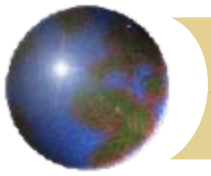


# *Does Innovation Matter for Less Developed Countries?*

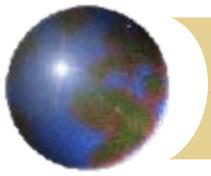
CAS Workshop on “innovation in Firms”  
Also, 30 Oct – 1 Nov 2007

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Henny Romijn, Eindhoven Univ. of Technology, the Netherlands



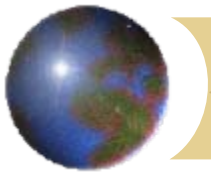
## *Overview:*

- Current mainstream views
- Lessons from recent history
- New developments, new challenges, time for a fresh look
- Three examples of significant innovations in LDCs
- Conclusions



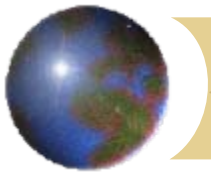
## *Mainstream views:*

- Global Competitiveness Report 2006-7:
  - High-income countries -> innovation driven
  - Intermediate-income countries -> efficiency driven
  - Low-income countries -> factor driven
  
- UNDP (2001), UNIDO (2002), RAND (2005), Arco index (2004):
  - S&T indices suggesting that great majority of LDCs do not innovate substantially or even at all.



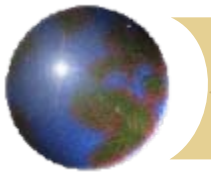
Does this indeed mean that LDCs hardly innovate?

And also that innovation is not a relevant, desirable or necessary activity to pursue for their socio-economic development?



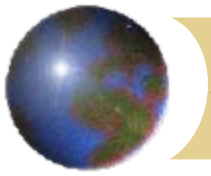
## *Lessons from recent history*

- Dominant view up to late 1970s: LDCs advance by importing & using technology from DCs -> what matters is making the right *technology choice*.
- Since early 1980s: LDCs advance by acquiring knowledge embodied in technology from DCs, and adapting technology locally -> what matters is *local technological effort*.



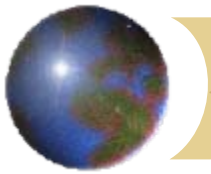
## *Lessons cont'd...*

- A lot of these efforts do not constitute R&D, yet they are crucial for technological progress in poor countries ('proto innovation').
- Technological learning is cumulative. Over time, full-fledged R&D capabilities can and do develop (but it takes several decades).



## *Lessons cont'd...*

- *Capital goods producers* assume a special role in this process – they cause pervasive rent spillovers.
- Innovation driven by *ongoing face to face interactions* with clients in user sectors.
- Hence, it was widely deemed important for LDCs to establish their *own local capital goods sector*.
- This required *protection*, because of pervasive market failures.

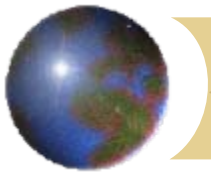


## *Lessons cont'd...*

- These lessons were unlearned in the neo-liberal counterrevolution. Countries were told to focus on static comparative advantage.
- Twenty-five years on, the GCR and leading institutions like the World Bank still reflect this thinking.

See, e.g. *Economic Growth in the 1990s, Learning from a Decade of Reform* (WB, 2005):

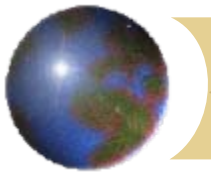
“Governments should be focused on improving governance standards and institutions for efficient functioning of markets”.



## *Lessons cont'd*

BUT, the evidence contradicts the preachings:

- Technology assimilation was central to industrialisation and growth of East Asian countries.
- Highly selective “carrot and stick” policies aiming towards creating dynamic competitive advantage. No blanket protection.

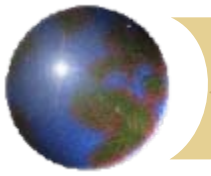


## *New developments, new challenges, time for a fresh look*

Drawing on these lessons, some now cautiously return to the technological learning paradigm (e.g. UNCTAD's *Least Developed Countries Report 2007*), but it is too much old hat.

### *The world is moving on:*

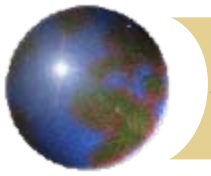
- Recent emergence of *new sectors*
- Need to address the *poverty challenge*
- Need to address the *sustainability* challenge.



## *New developments cont'd...*

New sectors: challenge the notion that all countries first need to industrialise in order to develop.

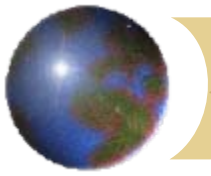
- ICT, biotech: Underlying technologies have stronger link with basic science than industrial technologies.
- Countries cannot build capabilities incrementally by engineers on the shop floor.
- Early involvement in science and R&D is needed; the alternative is to remain dependent on western technologies not designed for local requirements.



