

Distributional Assessment of Emerging Technologies

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Central question



⌘ How do

☑ public interventions affect

☑ distributional outcomes

☑ for the same emerging technologies

☑ under different national conditions?

⌘ Looking at technologies that emerged in the past

⌘ To develop framework for looking at the future.

Emerging technologies



⌘ Definition

- ☑ New, fast-growing
- ☑ Science-based
- ☑ High potential impact

⌘ Why emerging technologies?

- ☑ Still changeable
- ☑ Most likely to increase inequality
- ☑ Show intersection of global and national distributive processes

Five emerged technologies



- ⌘ Genetically-modified maize (GM)
- ⌘ Mobile telephones
- ⌘ Open source software (FOSS)
- ⌘ Recombinant insulin
- ⌘ Tissue culture for crops

Eight countries



⌘ North

- ☑ Canada
- ☑ Germany
- ☑ Malta
- ☑ United States

⌘ South

- ☑ Argentina
- ☑ Costa Rica
- ☑ Jamaica
- ☑ Mozambique

Case studies

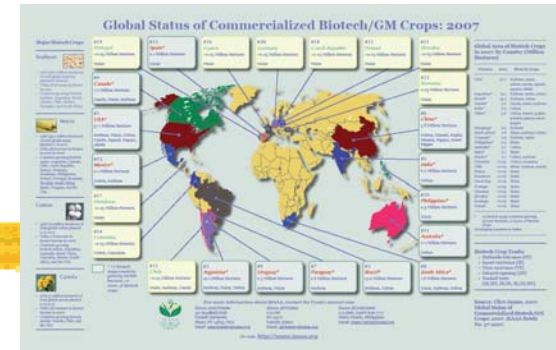
	AR	CA	CR	Ger	Jam	Mal	MZ	US
Mobile phones (8)	X	X	X	X	X	X	X	X
Open source (7)	X	X	X	X		X	X	X
rDNA Insulin (8)	X	X	X	X EU	X	X	X	X
GM maize (5)	X	X	X			X CZ		X
Tissue cultured crop (5)	X		X		X		X	X

Inequality of what?



- ⌘ Vertical and horizontal distribution of
 - ☑ Assets (business opportunity)
 - ☑ Employment
 - ☑ Benefits
 - ☑ Costs/risks

GM maize



- ⌘ Production technology
- ⌘ Use limited to a few countries (as with GM crops generally)
- ⌘ A few big firms worldwide
 - ⊞ Tight control through patents
 - ⊞ Developed and sold as part of a package
 - ⊞ Increasingly vertically integrated
 - ⊞ Some opportunities for maintaining local capabilities
- ⌘ Public intervention: patent policies, environmental regulation
- ⌘ Distributional boundaries drawn by ownership relationships and public controversy over GM

Mobile phones



- ⌘ Consumer technology
- ⌘ Widely hailed as distributional success
 - ☑ Mozambican study shows that reality does not always live up to reputation.
- ⌘ Broad distribution due to pre-paid pricing plans
- ⌘ Strong influence of competition policy in the context of public utility regulation
- ⌘ Distributional boundary drawn by infrastructure

Open source software



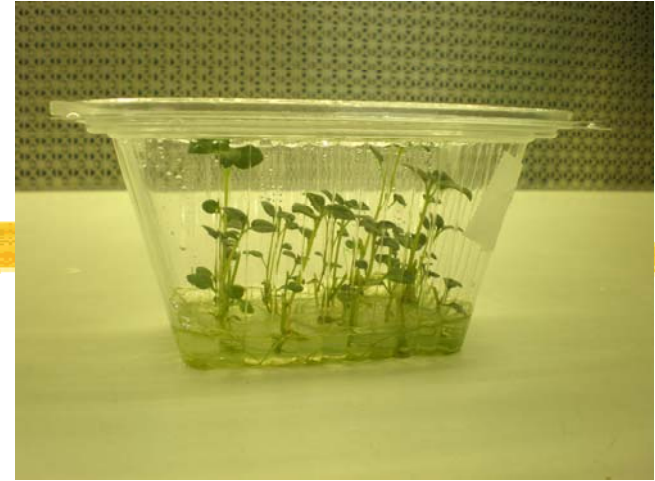
- ⌘ Production process and evangelical movement
- ⌘ Use in business; use by consumers
- ⌘ Alternative business model to proprietary software
- ⌘ Distributional effects through opening business opportunities
 - ☑ Anti-trust regulation and government procurement actions play strong roles
 - ☑ Competition between big firms, U.S. and Europe, emerging economies; not much action elsewhere
- ⌘ Distributional boundary drawn by skill (in business) and infrastructure (for consumers)

Recombinant insulin



- ⌘ Recombinant version is safer, but older versions co-exist, and newer versions may not be better therapeutically
- ⌘ Again, a few large multinational corporations
 - ⊞ Some differential pricing for developing countries
- ⌘ Made available in every country through public health services or insurance (sometimes spotty)
 - ⊞ But policies can have opposite distributional effects – e.g., in Mozambique
- ⌘ Distributional boundary drawn by education and living standard
- ⌘ Patent thicket is keeping generics from being developed.

