

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SPECIAL ISSUE: RISE OF INNOVATIONS IN INDIA

Guest Editors: Dr. Sunil Mani and Dr. Sudip Chaudhuri

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Sunil Mani and Sudip Chaudhuri

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Analysis of its evidence and some disquieting features

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Mamata Parhi

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Tirthankar Roy

Seminars and Conferences Participated during 2009-10

International

1. Presented a paper on 'Is India becoming more innovative since 1991?' at the *CSTM, University of Twente, The Netherlands, May 8 2009.*

2. Presented presented a paper on ‘The Empirical Implementation of the National System of Innovation Framework’ at the session the *Science of Science and Innovation Policy, First World Social Science Forum*, University of Bergen, Norway, May 11, 2009.
3. Presented a paper entitled ‘R&D and Technological Innovation in Small and Medium Enterprises, Policy Support for its Promotion based on the Indian Experience’ and also was the chairman of the drafting committee on policy recommendations at the *Asian SME Summit 2009*, organised by Federation of Chambers of Commerce and Industry of Sri Lanka (FCCISL) and Friedrich Naumann Foundation (FNF), Colombo, Sri Lanka, from 6 to 8 August 2009.
4. He also directed (along with Zheng Liang) an *International Workshop on ‘Globalisation of Innovation: R&D Outsourcing in China and India,’* at the School of Public Policy and Management, Tsinghua University, Beijing, China, on 27–28 August 2009. The workshop was sponsored by the International Development Research Centre (IDRC).
5. Presented a paper on “Economic implications of high skilled migration from India” And Chaired a session on “Innovation for Social Inclusion” at the Atlanta Conference on Science and Innovation Policy at the Georgia Institute of Technology, Atlanta, USA, October 2-3 2009.
6. Presented a paper on “Has India become more innovative since 1991” at the Human Sciences Research Council (HSRC), Cape Town, South Africa, October 20 2009
7. Presented a paper on “Economic implications of high skilled migration from India” at the Department of Economics, University of Stellenbosch, South Africa, October 21 2009
8. Gave the key note speech (Title: *Measuring Innovation in Industrialising Countries: Conventional versus New Indicators*) organized by the National Advisory Council on Innovation (NACI) at the Stellenbosch Institute for Advanced Studies, Stellenbosch, South Africa, November 22 2009.
9. Presented a paper on “Has China and India become more innovative since the onset of economic reforms in the two countries?” at the *International Conference on “The State and the Internationalisation of Business: Is there a China and India Model?”* at the University of Edinburgh, United Kingdom, October 30-31 2009
10. Gave two lectures and commented on presentations of six doctoral students at the 6th Globelics Academy PhD School jointly organized by the Research Unit on Complexity and Economics (UECE), at the Lisbon Economics and Management School (ISEG. Technical University of Lisbon) and by the Centre for Innovation, Technology and Policy Research, IN+, at ISEG, Lisbon, November 3-5 2009

11. Participated and presented a paper (Title: Global Financial Crisis *Its potential effect on innovative activity in India*) at the panel discussion on the impact of global financial crisis on innovative activities of firms and institutions in the BRIC countries, ISEG, Lisbon, Portugal, November 5 2009.
12. Presented a paper on “Growth of knowledge-intensive entrepreneurship in India, 1191-2008” at the *AEGIS Conference*, National Technical University of Athens, Athens, Greece, December 3-4 2009
13. Presented a paper on growth of technology-intensive new firms in India since the onset of economic reforms at the DIME Workshop, KITeS, Bocconi University, Milan, Italy, December 10-11 2009
14. Participated as a resource person at the Adhoc Expert Committee *Meeting on Science, Technology and Innovation Indicators* at UNCTAD, Geneva, January 18 2009
15. Presented a paper titled, ‘Measuring innovation in developing countries, New innovation indicators and public innovation policies’, at the Multi-Year Expert Meeting Enterprise development policies and capacity-building in science, technology and innovation, UNCTAD, Geneva, January 20-22, 2010.
16. Presented a paper titled, ‘Markets, regulation and bridging the digital divide: The Indian experience in increasing the access to telecommunications services’ at the International Symposium on *Innovation for Development: Frontiers of Research, Policy and Practice*, WITS Business School, University of Witswatersrand, Johannesburg February 24-26 2010.

