Science, technology and Innovation in the 2030 development Agenda

by
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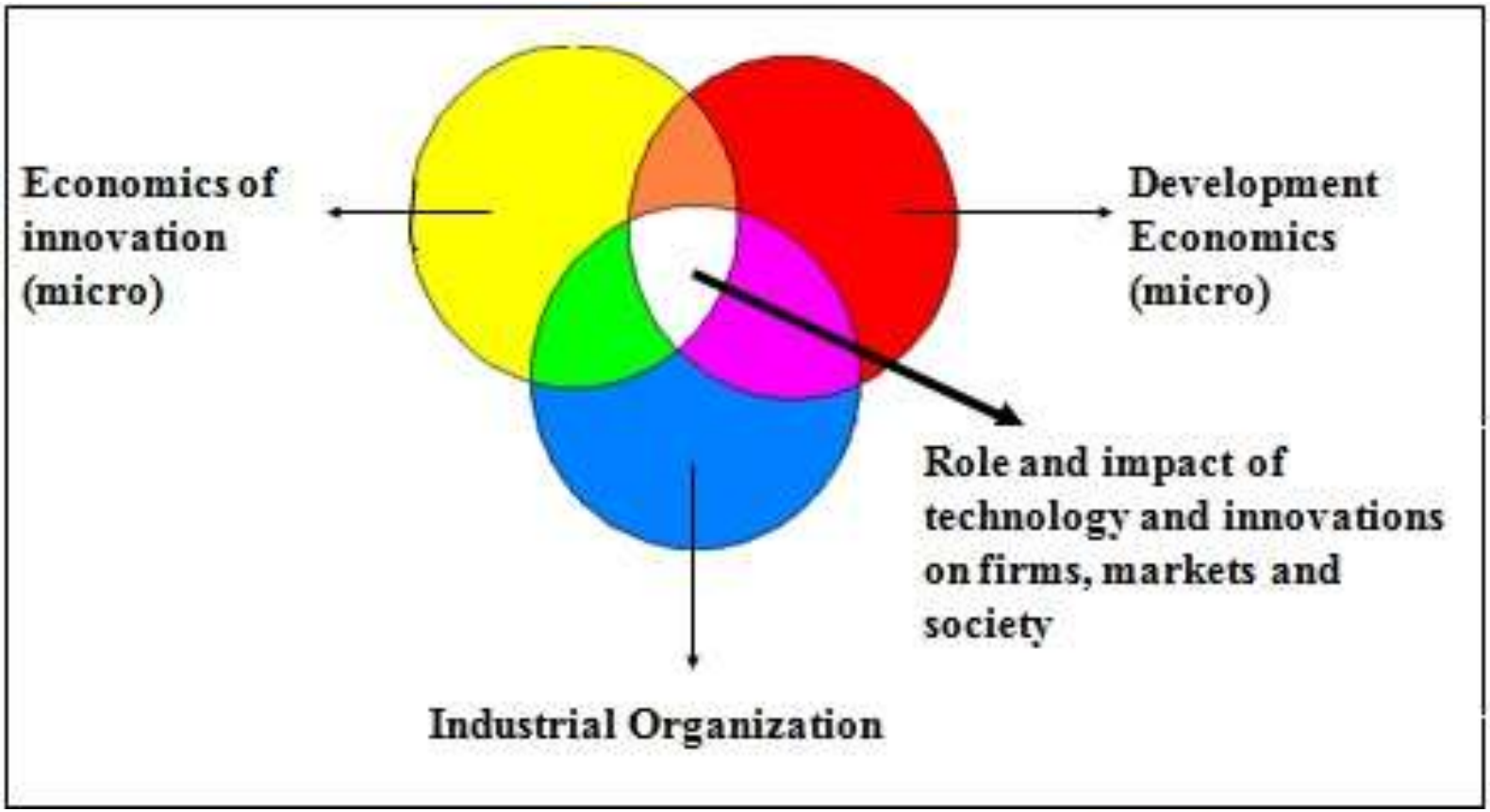
UNU-MERIT

Self Introduction

Specialisation and Focus



Technoconnexion

SITE4Society

Ganga Isère

FIN
Friend In Need India

sti4change

I don’t need to explain to you that science, technology and innovation are crucial for SDGs attainment…

1. We need to have knowledge

2. We need to be able to apply them

3. We need to make an impact

UNITED NATIONS UNIVERSITY
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1. For this STI capabilities are favourable and important but not sufficient

We need appropriate and efficient…..

Industrial capabilities + Regulatory capabilities

Incentive Systems + Financial capabilities

+

Scientific, tech, innovation capabilities

And.??.

2. And we need many E's along with STI capabilities to attain the SDGs

E = {Engagement, Ethics, Entrepreneurship}

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An initiative by Shyama V. Ramani

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STI4SDGs?
3. Let's debunk the common myths…

Myth 1: Lack of resources are the main the problem. More is always better.

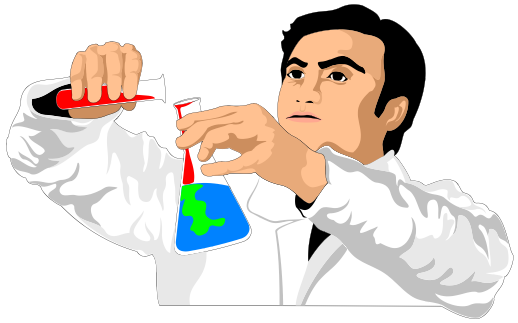
Myth 2: Invest funds in a science park and the triple helix model will come to life.

Myth 3: Build Industrial capabilities and watch development happen

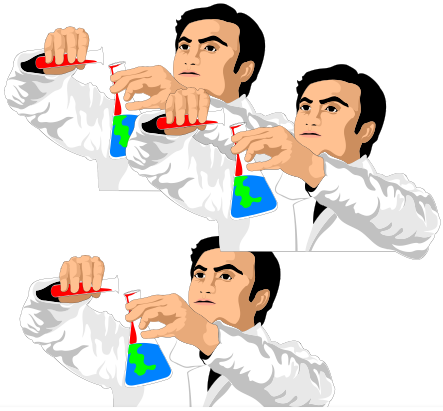
Myth 4: Lack of private finance is the main cause of slow catch-up.

