



## Workshop

### "Greening innovation for sustainable development: The role of lead markets and frugal innovations"

21 May 2013, 10.00-17.30

Deutsches Institut für Entwicklungspolitik/ German Development Institute (DIE)

Tulpenfeld 6, 53113 Bonn

Climate change mitigation and other pressing environmental needs call for technological innovations in sustainable development. Some efforts to develop "green" technologies are in fact currently being undertaken, mainly in OECD countries and some of the major emerging economies. In addition to environmental objectives, governments and firms increasingly recognize the opportunities to build competitive advantages in the rapidly growing area of green technologies.

The **lead market** concept suggests that certain domestic markets anticipate international demand trends and therefore stimulate innovations (and eventually entire sectoral innovation systems) before competitors do; these markets then become the reference market for others; standards are set here, and demand conditions encourage the development of more sophisticated goods and services, thereby providing local innovators with an early mover advantage. Product sophistication may stem from demanding customers (French or Italian fashion, for example) or new regulatory requirements (Danish wind turbines, German flue gas cleaning technology). The lead market idea is particularly relevant for policy-induced innovation, such as those stimulated by stricter environmental regulations or labels. In any case, these demand and regulatory conditions are more likely to be found within rich economies.

At the same time, overall consumption is growing only very slowly in OECD countries, whereas some population-rich emerging economies are witnessing an explosive growth of consuming middle classes, which is unprecedented in history. It is mainly the emerging economies that add new power plants, factories and other buildings to global stocks; and their share in the world market for cars, consumer electronics and other products is expanding rapidly. In these countries, demand is concentrated on less sophisticated products that are affordable for households that have recently grown out of poverty and who are less demanding in their purchases. Market dynamism thus makes these countries attractive for investors and innovators, but the type of demand calls for "**frugal innovations**", that is, new low-cost products or processes of "good enough" quality developed for price-sensitive consumers, often with very low profit margins but economies of scale in production. While it may be difficult to place those products in OECD markets, the properties of frugal products suggest they may encounter growing demand in developing countries throughout.

At a first glance, these two trends might suggest the parallel emergence of two patterns of innovation:

- (a) a range of sophisticated and relatively highly priced innovations developed by OECD firms for their home countries; most of these innovations have a "green" element, reflecting increasing pressure to decarbonize economies. These innovations diffuse internationally when scales in production bring unit costs down and more countries increase their regulatory requirements;

- (b) low-cost "frugal" innovations developed by local firms in emerging economies and eventually exported to other price-sensitive markets. The core impetus of frugal innovations is low cost, thus there is a rationale to use fewer resources and to use them efficiently. On the other hand, there is an incentive to reduce *all* costs, which may lead producers to externalize environmental costs wherever possible.

This stylized picture may, however, be too simplistic. In an increasingly globalized world, the most innovative firms tend to be international players, and they may develop products for market conditions elsewhere. This works in both directions. Producers from low-cost emerging economies may tap into OECD lead markets and technological leadership: Chinese solar panel producers took advantage of Germany's lead market and became global leaders; India's wind turbine industry, through firm acquisitions and R&D outsourcing, tapped into Danish and German innovation systems and managed to become global players. Conversely, Bosch developed innovative low-cost autoparts for India's Tata Nano, combining its own core competence with the inventiveness of engineering teams at its Indian subsidiaries.

### ***Issues for discussion***

The workshop aims to discuss three big questions:

**(1) What is the relative importance of the two drivers of innovations (lead markets and increasing demand for frugal goods and services) for building national competitive advantages?** What evidence do we have for the importance of **lead markets** for environmental innovations? Lead markets have several characteristics (demanding customers, regulations that anticipate international trends anticipatory regulations, networks of related firms, etc.): Which of these are central for the lead market concept, and which are most effective in creating early mover advantages? How likely can they be sustained in a globalizing economy? For example: What explains Japan's early mover advantage in hybrid engine technology, and how rapidly will Toyota's innovation rents be dissipated by competition? Will French carmakers benefit from their early launch of battery-electric cars? How relevant are national subsidies (e.g. for solar panels or the purchase of electric cars) when corporations develop products for global markets? What evidence do we have for lead markets in emerging economies (ethanol industry and flex fuel motors in Brazil)?

How realistic is the idea of **frugal innovations** developing into competitive success stories (Chinese motorbikes, Indian tractors ...)? Who tends to develop frugal innovations, who reaps the benefits: Domestic "Southern" firms or "Northern" multinationals? Are innovation for, and production of, frugal products socially inclusive, compared to other products?