National

1. Presented the Annual Distinguished Lecture on ‘The Innovative Performance of India since Economic Liberalization’ at the *National Geophysical Research Institute*, Hyderabad, on April 30 2009
2. Presented a lecture on ‘Why has Kerala not attracted much Industrial Investments since Economic Liberalization?’ to a visiting group of faculty and students of the *Duquesne University Graduate School of Business*, Pittsburgh, USA at Saintgits Institute of Management, Kottayam, May 15 2009
3. He presented a set of two lectures on ‘India’s Innovation Policy’ at the course on *Policy Analysis and Public Management* organised by IIM Bangalore and Maxwell School of Syracuse University at the Lal Bahadur Shastri National Academy of Administration, Mussoorie, on 9 June, 2009.
4. Gave three lectures on ‘Innovation and Technology Policy’ at the PGDM programme of the Indian Institute of Management Calcutta (IIM-C) from 14 to 16 September 2009.

5. Gave a lecture on “Measuring the innovative performance of Indian Business Enterprises in the post liberalization phase” at the Asian School of Business, Trivandrum, October 14 2009.
6. Participated in two workshops to design the course outline of the M A in Economics course at the new Central University of Kerala during August-September 2009. .
7. Presented a paper on “Has India become more innovative since 1991?” at the International Conference on “Development Vs Deprivation in the era of globalization” organized in connection of the golden jubilee celebrations of the University of Kerala, Trivandrum, December 15 2009
8. Presented a paper, n “Has China and India become more innovative since the onset of economic reforms in the two countries?” at the China-India Seminar: Innovation, Transformation, Displacement and Growth,” Rabindranath Tagore Centre for Human Development Studies, Kolkata, December 21-23 2009
9. He designed and taught an elective course on “Innovation and Technology Policy” at the PGPEX (Batch 3, Term vii, Session 2009-10) programme at Indian Institute of Management, Calcutta during February 8-12 2010
10. Gave a lecture, “Has India become more innovative since the onset of reforms in 1991?”, at Helioz-2010, UST Global, Technopark, Trivandrum, March 10 2010.
11. Participated in the discussions on bringing out the 2010 edition of India: Science, Technology and Innovation Indicators 2010 at National Institute of Science, Technology and Development Studies (NISTADS), New Delhi, March 16 2010.
12. Presented a paper titled, ‘The flight from defence to civilian space, Evolution of the sectoral system of innovation of India’s aerospace industry’, in the Conference on” Frontier Issues in Technology, Development and Environment”, Madras School of Economics, Chennai, March 20, 2010.

Professional involvement outside Centre

In addition to all the engagements reported in 2008-9

- Visiting Faculty, Indian Institute of Management-Calcutta. Designed and taught a full elective on “Innovation and Technology Policy’ at the PGPEX programme
- Honorary Visiting Professor, Faculty of Economics, University of Ljubljana, Slovenia

- Honorary Visiting Professor, Institute of Public Enterprise, Hyderabad, India (IPE- an ICSSR institution)
- Honorary Fellow, National Institute for Science, Technology and Development Studies (NISTADS- a CSIR Institution)
- Member, Steering group on FDI in R&D, Technology , Technology Forecasting and Assessment Council, Government of India
- Referee to : (i) Research Policy; (ii) Science and Public Policy; (iii) Technovation;(iv) International Journal of Technology and Globalization; (iv) Science, Technology and Society, (v) Edward Elgar ; and (vi) Springer and
- Member of the scientific committee, Globelics Kuala Lumpur 2010
- Member of the Programme Committee, Atlanta Conference on Science and Innovation Policy 2009, Georgia Institute of Technology
- Member, Editorial Board, *Journal of Economic Policy and Research*, Institute of Public Enterprise, Hyderabad
- Member, Editorial Board, *International Journal of Development and Social Research*, XIMB, Bhubaneswar.
- Member, Faculty Selection Committee 2010, National Institute of Science, Technology and Development Studies, Delhi.

Work Plan for 2010-11

- **Completion of the book, *India, an Emerging High technology giant, But does she have feet of clay?*, London: Anthem Press.**
- **New Research Project 1:**
 - Title:** What has happened to innovative activities of India public sector enterprises?
 - Expected date of Completion:** March 31 2011
 - Publication plan:** CDS Working Paper and later on as a journal article.
- **New Research Project 2:**
 - Title:** Intellectual Property Rights and Developing Countries, A comparative analysis of Brazil, India, South Africa and Thailand. It is four country study with two member research teams in each of the four. I will be the team leader of this project.
 - Sponsor:** Columbia University, USA. through Columbia Earth Institute and the Columbia School of Public Health

Expected date of completion: August 2011.