Myth 5: Have a clear STI architecture and see STI based solutions emerge

4. Let’s start with Science

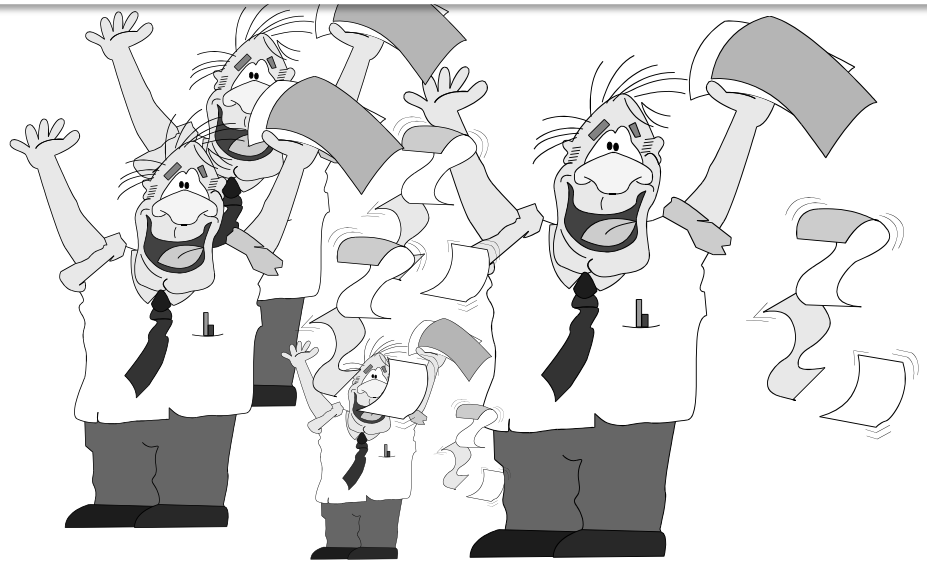


4.1 Science and Scientists: Thinking quantity without quality is myopic



Some countries might lack scientists……

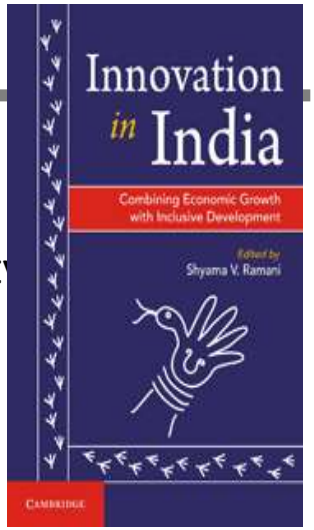
But in almost all emerging countries there is a lack of the right incentives…



- to make scientists perform;
- to develop poles of excellence;
- to be able to control the quality and the quantity of science production.

Gita Surie

Associate Professor, Adelphi University;
Senior Fellow, Wharton School, University of Pennsylvania



Chapter 2: The University as a Catalyst of Innovation, Entrepreneurship, and New Markets in the Indian System of Innovation

"Firms in emerging and developed economies are collaborating more with academic institutions in terms of R&D and knowledge exchange due to heightened competition, abbreviated product life cycles, and rising costs together with increased connectivity. "

*"Improving the Indian system of innovation in terms of transforming scientific knowledge into technology with commercial potential requires that i**nstitutions** become* ***more meritocratic and collaborative, less political*** *and foster higher order thinking skills and the social capabilities of graduates."*

5. Let’s go from Science to Technology and Industry

(5. STInd)

Thinking Technology or rather than Technology paradigm is myopic

5.1 STInd

PROBLEM

Technology paradigm = A vector with components from four spaces

TECHNOLOGY SOLUTION

DELIVERY PLATFORM

SCIENCE BASE

Different Technology Paradigms in Agriculture have different systemic impact

5.2 STInd

	Green Revolution	Genetically modified crops
Problem	Productivity – Food security	Productivity – Livelihoods
Solution package	HYVs/hybrids+ synthetic fertilizers + pesticides + practices	GM seeds + practices
Science Base	Plant breeding = Plant Sciences + Chemistry	Genetic Engineering + plant breeding =Molecular Biology + Genetics
Delivery Platform	International Public Sector Cooperation	Multinational Companies and Private companies

5.3 STInd

Ambuj Sagar

Vipula and Mahesh Chaturvedi Professor of Policy Studies and the D[illegible] Affairs & International Pr[illegible] Indian Institute of Techn[illegible] India.

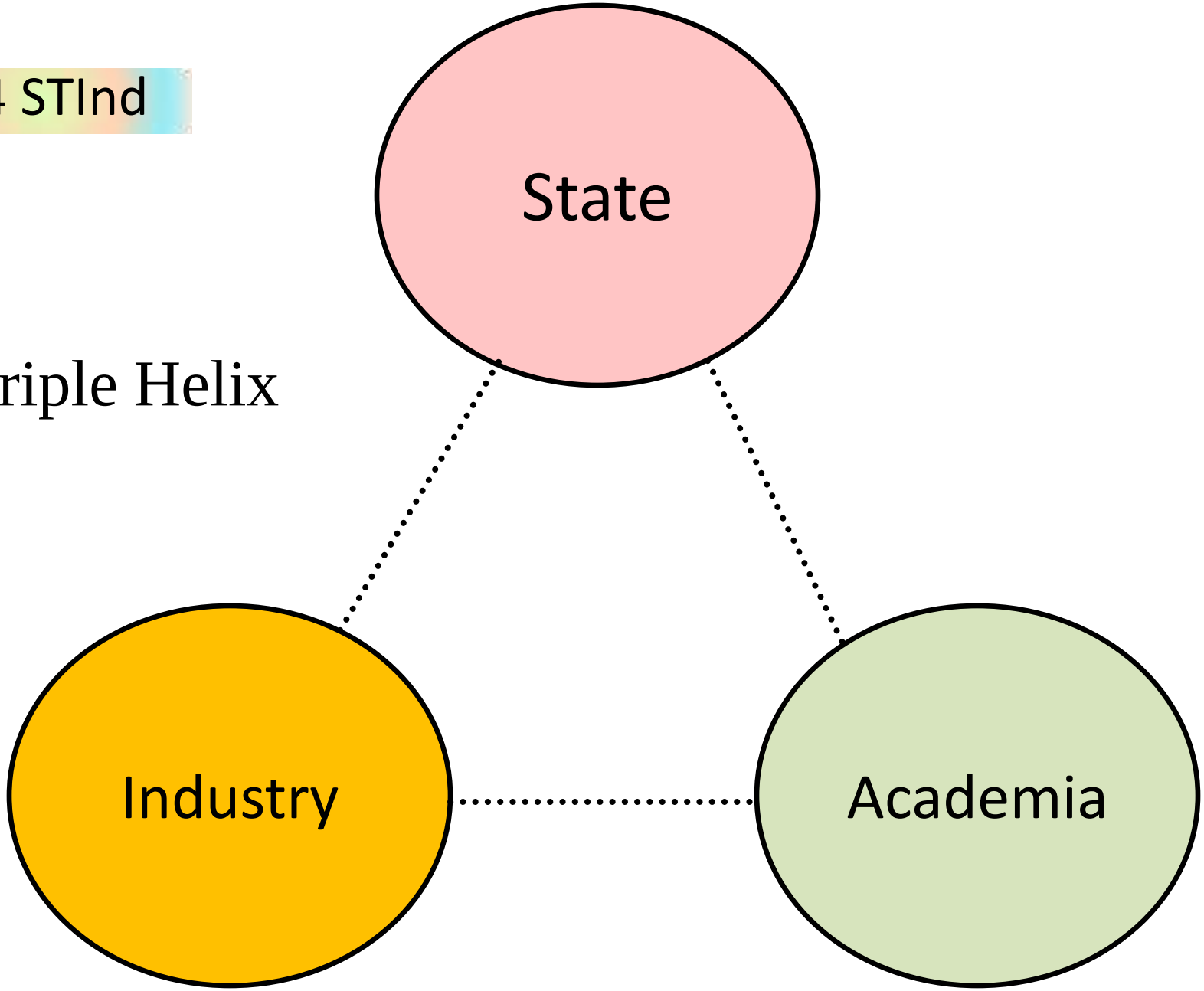
Chapter 8: Energy innovation (sub)systems in India

