

**Centre for Studies in Science Policy
School of Social Sciences**

Course Title	:	Agriculture, Innovation and Technology Policy in South Asia
Course No. & Type	:	SP 610P (M.Phil./Ph.D.) Optional
Faculty in charge	:	Pranav N. Desai, Rajbeer Singh & Dinesh Abrol
Mode of Evaluation	:	1. A term paper on a selected problem (40%) 2. Seminar presentation (30%) 3. Book Reviews (30%)
Credits	:	4
Instruction Method	:	Lecture-cum-Seminar

Course Outline:

This course analyses innovation and technology dynamics, with emphasis on basic concepts in innovation analysis. Though the focus of the course is on South Asia but it would be open for students to explore with other regions primarily to bring-in innovation issues in agriculture. The course covers the perspectives on the innovation process, its institutional linkages, and its impact on economy, primarily discusses the issues related to access, affordability and socio-economic impact of technologies, largely in the context of biotechnology in the agriculture production.

Background

In the last one decade, South Asia has exhibited magnificent economic growth in the sectors such as industrial and services. The growth story is likely to be further accelerated once agriculture occupies its right place. With emergence of biotechnology as a major technological option things may change very fast, as has emerged from the Bt cotton experience from India. It would be worth to see following documents:

Expectations

The aim of the course is to equip students with skills for identifying policy options for addressing innovation related issues particularly in context of agriculture sector. This would also expose students to regulatory and other institutional frameworks that innovation choices bring with them on one hand and how same choices may also offer a major policy option to the world's most food insecure region. The course uses an interdisciplinary approach in the development and diffusion of technology and innovation policy.

The course would encourage students to base their analytical abilities for identifying right policy options needed for correct innovation choices

Topics to be covered

Module 1: Conceptual and Macro Perspective

1. Introduction

Where do we stand in agriculture production? Why agriculture innovation strategy is important for economic growth and environmental sustainability?

How farmers' have contributed towards innovation?

What are the key features of traditional practise on our farms and how advances in agriculture biotechnology and help us address issues related to food and nutritional security in South Asia (and other regions)?

2. Framework of Innovation

What do we mean by technology paradigm?

How is that defined? What are the various theoretical approaches for analysing impact of innovation?

How best agriculture innovation system can be tailor-made for specific situations?

3. Technological innovation and Role of Institutions

Capacity development for agricultural technology in developing countries: Concepts, contexts, case studies and operational challenges of a systems perspective

4. Innovation and Policy Priorities: Productivity and Ecological concerns

Module 2: Contemporary Developments and Innovation System

What are the various tools for capturing innovation and for what all policy objectives they may well be used?

5. Agriculture Innovation System: Need Assessment through Scenario planning

Scenario Planning to Guide Long-term Investments in Agricultural Science and Technology: Theory and Practice from a case study on India,

6. Emergence of Biotechnology and Response from South Asia

Diversity in Agricultural Research Resources in the Asia-Pacific Region, Agricultural Science and Technology Indicators Initiative

7. International Cooperation

Module 3: Capacity and Technology Adoption

What institutional pre-requisites are important for effective adoption of new technologies?

What kind of capacities are needed in a particular setting?

9. Biosafety Debates and Capacity Building: Context of South Asia

10. Capacity across Bangladesh, Nepal and Sri Lanka

Module 4: Trade and Technology Linkages

Is there a direct linkage between innovation and trade? If so, what are the key trade policies that may affect innovation policies?

11. Access to Technology and Intellectual Property Regime

Plant variety protection in developing countries.

Introducing Plant Breeders' Rights in India : A Critical Evaluation

12. Precautionary approaches and WTO

The Precautionary Principle and the Law of Unintended Consequences

13. International Trade Impacts

Readings

Module 1

Chapters 1 in Agriculture at a Cross Roads: Global Report, IAASTD, Island Press, Washington DC

Herring Ronald J (2007) The Genomics Revolution and Development Studies: Science, Poverty and Politics, *Journal of Development Studies*, Vol 43, No. 1, pp 1-30 January

Chapter 2 in The Bioeconomy to 2030: Designing A Policy Agenda, OECD, Paris.

