



# The Development of Innovative Industries and the Role of Public Research Institutions: The Case of Renewable Energy

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## Motivation

- **Universities: “engines of innovation”**
  - play a key role in the development of successful local innovation systems (discover, attract, adapt knowledge)
- **UAE needs to diversify its industrial base into knowledge based assets and to rely more on alternative sources of energy**
- **Sustainable economic development is increasingly linked to innovation in products, processes, services**
- **The role of research universities in technological development is not well understood (Lester and Piore 2004)**

## Research Plan

### Phase I: Industry focus

- Examine the development of solar PV industry in California, Massachusetts and Germany

### Phase II: Regional focus

- Examine the role of MIT in the development of solar PV, energy services, and robotics in Massachusetts

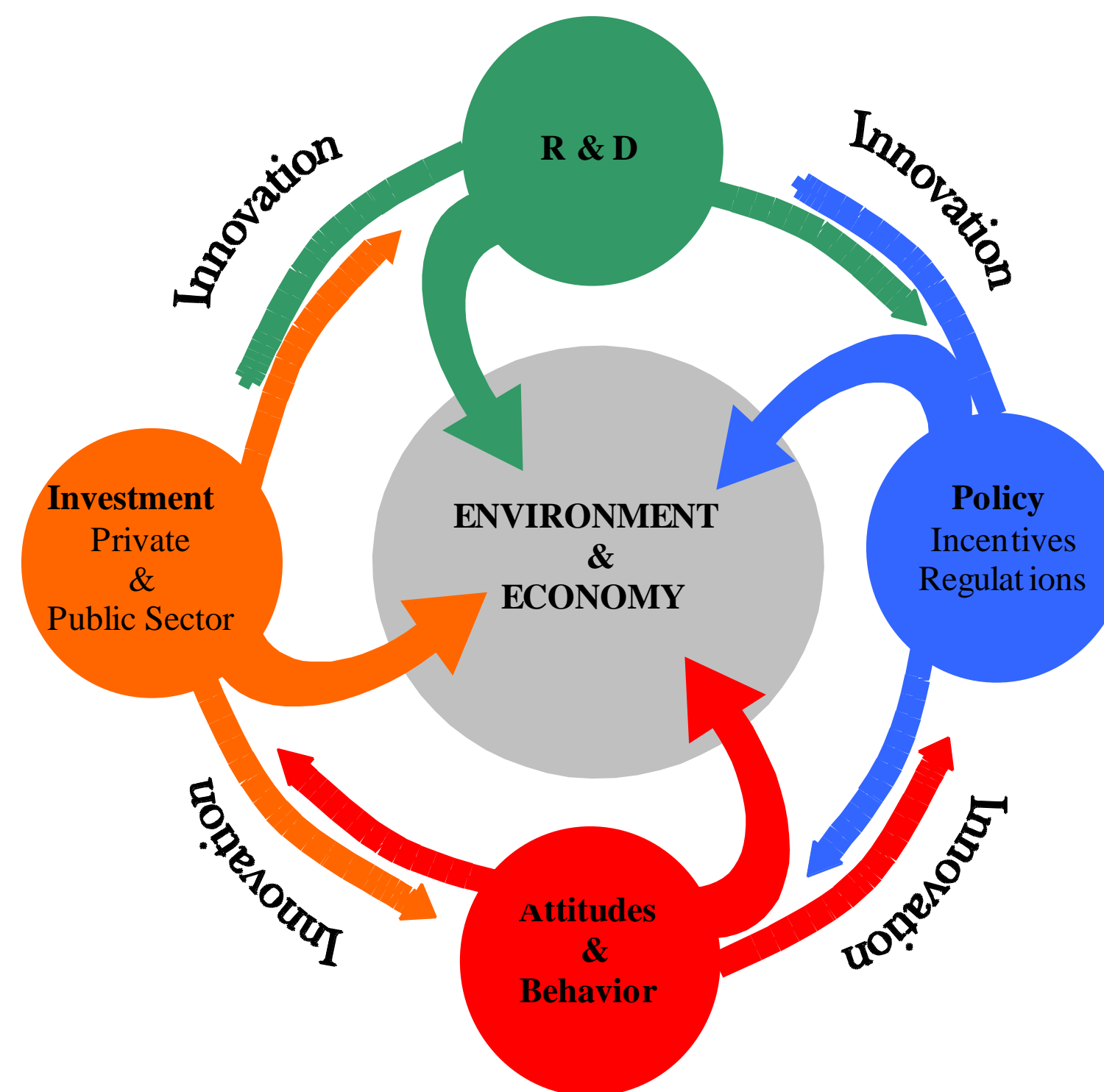
### Phase III: Abu Dhabi focus

- Evaluate the challenges and opportunities in the transition from fossil fuels to renewable energy technologies, drawing on cases in UK & Norway.
- Based on Phase I & II, develop an innovation strategy for Abu Dhabi and define the way in which MIST will engage in the innovation ecosystem.

## Research Questions

- What is the relative importance, for innovation and economic development, of public research institutions in knowledge creation, problem-solving, education and training, and the provision of public space?
- How should the links between universities and industry evolve so as to serve the goals of both kinds of institutions?
- What types of indicators (metrics) are most useful for evaluating the effectiveness of public spaces for interpretive processes in local innovation systems?