" There is a wide range of technologies that are involve[illegible] extraction/capture, conversion, and utilization of energ[illegible] application areas. The development and commercializ[illegible] technologies often involve very different innovation pro[illegible] there is very little examination of these, despite the und[illegible] energy innovation for any country. "

Energy needs in India would be met better today if we had examined tech paradigms rather than technologies

5.4 STInd

Triple Helix



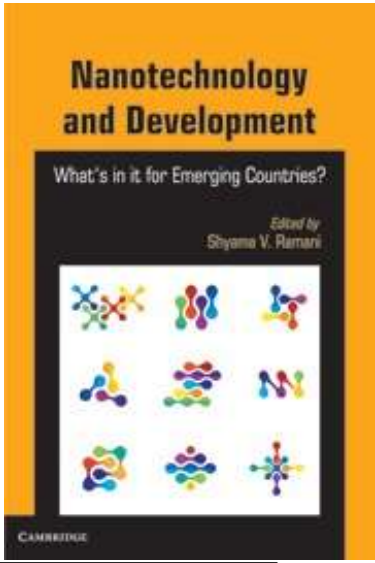
Jorge Niosi

Professor in the Department of Management and Technology at the 'Université du Québec à Montréal' and Canada Research Chair on the Management of Technology. He is the author, co-author, editor or co-editor of 14 books published in Argentina, Canada, France, the United Kingdom and the United States.

Chapter 9: Nanotech after Biotech in Emerging economies: Déjà vu or a new form of catching up?

"After nearly 30 years of engagement, the diffusion of biotechnology among the emerging countries, including those in the Latin American region remains highly uneven."

"Even if scientific capabilities are built, there is no magic bullet to get the private sector to move, though efficient science-technology-innovation (STI) institutions may be helpful."



Not only resources but efficient STI Institutions matter – see Latin America

5.6 STInd

Dominique Vinck

Professor of Science and Technology Studies at Lausanne University. He is also the Director of the Laboratory for Cultures and Digital Humanities (Social Sciences Institute) at Lausanne University.

Chapter 3: How is a regional technology cluster created? Insight from the construction of the nanotech cluster in Grenoble

"The case study clearly confirms that interactions between the state, industry, and academia are necessary for a technology cluster to emerge in an endogenous fashion."

"Collective conversations are necessary for the transformation of expectations into tangible infrastructure."

Triple Helix is important but Heroes are much more important

5.7 STInd

Can Huang

Professor, School of Management, Zhejiang University

Chapter 5: Sure Bet or Mirage? On the Chinese Trajectory in Nanotechnology

"China has performed well in areas such as strengthening basic research, constructing nanotechnology-related databases, and developing national standards; in establishing national key laboratories and research centers in the field with substantial government investment. However, China has encountered enormous difficulty in commercializing new technology and upgrading traditional industries through nanotechnology."

Government can help to only to some extent – there must be private sector enthusiasm

STI4SDGs?
3. Let's debunk the common myths…

Myth 1: Lack of resources are the main the problem. More is always better. 

Myth 2: Invest funds in a science park and the triple helix model will come to life. 

Myth 3: Create incentives for firm innovation and watch industrial capabilities happen. Build Industrial capabilities and watch development happen

Myth 4: Lack of private finance is the main cause of slow catch-up.

Myth 5: Have a clear STI architecture and see STI based solutions emerge

6. Let’s go to Innovation Now

6. Innovation

Mirror Mirror on the wall – which is the best innovation of them all? Ps- for the SDGs?

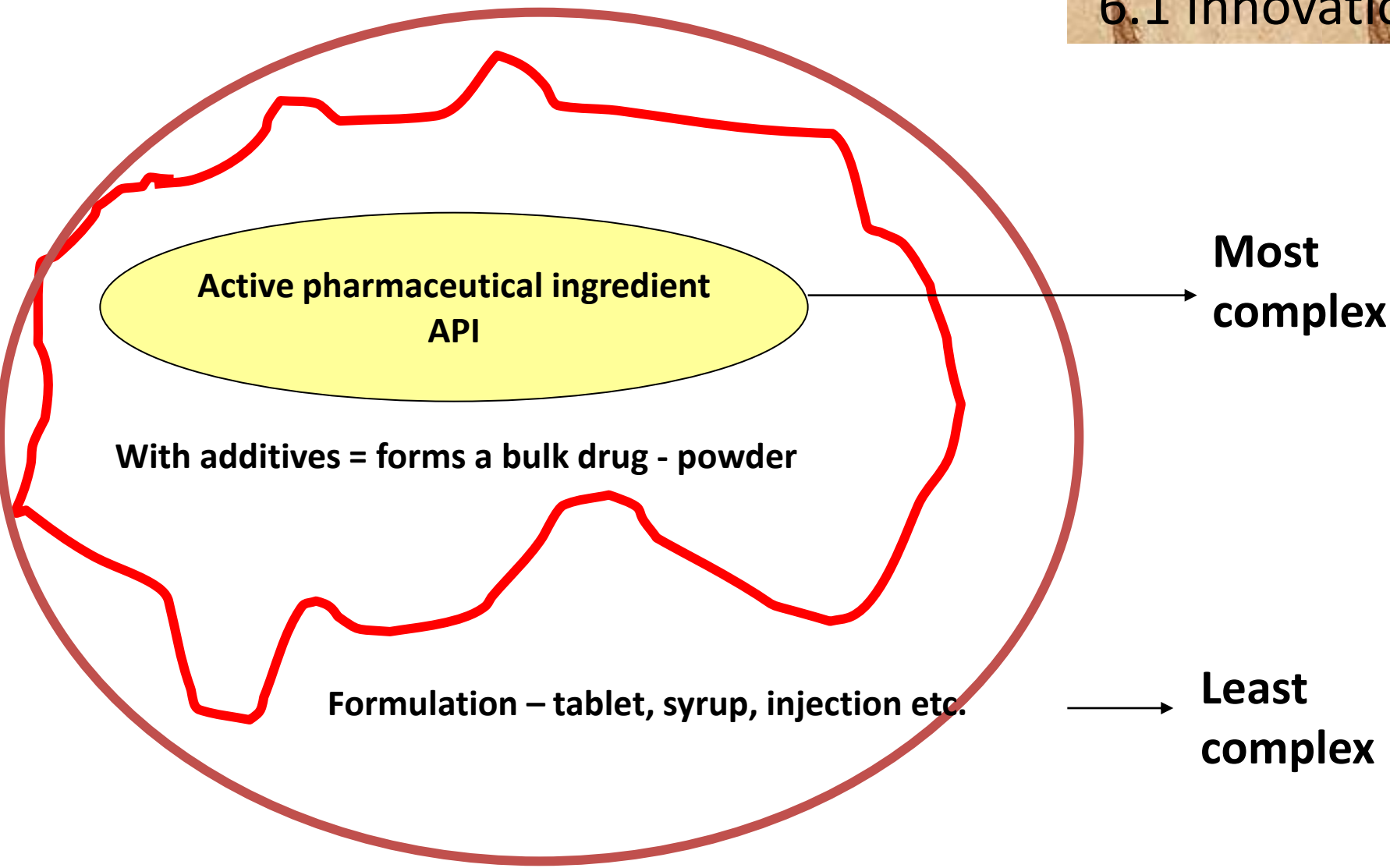
Thinking only incremental or radical is myopic

6.1 Innovation

- Incremental innovations
- Radical technological innovations
- Radical second generation or reengineered technological innovations
- Disruptive innovations
- Frugal/Grassroots innovations
- BoP & Pro-poor Innovations
- Social Innovations

What goes into the making of a drug?