ADB (2009). Asian Development Outlook 2009: Rebalancing Asia's Growth, Asian Development Bank, Manila. <http://www.adb.org/Documents/Books/ADO/2009/>

Optional Reading

Brookes Graham and Peter Barfoot (2008) Global Impact of Biotech Crops: Socio-Economic and Environmental Effects 1996-2006, *AgBioForum*, 11(1) 21-38.

Sussex M. Ian (2008) The Scientific Roots of Modern Plant Biotechnology, The Plant Cell Preview, www.aspb.org

Parayil Govindan (2003) Mapping technological trajectories of the Green Revolution and the gene Revolution from modernization to globalization, *Research Policy*, Volume 32 pp 971-990.

2. Framework of Innovation

Dosi Giovanni et. al. (2008) Schumpeterian themes on Industrial evolution, structural change and their microfoundations, *Industrial and Corporate Change* Volume 17, No. 4 pp 601-609.

Shulin Gu 1999. 'Implications of National Innovation Systems for Developing Countries: Managing Change and Complexity in Economic Development'. INTECH Discussion Paper #9903, UNU, Maastricht.

Bartholomew Susan 1997. 'National System of Biotechnology Innovation: Complex interdependence in the Global System'. *Journal of International Business Studies*, Vol. 28, Issue 2.

Optional Reading

Edquist C. (2001) The Systems of Innovation Approach and Innovation Policy: An account of the state of the art, Lead Paper presented at the DRUID Conference, Aalborg, June 12-15.

Nelson R R. (2008) Economic Development from the perspective of Evolutionary Economic Theory, *Oxford Development Studies*, Vol. 36, No.1, March

Lall S (2000) 'Technological Change and Industrialisation in the Asian newly Industrializing economies,' L.Kim and R. Nelson (eds) *Technology, Learning and Innovation* (Cambridge university Press)

3. Technological innovation and Role of Institutions

Hall Andy and Jeroen Dijkman (2006) Capacity development for agricultural biotechnology in developing countries: Concepts, contexts, case studies and operational challenges of a systems perspective. #3 Working Paper Series, January, United Nations University - Maastricht Economic and social Research and training centre on Innovation and Technology Maastricht, The Netherlands, <http://www.merit.unu.edu>

Vanloqueren Gaetan et.al. (2009) How Agriculture research shape a technological regime that develops genetic engineering but locks out agroecological innovations, *Research Policy*, Volume 38, pp 971-983.

Vigorito J. Anthony (2003) Agricultural Biotechnology and Normative Transformation in Academic Science, Paper presented at the annual meeting of the American Sociological Association, Atlanta Hilton Hotel, Atlanta, GA, Aug 16.

Chaturvedi Sachin (2007) "Exploring Interlinkages between National and Sectoral Innovation Systems for Rapid Technological Catch-up: Case of Indian Biopharmaceutical Industry", *Technology Analysis and Strategic Management*, September, London.

Optional Reading

Evenson Robert E. And Larry E. Westphal (1994) Technological Change and Technology Strategy, Economic Growth Center, Yale University, Discussion Paper Number 709, Yale University.

4. Economy and Agriculture of South Asia

Chapter 1 in South Asia Development and Cooperation Report, Oxford University Press, Delhi.

Chapters 2 in Agriculture at a Cross Roads: Global Report, IAASTD, Island Press, Washington DC

Optional Reading

Pray Carl et. al. (2005) Innovation and Dynamic Efficiency in Plant Biotechnology: An Introduction to the Researchable Issues, *AgBioForum*, 8(2&3): 52-63.

Module 2: Contemporary Developments and Innovation System

5. Agriculture Innovation System in South Asia: Need Assessment through Scenario planning

Rajalahti Riika et. al. (2006) Scenario Planning to Guide Long-term Investments in Agricultural Science and Technology: Theory and Practice from a case study on India, Agriculture and Rural Development Discussion Paper #29, World Bank

6. Emergence of Biotechnology and Response from South Asia

Beintema Nienke M. and Gert-jan Stads (2008) Diversity in Agricultural Research Resources in the Asia-Pacific Region, Agricultural Science and Technology Indicators Initiative, IFPRI, Washington DC.

