

International Development Project

Risk Management of Technological Change

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Technological Advance Benefits & Risks



- **Hidden costs of technology:**
 - **Mad cow diseases: cost cutting techniques**
 - **Nuclear power: e.g. Three Mile Island, Chernobyl**
 - **Thalidomide medicine: birth defect**
 - **CFCs (Chlorofluorocarbons)**
 - **Ethical issues: possibility of human cloning**
 - **Information and communication technologies (ICT): international crime & drug trade networks, child pornography etc.**

Why Adopt New Technologies?



- **Possibilities for promoting human development**
- **New technologies often improves on the ones they replace: more convenient, more livable, etc.**
- **Many potential risks can be managed**
- **Technological change becomes a positive force for development**

*****however*****

- **Trade-offs of technological change vary from country to country**

Technologies & Developing Countries



■ **Disadvantages:**

- **Lack in regulatory institutions needed to manage the risks**

■ **Advantages:**

- **Followers do not incur the first-mover risks**
- **Can observe how those risks play out in other countries**
- **Can learn from others in designing regulations and institutions**
- **May be able to establish low-cost regulatory systems**

Risks of Technological Changes



1. Human behavior and social organization

- **Biotechnology for weapons**
- **ICT for money laundering and illegal trades**

2. Technology

- **Gene flow from genetically modified organisms to non-target organisms**
- **Mobile phone and brain cancer**

Technological Changes & Potential Harms



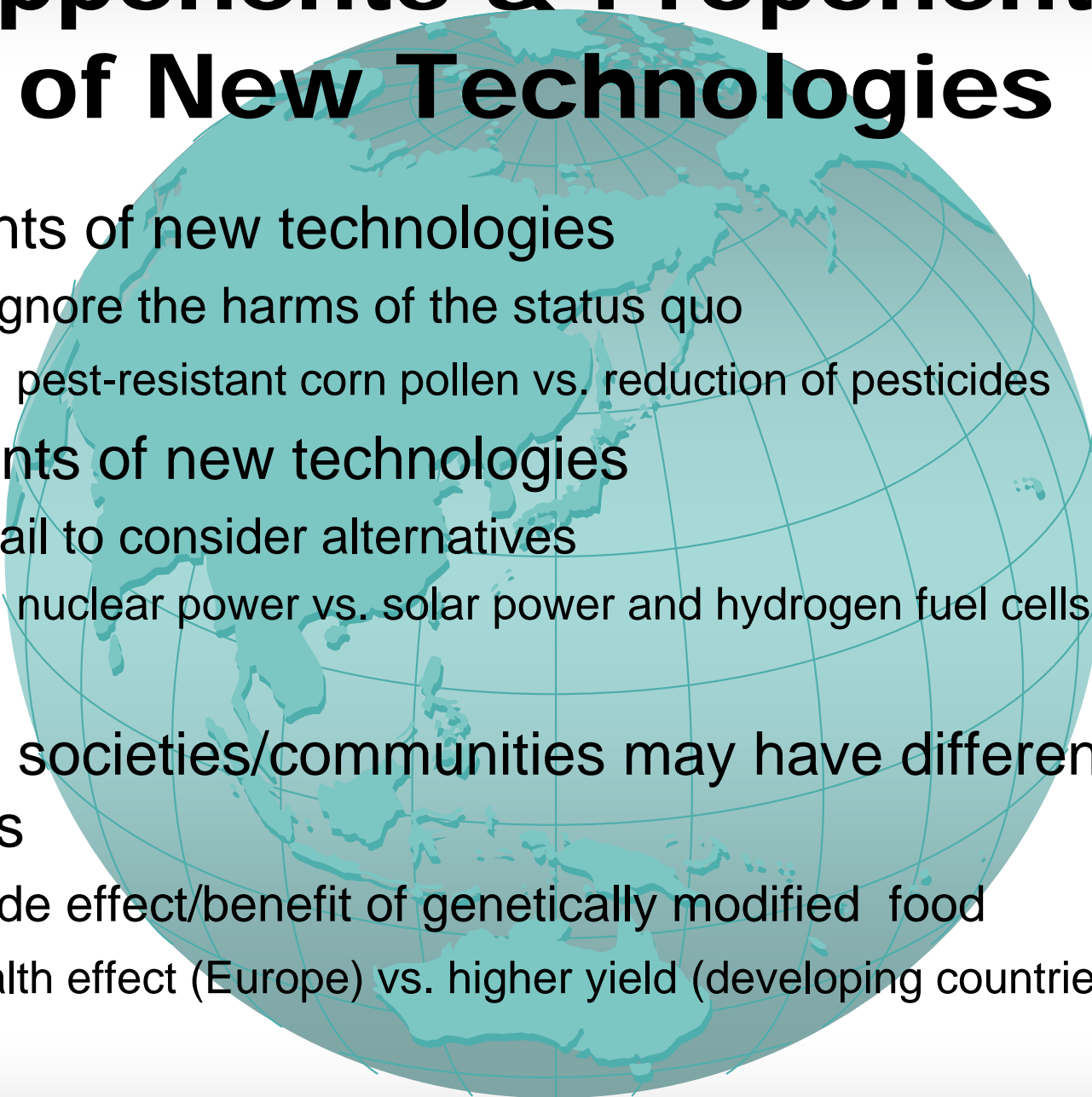
1. Possible harms to human health

- Environmental harms: polluted air and water, power plants producing sulphur dioxide,
- Medical substances: thalidomide
- Biotechnology applications in health care: side effect of vaccines and diagnostics