6.1 Innovation



6.1 Innovation

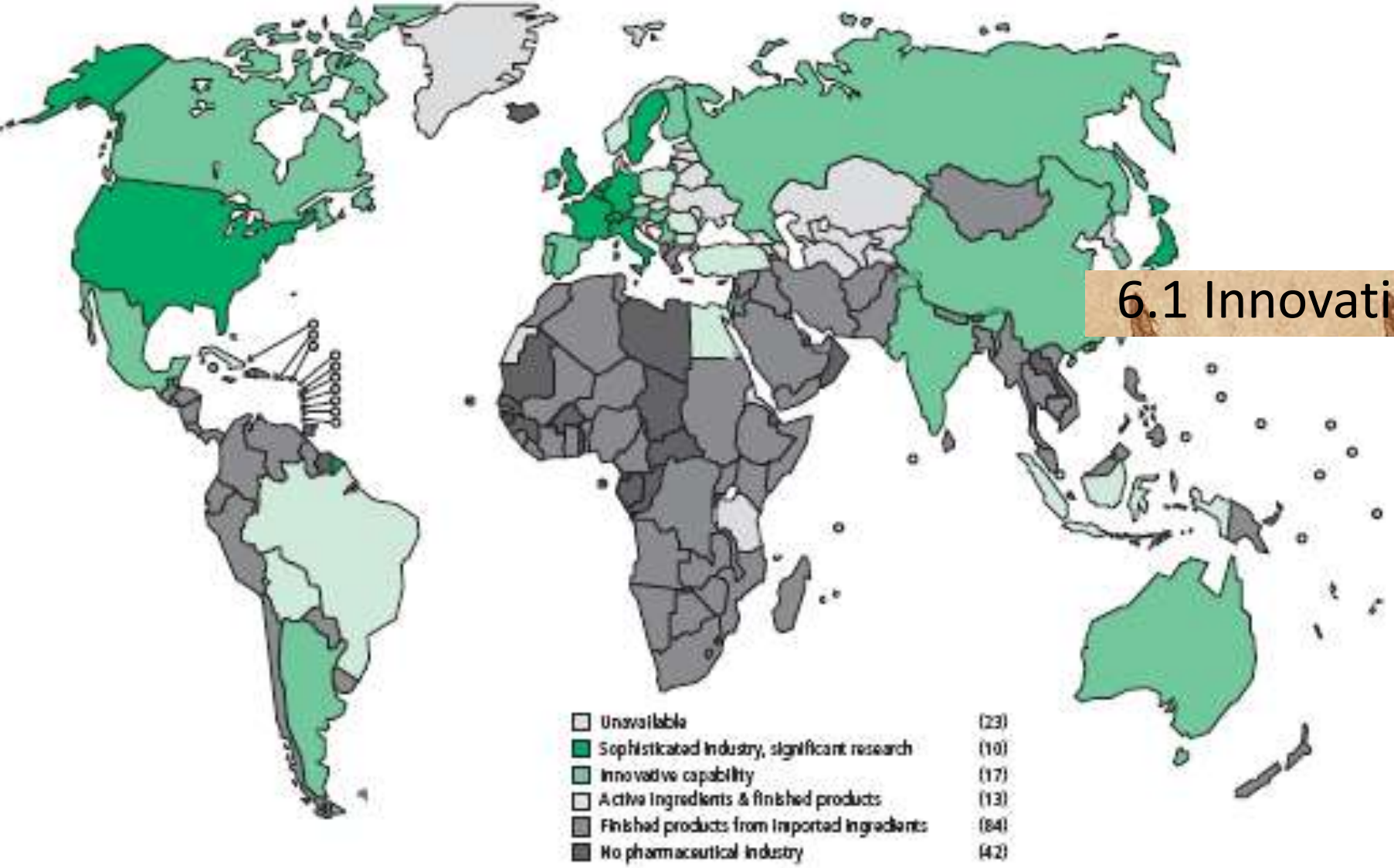