Tissue culture



- ⌘ Production technology
- ⌘ Openly source biology
- ⌘ Lowers risk of disease in vegetatively propagated crops
- ⌘ Can be used by public laboratories to achieve public goods, as in OFSP and bananas in CR
- ⌘ Can also generate business opportunities
- ⌘ Distributional boundary drawn by skill and infrastructure

Some cross-case observations



⌘ Distribution of assets

- ☑ Big corporations are important actors
- ☑ IP strategy plays a significant role

⌘ No big employment effects.

- ☑ Numbers directly employed are modest.
- ☑ Jobs shift upward in skill and quality but numbers do not change much.

⌘ Distribution of benefits and costs bounded

- ☑ Not only by price
- ☑ Also by skill and infrastructure
- ☑ Absorptive capacity varies by context.

Public interventions (1)



- ⌘ **Research policies** often have limited direct influence on distributional outcomes of specific technologies, BUT
 - ☑ Problem-oriented research is the backdrop in several cases (health, agriculture)
 - ☑ National R&D activity is part of the overall environment where ET-based business opportunities are taken up.
 - ☑ Especially in tissue culture, public laboratories are major actors, competing with private firms.

Public interventions (2)



- ⌘ **Innovation policies** have more direct influences, in particular *patent policy*.
- ⌘ Current versions support strategic patenting which can form part of the distributional boundary.
- ⌘ But inventive IP uses (copyleft) can also open up new opportunities.
- ⌘ Anything shareable is more likely to diffuse.

Public interventions (3)



- ⌘ **Human resource policies** are absolutely critical across the cases.
 - ☑ Availability of people with appropriate levels of skills often forms the distributional boundary.
- ⌘ This extends well beyond the research workforce.
 - ☑ Programmers
 - ☑ Health service workers
 - ☑ Tissue culture lab personnel
 - ☑ Educational levels of consumers

Public interventions (4)



- ⌘ **Regulatory and procurement policies** are crucial in shaping business decisions about technological projects.
- ⌘ Mildly to strongly redistributive
 - ☑ Public procurement
 - ☑ Public utility regulation
 - ☑ Anti-trust
- ⌘ Decrease access through cost or prohibition
 - ☑ Health and safety regulations
 - ☑ Environmental regulations

Decision contexts



- ⌘ Clearly need to address both private and public decision makers
- ⌘ No one size fits all for countries
- ⌘ National decision contexts are fragmented
 - ☒ STI – research agendas, industrial policies, intellectual property protection, and human resource policies
 - ☒ Regulatory policies – shape diffusion importantly
 - ☒ Public procurement – also crucial in diffusion
- ⌘ May need to do distributional technology assessment

Distributional technology assessment



⌘ DTA would raise a common set of questions:

- ☑ What business opportunities are being created? Who will take them up? Do all groups have equal opportunity? [egalitarian, fairness]
- ☑ What jobs are being created and lost? Who is prepared for them? Will they stay here? [egalitarian, fairness]
- ☑ Who will have access to the technology? Should we use public services or procurement to make sure everyone benefits? [pro-poor]
- ☑ What risks are involved? Will some groups be more exposed to them than others? [fairness, pro-poor]

Policy options - examples



⌘ No one size fits all.

- ☑ Pro-poor innovation projects
- ☑ Conceive of the technologies as “public goods”
- ☑ Governments need to measure and monitor diffusion
- ☑ Independent paths for public comment are needed.
- ☑ Do nothing – let competitiveness pay for redistribution of income and let the market work
- ☑ Focus training to attract knowledge-based jobs
- ☑ Reform patent system
- ☑ Establish distributional effects as part of corporate responsibility

Summary



- ⌘ Distributional consequences take many forms.
- ⌘ “Diffusion” consists of both push and pull, need and absorptive capacity.
- ⌘ A broad range of policies affects this process, not just STI policies.
- ⌘ The ResIST agenda needs to address and engage a wide set of decision makers, both public and private.