Eco-innovation in the Knowledge Economy - challenges and opportunities for ICT

OECD workshop
ICTs and Environmental Challenges
Copenhagen 22-23 May 2008
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The theme

New insights from the rise of the "eco-innovation" agenda: Clean, Clever and Competitive (Lissabon Strategy)

RQ: What is the link between clean and clever – and ICT?

1. Relate eco-innovation to competitive conditions of the knowledge economy
2. Highlight ICT aspects – part of the solution?
3. Along the way: Upcoming research questions and policy challenges
Globalisation & eco-innovation

- New linkage between environmental and innovation policy
  A global race for green competitiveness?

- Eco-innovation policy & visions on the rise
  - Asia: “Green growth” strategy of UNESCAP
  - China: the “circular economy”
  - Japan: Ressource efficiency goals
  - US: Sustainable energy production and consumption
  - Europe: “Clean, clever and competitive” (Lissabon proces)
The innovation process & policy

Knowledge sources:
- Research
- Experimentation (Learning by doing, competencies of employees)
- Knowledge sharing (B2B, knowledge institutions)

Environmental policy:
- Regulation
- Fiscal measures
- Clean tech. Programmes
- Eco-labels & declarations
- EMS

Innovation policy:
- Technology mediating institutes
- Innovation consortia
- Regional growth initiatives
- Business PhDs
- Incubation centres
- Technology foresight & strategic networks

Source: Own source
Defining eco-innovation

**Definition:**

- "Innovations which are able to attract green rents on the market – they create value to users while progressively reducing net environmental impacts”

- competitiveness parameter rather than environmental assessment

- greening as a moving target

**Strength:** The environment as a business case, from burden to opportunity

**Weakness:** Focus on P rather than C - how do we reach SCP?
Understanding eco-innovation

• *The firm as (eco-) innovator, rather than as a polluter*
  – impacts on the eco-innovation process rather than the environment directly
  – *RQ: the roles different types of companies play for eco-innovation*

• The firm within the wider innovation system
  – the innovative capacity of national/regional innovation systems towards eco-innovation

• *Focus: the degree to which environmental issues are becoming integrated into the economic process*
Green competitiveness – new opportunities

• We know empirically little on the greening of companies/economic sectors
  
  – Some shift from reactive to proactive environmental strategies – **broad range of incentives**.
  – Short term: risk management.
  – Medium term: some moderate positive connection between environmental performance and competitiveness.

• Development of eco-innovation indicators (FP6 project: “Measuring eco-innovation”, upcoming “Observatory on Eco-innovation”)
Green competitiveness – new opportunities

Foresights: rapid expansion of global markets - from around currently 390-470 billion to 5-600 bn US$ in 2010......

Two market segments for eco-industries
- **Developing countries** - 1 pct of GDP- but growth potential - 8-12 pct growth to 2010
- **Developed countries** - 2 pct of GDP- mature markets
  – still a luxury good characteristics of eco-innovation? (Source: OECD Kennett & Stenblick 2005)

- Globalisation: new division of eco-innovative labour
Changing competitiveness in the knowledge economy

• Stronger competition resulting from globalisation and deregulation

• Structural change from scale-based manufacturing to new innovation-oriented strategies

• **Knowledge is the key resource** – supported by ICT: growing codification of knowledge and its transmission through ICT

• Innovation has become more rapid, more widely diffused in the economy and closer linked to scientific progress
New eco-innovation opportunities in the knowledge economy?

1. Markets are more transparent: companies have to account for what they are doing (globally)

2. Markets are more communicative: more info on products

3. Product stories are increasingly important: branding

4. Competition for human capital – new demands on companies from the workforce
Towards a green techno-economic paradigm?

- A full-world economy: A high environmental performance as an international business standard and foundation for competitiveness

- From a “wasteful” to a “ressource-efficient” technological trajectory
A green learning curve

- High knowledge needs for linking up individual action (in production and consumption) to environmental impact

- Uneven greening among sectors & regional innovation systems?
  - high transaction costs and friction to eco-innovation (lock-in to none-green practices and strategies)

- Green industrial dynamics: Distribution of green strategies, competencies and search rules
ICT - 3 main opportunities for eco-innovation

1. Well-functioning green markets have very high information and knowledge demands
   - ICT is essential for creating clever markets that may meet these demands – we need novel solutions

2. Organisational development – EMS and ICT tools for clever production and proactive strategizing

3. Clever buildings and cities for sustainable consumption – ICT has a key role in creating systems/technologies which systematically and continuously may
   a) regulate our consumption
   b) inform us about our consumption
   c) make eco-consumption fun, fancy and comfortable

We need systems which provide direct and immediate feedback on our consumption/activities and its environmental impacts so as to allow us to use resources efficiently, i.e. at the right time, the right space and the right amount.
ICT – challenges for eco-innovation

- Setting the ICT sector on a green path
  - Strengthen environmental competencies and green search rules

- Enabling effects – look for novel application opportunities for smart systems – also in none-high tech sectors

- ICT and the division of eco-innovative labour - How to achieve efficient learning and coordination on eco-innovations across different economic sectors and other actors in the innovation system

- Globalisation- Identify and address the particular conditions for eco-innovation in different types of (national) innovation systems
A taxonomy of eco-innovations

Five categories of eco-innovations:

1. **Add-on eco-innovations** – remedying the environmental problems of the customer ex-post

2. **Integrated eco-innovations** – cleaner similar solutions

3. **Alternative product eco-innovations** – cleaner dissimilar solutions

4. **Macro-organizational eco-innovations** - new solutions for an eco-efficient way of organizing our production and consumption at the more systemic level

5. **General purpose eco-innovations** - (ICT, biotechnology and nanotechnology) - enabling (derived rather than direct) and pervasive effects on (eco-)innovations

RQ: how ICT has changed in contribution and role in the eco-innovation process over time and space
Conclusions – ICT steps towards eco-innovation

• ICT may form a very important part of the eco-innovation agenda of tomorrow if the opportunities are seized including:
  – ICT innovations contribute to direct environmental improvements but more importantly in aiding the development of clever, self-sustaining resource efficient technology systems.
  – The long run focus: Contributing to wiring up national innovation systems for eco-innovation by making more well-functioning green markets and organisations.

• We need to know more about the industrial dynamics of the greening of the ICT industry – what role do different types of companies and sectors play for the greening of markets?
Thank you