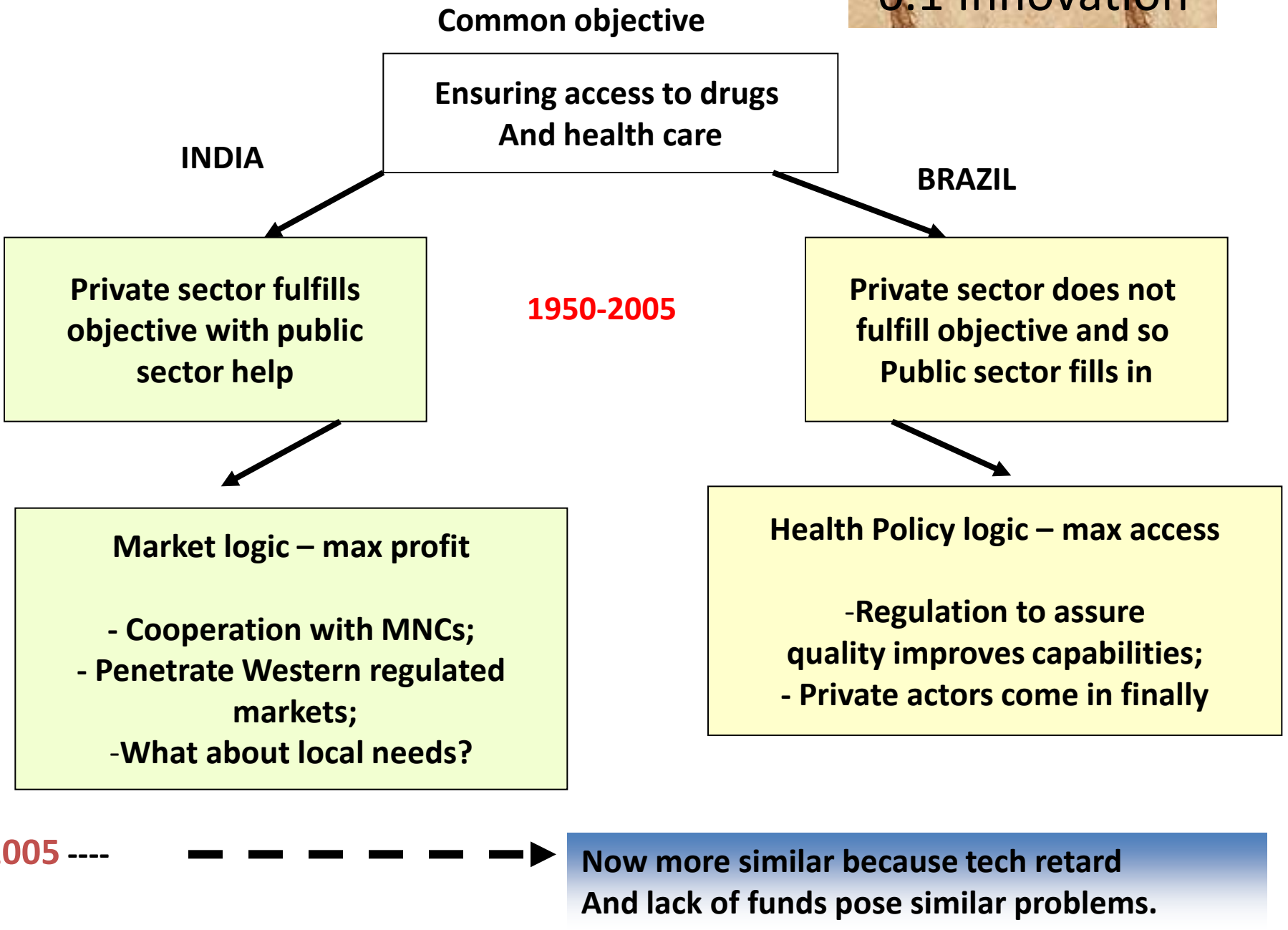
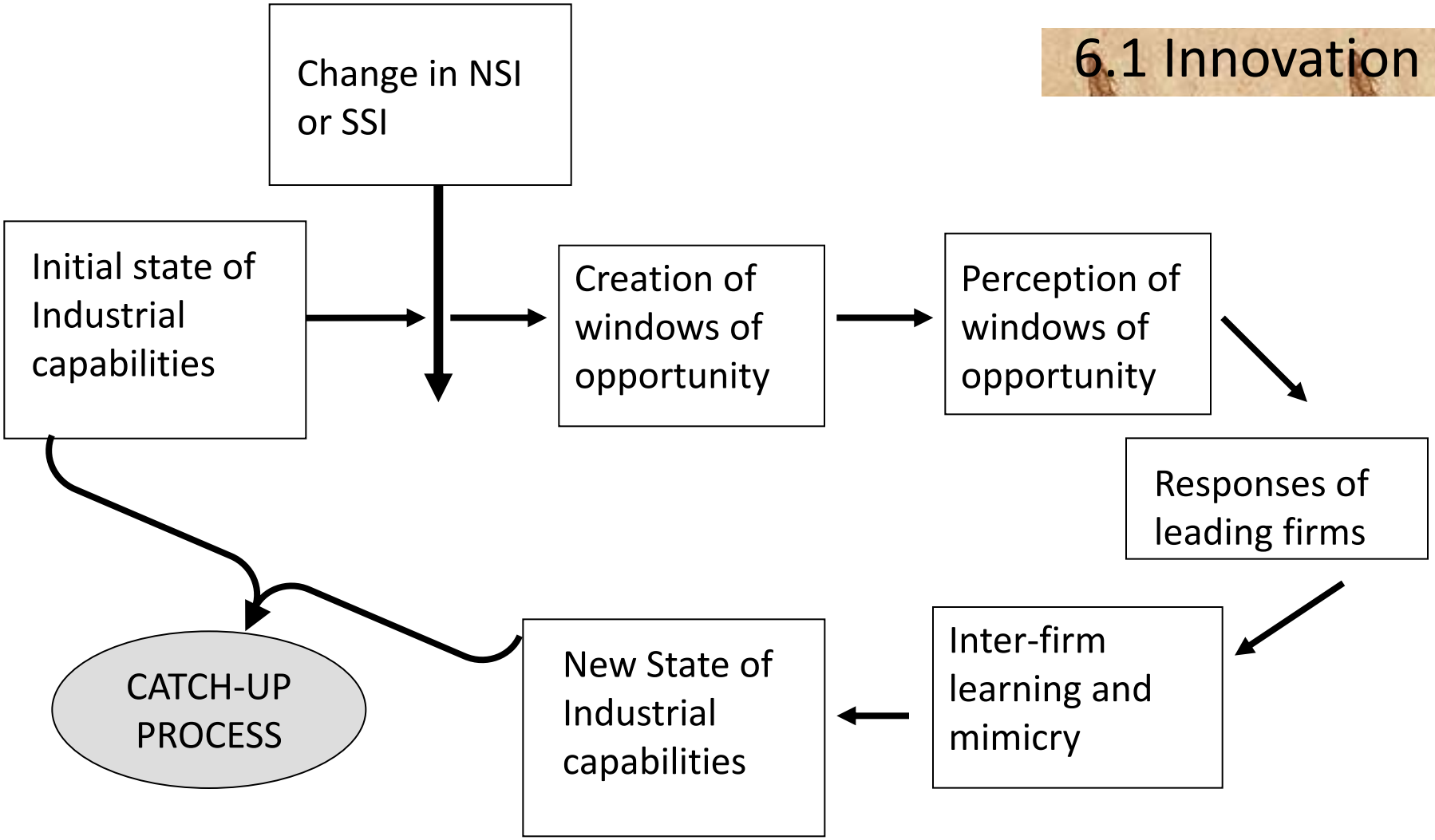