Chaturvedi Sachin et. al. ed. (2009) Biotechnology Capacity Among Asian Economies, Report for UNESCO Jakarta.

7. Adoption and Diffusion of Technology

FAO (2009) Economic Impacts of Transgenic Crops, Agricultural Biotechnology: Meeting the needs of the poor, Rome.

Pingali Prabhu (2004) Westernization of Asian Diets and the transformation of food systems: Implications for research and policy ESA Working Paper No. 04-17, September, FAO

8. International cooperation

Desai, P. N. (1997), *Science, Technology and International Cooperation* (Har-Anand Publications Pvt. Ltd. New Delhi).

Desai, P. N. "Administration of International Cooperation in Indian Agricultural Research". *Agricultural Administration* (Applied Science Publishers Ltd., London, Vol.10, No.1, May, 1982), pp.12-22

Desai, P. N. "Challenges of Agro- Biotechnologies, Intellectual Property Rights and Globalization", *Asian Biotechnology and Development Review*, Vol. 7 No. 2, March, 2005.

Desai, P. N. "Globalization of Innovations: Changing Nature of India's Science and Technology Cooperation Policy", *International Journal of Institutions and Economies*, Vol. 1, No. 1, April 2009, pp. 52-77.

Desai, P. N. "Traditional Knowledge and Intellectual Property Protection: Past and Future", *Science and Public Policy*, Vol. 34, No.3, April 2007.

Optional Reading

Chaturvedi, Sachin (2007). "Environmental Concerns and Biotechnology in South Asia". *South Asia Journal*, Islamabad, Volume 18 Issue 4, December.

8.Biosafety Debates

Brookes Graham and Peter Barfoot (2008) Global Impact of Biotech Crops: Socio-Economic and Environmental Effects 1996-2006, *AgBioForum*, 11(1) 21-38.

Optional Reading

Jaffe Gregory (2004) Regulating transgenic crops: a comparative analysis of different regulatory processes, *Transgenic Research* 13: 5–19, 2004. Kluwer Academic Publishers. Printed in the Netherlands

Jaffe G (2005) Implementing the Cartagena Biosafety Protocol through national Biosafety regulatory systems: an analysis of key unresolved issues, *J. Publ. Aff.* 5: 299–311 (2005)

Module 3: Capacity and Technology Adoption

9. Capacity across India and Pakistan

Chaturvedi Sachin (2005) “Dynamics of Biotechnology Research and Industry in India: Statistics, Perspective and Key Policy Issues”. OECD STI Working paper (2005). Directorate for Science, Technology and Industry, OECD.

Gupta, Shalini (2007). “Indian Biotechnology Industry: An Overview”, *Asian Biotechnology, Innovation and Development: Issues in Measurement and Collection of Statistics*, RIS, New Delhi.

DBT (2009). Annual Report, 2008-09. Department of Biotechnology, Ministry of Science and Technology, Government of India, New Delhi.

10. Capacity across Bangladesh, Nepal and Sri Lanka

Choudhury, Naiyyum and M. Serajul Islam (2005). ‘Biotechnology in Bangladesh’ in Sachin Chaturvedi and S. R. Rao (eds.) *Biotechnology and Development: Challenges and Opportunities for Asia*, ISEAS, Singapore, RIS and Academic Foundation, New Delhi.

Biotechnology Society of Nepal (2009)

<http://www.bsn.org.np/index.php?pages=resource&&id=1>

Module 4: Trade and Technology Linkages

11. Precautionary approaches and WTO

Turvey, C. and Mojduszka, E. 2005. “The Precautionary Principle and the Law of Unintended Consequences,” *Food Policy*, Vol. 30, No. 2, pp. 145-161.

12. International Trade Impacts

Zarilli, S. 2005. *International Trade in GMOs and GM Products: National and Multinational Legal Framework*. United Nations Conference on Trade and Development, Geneva.

http://www.unctad.org/en/docs/itcdtab30_en.pdf

Gaisford James D. (2002) Agricultural Biotechnology and the FTAA: Issues and Opportunities, *Journal of International Law and Policy*, The Estey Centre, Vol. 3 No. 2 p. 328-345.