## Innovation Ecosystem



## Methods

- **Longitudinal, comparative case studies to trace scientific, technological and commercial development of:**
  - same industry in different locations
  - different industries in the same location
- **Data sources:**
  - Interviews with business practitioners, university researchers and administrators, economic development officials and policymakers
  - Quantitative statistics: R&D expenditures, patents, technology licenses and royalties, publications, employment, wages, etc.
- **Semi-structured interviews, observations, statistical analysis, literature reviews**

## Progress

- **Solar PV sector in the US; Institutional framework for R&D and market deployment; Solar cluster in Massachusetts; Beginning fieldwork in California**

## Outcomes

- **Create an economic development strategy framework for universities and public research institutions**
- **Develop new concepts, theory and vocabulary to explain innovation**
- **Develop new ways to measure the interpretive dimension of innovation**
- **Analyze technological and institutional development trajectories of different locals**
- **Explore ways to accelerate the transition from reliance on carbon-based fuels**
- **Examine local innovation capabilities allowing MASDAR to make strategic and informed decisions for policy choices**

## Knowledge Exchange Mechanisms Between Universities and Industry

### Educating People

- Training skilled undergraduates, graduates & postdocs

### Increasing the Stock of ‘Codified’ Useful Knowledge

- Publications
- Patents
- Prototypes

### Providing Public Space

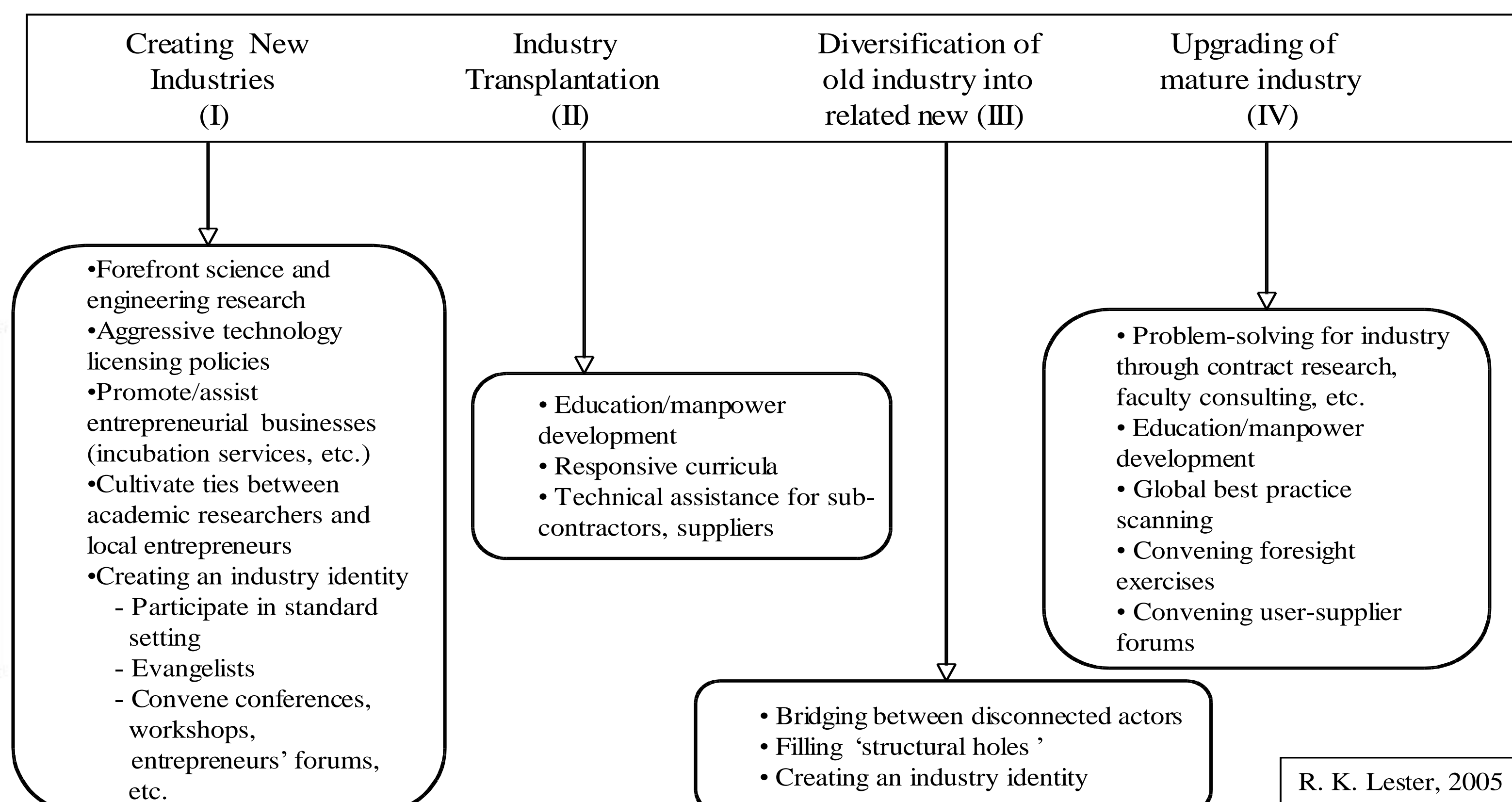
- Forming/accessing networks and stimulating social interaction
- Influencing the direction of research processes among users and suppliers of technology and fundamental researchers
- Meetings and conferences
- Hosting standard setting forums
- Entrepreneurship centers
- Alumni networks
- Personnel exchanges (internships, faculty exchanges, etc.)
- Visiting committees
- Curriculum development committees

### Problem Solving

- Contract research
- Cooperative research with industry
- Technology licensing
- Faculty consulting
- Providing access to specialized instrumentation and equipment
- Incubation services

Source: Cosh et al. (2006)

## University Roles in Regional Innovation-Led Growth Pathways



R. K. Lester, 2005