Figure . Local pharmaceutical production capacity among countries
Source: WHO, 2004

6.1 Innovation



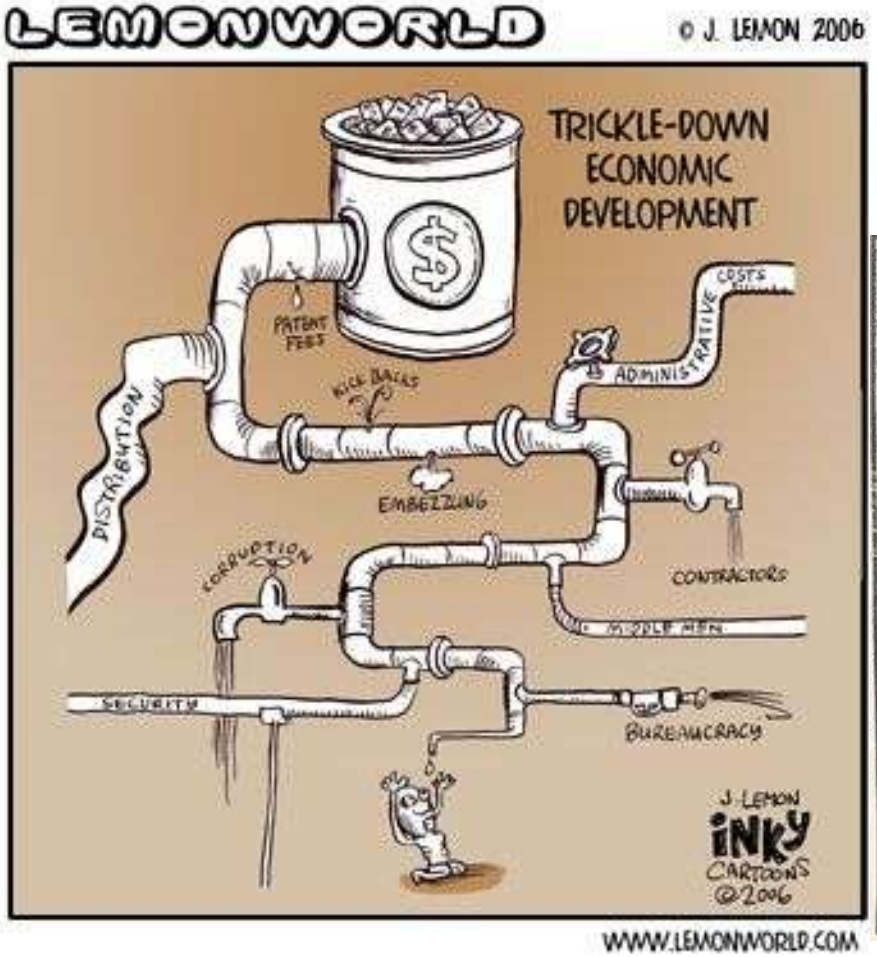
Dynamics of catch-up at meso level



Guennif and Ramani, 2012

Do industrial capabilities build-up always reduce Poverty?

6.2 Innovation



Traditional View – Inter-linkages, Employment, Income Generation & Trickle down to the poor

Question for a champion: Are BoP innovations and Pro-poor innovations the same thing?

6.3 Innovation

Beauty saloon with shampoos

Scratch cards for mobiles

Eco-Toilet

Innovative roof but faulty vent pipe

Pro-poor Innovations need not always be produced by the public labs and universities

6.4 Innovation

7. Let’s go to Engagement Now

7. Engagement

Nédson Antônio Campos

Professor in the Department of Industrial and Mechanical Engineering at the Federal University of Viçosa, Brazil.

Chapter 6: Panorama of Nanoscience and Nanotechnology in Brazil

"Scientists were able to introduce the NST in the priority investment portfolio of the Brazilian government, but the lack of arguments in favor of NST- as a differentiated technology - did not ensure exclusivity in relation to other strategic technologies such as biotechnology."

7. 1 Engagement between scientists and technocrats

Risk: Competition between technologies

Christopher Newfield

Professor in the English Department at the University of California, Santa Barbara.

Chapter 2: Learning From Solyndra: Changing Paradigms in the US Innovation System

"The 'early-stage public subsidy,' model presides over the U.S. innovation system and its intellectual foundation is sometimes called the linear model–a model that has been much criticized in theory, but remains operative in practice. We propose a general shift from a linear innovation model to our social innovation model, which we call the Social Innovation of Technology (SIT)."

7. 1 Engagement between scientists and technocrats

US lost out in solar energy because of linear model of innovation in a market driven system

7. 1 Engagement between scientists and technocrats

Daryl Boudreaux

President, Boudreaux & Associates
Emeritus Chief Scientific Officer, NanoHoldings LLC.

Chapter 2: Learning From Solyndra: Changin Paradigms in the US Innovation System

"To convey an idea of how the linear model operates in practice, we summarize the corporo history of our case study, Solyndra."

"Our story illustrates how guarded communications are particularly damaging to t process of knowledge creation, in which disclosure of all core issues, data in all possible detail, and discussion of minute anomalies many be important to forming and testing new approaches."

Sometimes cooperation is better than cut-throat competition for everybody

7. 1 Engagement between scientists and technocrats

Nupur Chowdhury

Associate Professor, Centre for Environment and Climate Change, Jindal Global Law School, O. P. Jindal Global University.

Chapter 8: *On India's plunge into Nanotechnology: What are good ways to catch up?*

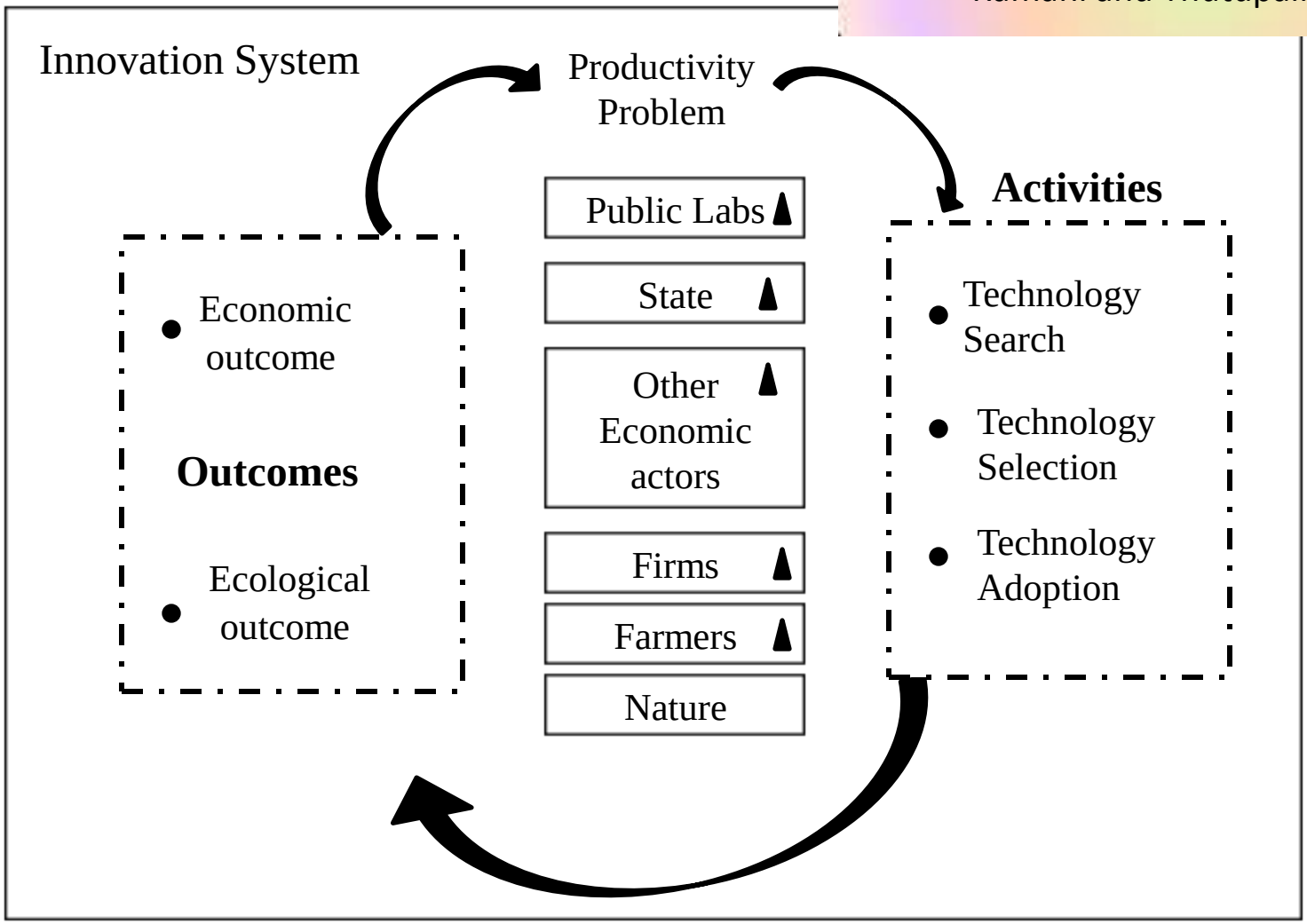
"Strategically speaking, the improvement of linkag between the actors involved in public research funding, technology development technology transfer, and risk regulation is critical to the future success of nanotechnology in India."