How are the two concepts interrelated? Does it make sense to conceptualize "lead market for frugal innovations"? To what extent can both dynamics co-exist? Is there a typical sequence (e.g. with rising customer demands, regulations, networks)?

**(2) To what extent are both concepts compatible with, and conducive to, green innovations?**

How much empirical evidence do we have of higher environmental standards triggering green innovations? What is the role of regulations, voluntary standards, subsidies, consumer awareness in this? Where do trade-offs exist between existing lead markets and low carbon development (e.g. Germany's lead market role in high-powered up-market cars)? What is the environmental performance of frugal innovations: To what extent are they more resource-efficient (because they focus on basic functions) and to what extent is cost reduction achieved at the expense of environmental performance?

**(3) What are the implications for Green Industrial and Innovation Policy?** What can governments do to create lead markets? What can they do to ensure that national lead market conditions benefit domestic firms and innovation systems? What options do developing countries have in this regard? How can frugal innovations be supported and their environmental performance improved? To what extent does this require re-engineering on innovation systems?

To trigger the debate, short and specific inputs from ongoing research projects are invited, but most of the workshop time will be left for structured discussions, including breakout sessions.

## **Preliminary Agenda**

|       |   |  |  |
|-------|---|--|--|
| 10:00 | Welcome and introduction  | Tilman Altenburg<br>Mario Cimoli   |  |
| 10:20 | Lead markets – the concept  | Klaus Rennings   |  |
| 10:40 | Frugal innovations – the concept  | Cornelius Herstatt   |  |
| 11:00 | Discussion of the concepts  |  |  |
| 11:30 | Evidence from the ‘Lead Markets in Emerging Economies’ project & discussion   | Klaus Jacob/ Rainer Quitzow  |  |
| 11:50 | <i>Coffee break</i>   |  |  |
| 12:20 | Evidence from the ‘Technological Trajectories’ project & discussion   | Tilman Altenburg/ Doris Fischer  |  |
| 12:40 | <i>Lunch break</i>  |  |  |
| 14:00 | Evidence from TUHH’s work on frugal innovations in India & discussion   | Rajnish Tiwari   |  |
| 14:20 | Breakout Sessions   |  |  |
|       | <i>Session 1: Lead markets in a globalising world: What role for driving innovation and for national competitiveness?</i> | <i>Session 2: Frugal innovations: Niche markets vs. opportunities for new national competitive advantages?</i> | <i>Session 3: To what extents can lead market and frugal innovation dynamics trigger “greening”?</i> |
|       | Moderator: Jonathan Köhler  | Moderator: Helmut Asche  | Moderator: Heleen de Coninck   |
| 15:45 | Reports back from breakout groups   |  |  |
| 16:15 | Round table: What are the implications for Green Industrial and Innovation Policy   |  |  |
|       | <i>Participants: Hubert Schmitz, Klaus Rennings, Rainer Walz, Klaus Jakob, Anna Pegels</i>                                |  |  |
|       | <i>Moderator: Mario Cimoli</i>  |  |  |
| 17:15 | Farewell and agreement on next steps  | Tilman Altenburg   |  |
| 17:30 | End of workshop   |  |  |

**Participants:**

1. Tilman Altenburg, DIE
2. Saskia Anders, GIZ
3. Hasso Anwer, GIZ
4. Helmut Asche, University of Leipzig and German Evaluation Institute
5. Holger Bär, FU Berlin
6. Shikha Bhasin, DIE
7. Mario Cimoli, UN ECLAC
8. Heleen de Coninck, Radboud University Nijmegen
9. Doris Fischer, University of Würzburg
10. Martina Fromhold-Eisebith, RWTH Aachen
11. Alejandro Guarín, DIE
12. Aimée Hampel-Milagrosa, DIE
13. Cornelius Herstatt, Hamburg University of Technology
14. Klaus Jacob, Free University of Berlin
15. Oliver Johnson, DIE
16. Jonathan Köhler, Fraunhofer ISI
17. Markus Loewe, DIE
18. Wilfried Lütkenhorst, visiting researcher DIE
19. Dirk Messner, DIE
20. Anna Pegels, DIE
21. Rainer Quitzow, Free University of Berlin
22. Klaus Rennings, Centre for European Economic Research (ZEW)
23. Sebastian Rovira, UN ECLAC
24. Hubert Schmitz, IDS Sussex, visiting researcher DIE
25. Rajnish Tiwari, Hamburg University of Technology
26. Georgeta Vidican, DIE
27. Rainer Walz, Fraunhofer ISI
28. Sabrina Weithmann, University of Würzburg