## *New developments cont'd...*

The poverty challenge: Assimilation-based technology accumulation strategies have not performed well in relation to poverty alleviation in many LDCs.

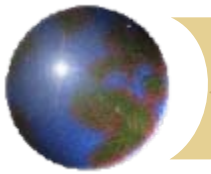
- Too capital intensive for poor countries with large labour surplus; neglect of problems afflicting tropical countries, etc.
- Millennium Goals S&T Task Force, Johannesburg Summit and WHO call for investment in *independent S&T innovation capacity* in LDCs, even the poorest ones.



## *New developments cont'd...*

The sustainability challenge: The western technological trajectory itself is hitting its limits. Adoption of technology follower strategies by big LDCs is unsustainable.

- While accumulation of knowledge about western technologies is needed to learn to innovate locally, it can also lead to lock in, in terms of knowledge base & physical artefacts.
- Need to start substantial local innovation early: *economic* catch up need not imply straightforward *technological* catch up.

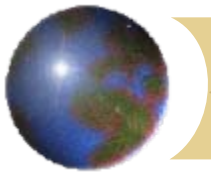


*So, innovation in LDCs matters, but it is possible?  
Three examples suggest that it may be.*

1. Innovation in new sectors

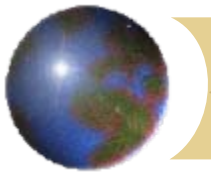
CorDECT Wireless in Local Loop (WLL), IIT Madras

- “Fixed wireless” system.
- The first telecom system fit for simultaneous voice and data transmission at its launch (2000).
- Costs a factor of 3-4 less per connection than equivalent western technologies, highly suitable for poor rural areas.
- Innovative organisational (franchise) model.



## Some quotes from the team leader...

- "...CorDECT is a *disruptive technology* which required total mastery of current knowledge in the area and then a lot of innovation."
- " Bringing down the costs of telecom services by a factor of 3 to 5 is the R&D task now facing developing countries like India, because *such radical innovations alone will transform poor people's lives.*"
- " *By following what is being done in the west, we will always remain only followers.* What we need to do is understand our requirements and work towards meeting these. This *different starting point* will ... eventually enable us to become technological leaders."

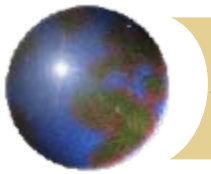


## *Examples cont'd*

### 2. Innovation for poverty alleviation

OZ malaria treatment, Ranbaxy (India) & MMV (intern. foundation). Similar Chinese state-led initiative.

- Synthetic medicine based on ancient Chinese herb (Artesiminin), the only remaining truly effective treatment in existence.
- Synthetic variant much cheaper than herbal original.
- Ranbaxy is major generics producer, ramping up its basic R&D.
- "The company identifies with the malaria crisis *because it is based in India*, and has therefore decided to devote substantial resources to it."

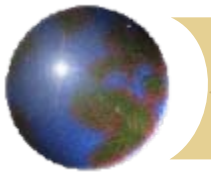


## *Examples cont'd*

### 3. Innovation for sustainability

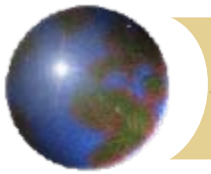
#### Small-scale biomass gasifiers, IISc, Bangalore

- Rural electrification is big challenge: people unable to pay, lack of power for grid expansion, finite fossil resources, etc.
- Low cost biomass gasifiers can meet the need for basic lighting, irrigation, drinking water pumping, etc., for 1-2 billion people.
- Complex thermo-chemical technology, yet IISc designed a rugged system suitable for village use.
- Scientists learnt by experimenting in a local village for 18 years.
- IISc is world leader, exports to Europe, Japan, USA and many LDCs.



## Conclusions

- Innovation in LDCs *matters* for building *dynamic competitiveness*, also in the poorest ones.
- Earlier this was achieved through *incremental learning* from western technology, aimed at *industrialisation*.
- Now, more attention is also needed for building *radical* innovation capacity in LDCs...
- ... to take advantage of *new development possibilities* and meet major *poverty and sustainability challenges*.
- And, it is beginning to *happen*, esp. in India and China (see *The Economist*, Oct 13th 07, 'Revving up').



## Some policy issues:

- Physical proximity (user-producer interactions) still matters
- Globalisation & liberalisation impede local innovation, incremental or radical. Nurturing policies remain essential
- Importance of domestic innovation *system* (scientists need manufacturers for commercialisation)
- Mentality change is needed among policy makers, this will take time
- Large LDCs taking the lead – importance of South-South transfers & collaborations