Less Silos thinking and more interaction between different actors

Sources of Controversy

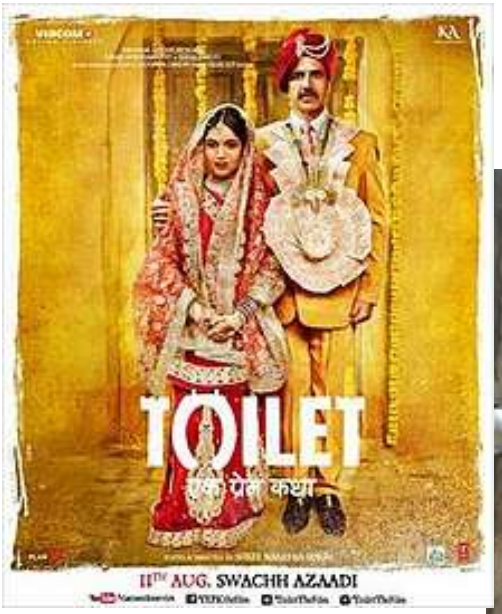
7.2 Engagement Between systemic stakeholders

Ramani and Thutupalli (2016)



7.2 Engagement between systemic stakeholders

Diarrhoea is a major health burden in many emerging countries
Need for safe, long lasting toilets and toilet usage



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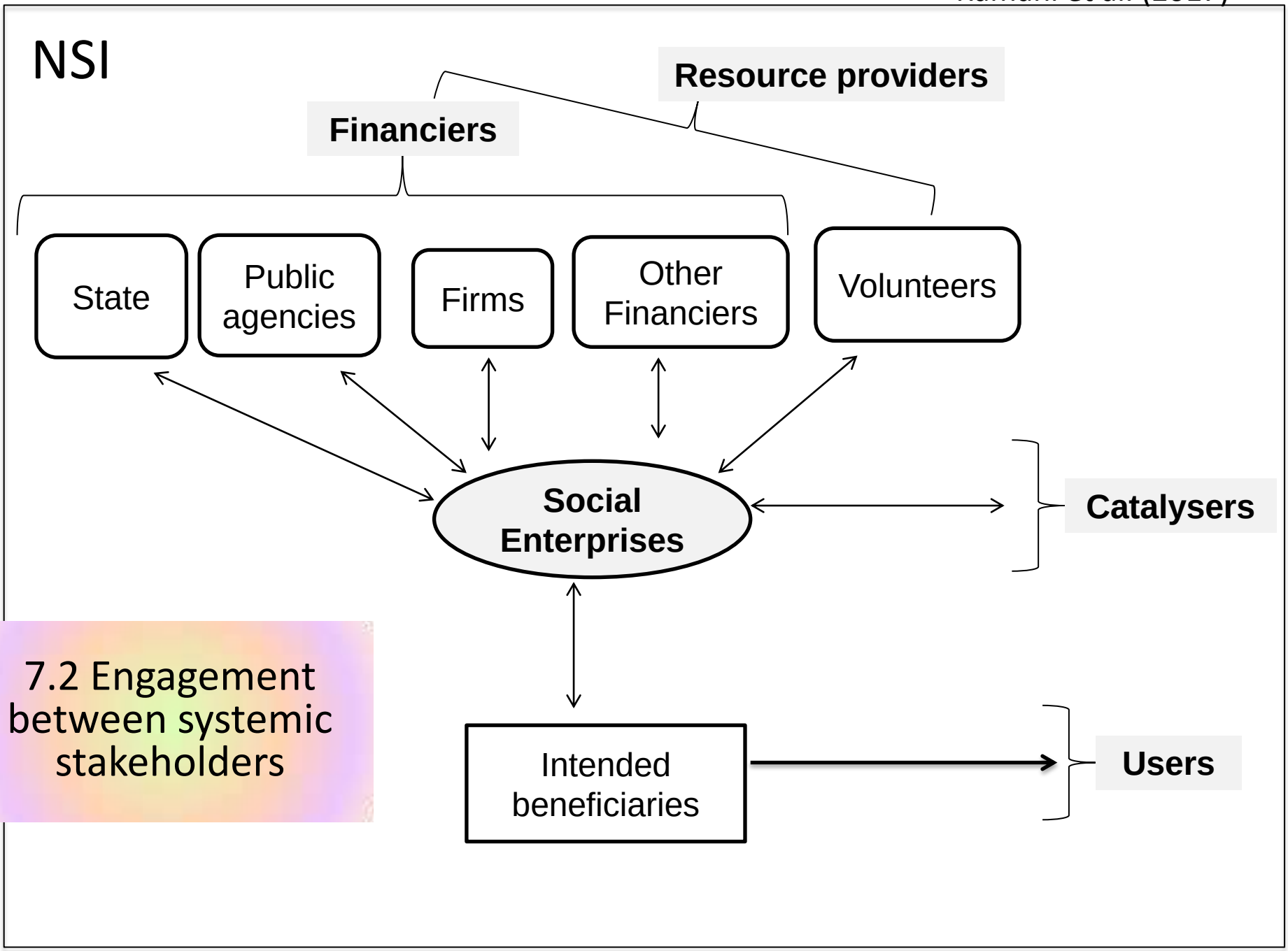
Ramani et al. (2017)

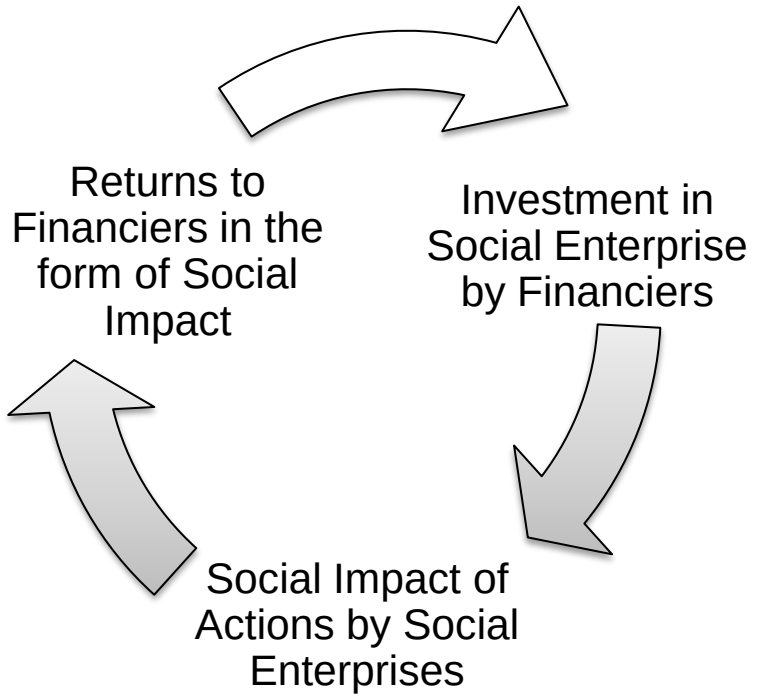


7.2 Engagement between systemic stakeholders

Ramani et al. (2017)