2. Possible harms to the environment

- Genetically modified organisms: destabilization of ecosystem and reduction of biodiversity

Opponents & Proponents of New Technologies



1. Opponents of new technologies

- Often ignore the harms of the status quo
 - E.g. pest-resistant corn pollen vs. reduction of pesticides

2. Proponents of new technologies

- Often fail to consider alternatives
 - E.g. nuclear power vs. solar power and hydrogen fuel cells

■ Different societies/communities may have different decisions

- E.g. Side effect/benefit of genetically modified food
 - Health effect (Europe) vs. higher yield (developing countries)

Driving the Debate



- **Public trust in regulators**
 - Failure in Europe: BSE in UK, HIV in France
- **Claims from competing interests**
 - Strong influence by interest groups
 - Media hype
 - Lobbying

Global Debate?



“Views that dominate the global debate can lead to decisions not in the best interest of local communities”

- ◆ Debates on technologies tend to mirror the concerns of rich countries
 - ◆ E.g. malaria and DDT: UNEP banned use of DDT in 2001 (donor agencies do not fund its use)
 - ◆ Possible harms to health vs. effective tool against disease
- ◆ Developing countries can come under pressure from donor agencies and multinational companies
 - ◆ May fall in line behind European countries and US

Precautionary Principles



A much-discussed decision-making tool

1. Consideration of benefit and risks in current technology
 - Soft formulations: weight potential benefit & risks
 - Strong formulations: examine only direct risks
2. Cost-effectiveness of prevention
 - Soft formulations: need to balance the costs (e.g. preventing potential environmental harms)
 - Strong formulations: do not weight costs of prevention
3. Certainty of harm or certainty of safety
 - Soft formulations: absence of certainty of harm does not prevent regulatory action
 - Strong formulations: require certainty of safety to avoid regulatory action

Precautionary Principles



4. Burden of proof

- Soft formulations: on those who claims that harm will occur
- Strong formulations: on producers to prove

5. Optional or obligatory action

- Soft formulations: permit regulators to take action
- Strong formulations: require action

6. Locus of decision-making

- Soft formulations: place authority in regulators
- Strong formulations: place power in political leaders

Building Capacity to Manage Risks



1. Using scientific information: turning uncertainty into risk
 2. Ensuring public participation through risk communication
 3. Creating flexible institutions and diverse technologies
- E.g. Miracle Seeds
 - Health risks: allergies, toxicity, pleiotropic effects, antibiotic resistance,
 - Environmental risks: unintended effect on non-target species, effects of gene flow to close relatives, increased weediness, development of pest resistance to pest-protected plants, concerns about virus-resistant crops, threats to biodiversity

Challenges Facing Developing Countries



1. Shortage of skilled personnel

- Professional researchers, trained technicians are essential for adapting technologies for local use

2. Inadequate resources

- Cost of maintaining a regulatory framework
- Risky dependence on donor

3. Weak communication strategies

- Often no official communications strategy for informing the public in developing countries

4. Inadequate feedback mechanism

- Providing information and gathering feedback are typically weaker in developing countries

Example in ICT



- **Broadband power line communications (BPL/PLC)**
 - **Strong alternative to DSL**
 - **Strong interference to short wave radio**
 - Not extensively used in developed countries
 - Fully utilized in developing countries
 - **Deployment of BPL in developing countries**
 - Dependence on developing countries
 - Lack of human resources for regulatory issues

Advantage of developing countries



1. Learn from technology leaders

- Take advantage of followers
- Can establish low-cost regulatory systems
- Avoid redundant testing

2. Harmonize standards through regional collaboration

- Develop health and environmental standards
- Share knowledge, best practices, research findings, biosafety expertise and regulatory approval etc in region

Example in ICT



- **Spread of cell phone**
 - **Skip of fixed line phone**
 - **Infrastructure: line to point**

Advantage of developing countries



3. Develop national scientific and extension capacities

- adaptive research is more relevant in poor countries: how to borrow and adapt technologies

4. Strengthen regulatory institutions

- Requires human and institutional capacity at the national level

5. Mobilize local voices

- Programs aimed at involving the public in assessing technology
- Farmers and consumers from developing countries, experts from universities, farmers unions, NGOs, national government etc.

Global collaboration for managing risks



- ◆ **Conduct longer-term research**
- ◆ **Restore public trust in science**
- ◆ **Expand donor assistance for building capacity**