NSI – Product and Systemic Challenges from Supply and Demand Sides

- Inappropriate product design
- Unaffordable price
- Incompatible with local resources, capabilities and culture



7.2 Engagement between systemic stakeholders

Lower the development level = More Complex the Governance Architecture

7.3 Of Government to People: Multiple and Parallel Discourses – Impacting Same Outcomes

POOR

Urban Planning

Environment Ministry

Resilience

Climate

Local growth & development

Resilience

Firms

NGOS

UNIV

World Bank etc.

Systemic Risk: Climate NOT embedded efficiently in development process

7.3 Of Government to People

Rebeca de Gortari Rabiela

Full time researcher at the Institute for Social Research, National Autonomo University of Mexic Mexico. Editor of bo entitled 'Computad Internet en la biblio pública mexicana.'

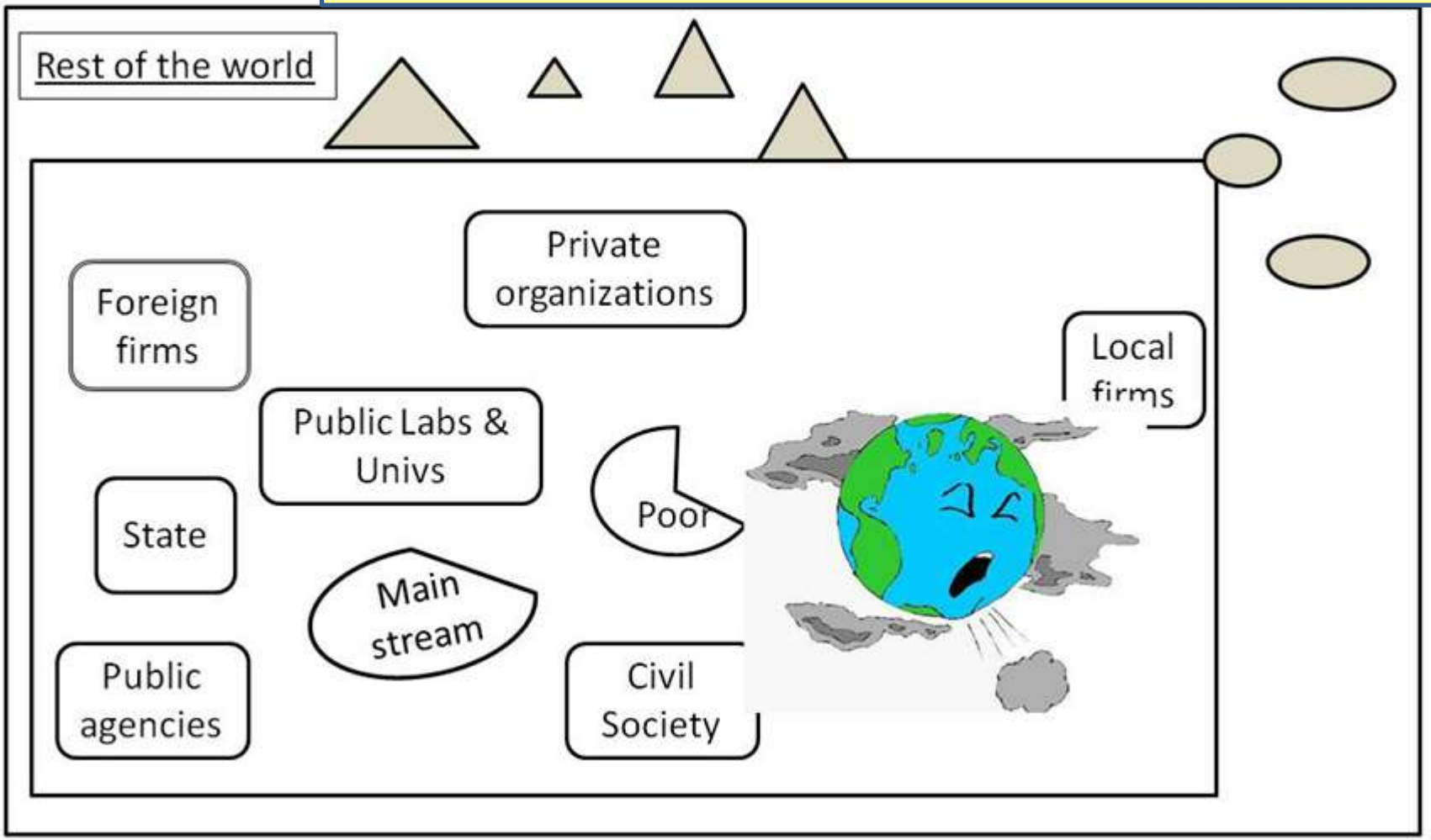
Continuity of political engagement matters

Chapter 7: NST without NII ? The Mexican Case Study

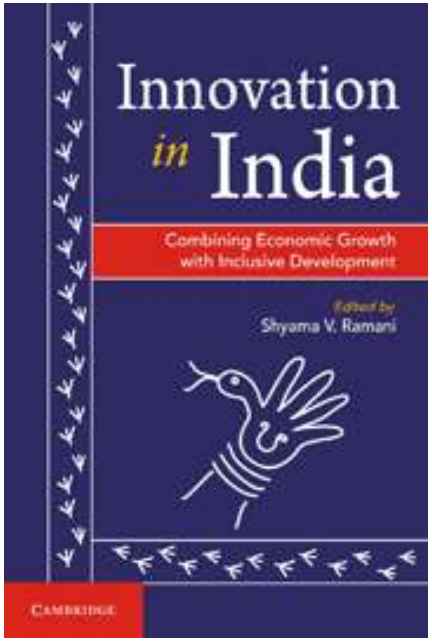
"Three lessons are worth noting from the Mexican experience.
First, people matter.
Second, history matters.
Third, continuity matters and this is the weakest point of the Mexican innovation system. "

7.3 Of Government to People

What's the price to pay of progress along one direction?
What are the externalities generated?
Via market? Outside of market?



7.3 Of Government to People



Last Thoughts:

We need to think more "Indian".

The country is ridiculously imitative in policy.

We have to figure out politically how to move forward together, not a technocratic innovation policy that does not recognise Indian reality. (i.e. not run by techno-bureaucrats and politicos alone).