

# **Industrial policy from a systems of innovation perspective**

Charles Edquist

**CIRCLE**

Centre for Innovation, Research and  
Competence in the Learning Economy

# Why industrial policy should be = innovation policy

- **Policy** = action by public organisations
- Public resources are limited
- Public action should **not duplicate** private action – but supplement it (will return to this later)
- Private actors are weak where **uncertainty** is large
- **Innovation** is plagued by uncertainty
- Uncertainty is largest for innovation in **new** fields
- Hence innovation policy should focus mainly on **new** fields: it should serve as a **midwife** – not provide support towards the end of life

# Systems of innovation (SI)

- The SI approach is about **determinants** of innovation processes – **not** about their consequences
- Innovation processes develop over time and involve the influence of many factors and feedback processes, and they can be characterized as **evolutionary**. Therefore, **an optimal or ideal SI cannot be specified**
- The notion of **optimality** is **irrelevant** in a SI context

# Components in SI's

- **Organisations** and **institutions** are the main components of SI's
- **Organisations** = are formal structures that are consciously created and have an explicit purpose = **players**
- **Institutions** = habits, norms, routines, rules or laws = the **rules** of the game

# 10 important activities in SI's (1)

Provision of **knowledge inputs** to the innovation process:

1. Provision of **Research and Development** (R&D), creating new knowledge, primarily in engineering, medicine and the natural sciences.
2. **Competence** building (provision of education and training, creation of human capital, production and reproduction of skills) in the labor force to be used in innovation and R&D activities.

# 10 important activities in SI's (2)

## Demand-side factors:

**3. Formation of new product markets.**

**4. Articulation of quality requirements**  
emanating from the demand side with  
regard to new products.

# 10 important activities in SI's (3)

## Provision of constituents for SI's:

5. **Creating and changing organizations** e.g. enhancing entrepreneurship and intrapreneurship, research organizations, policy agencies, etc.
6. **Networking** through markets and other mechanisms, including interactive learning between different organizations
7. **Creating and changing institutions** - e.g. IPR laws, tax laws, environment and safety regulations, R&D investment routines, etc

# 10 important activities in SI's (4)

## Support services for innovating firms:

8. **Incubating activities**, e.g. providing access to facilities, administrative support, etc.
9. **Financing** of innovation processes and other activities that can facilitate commercialization of knowledge and its adoption.
10. Provision of **consultancy services** of relevance for innovation processes, e.g. technology transfer, commercial information, and legal advice.

# Activities vs. Components

- The ten activities are actually hypothetical **determinants** of innovation processes.
- The increased emphasis on ‘activities’ does not mean that we can disregard or neglect the ‘**components**’ of SIs.
- We need to focus on both **activities** and **components** understand innovation processes – and to design innovation **policy**.

# Reasons for policy intervention

**Two conditions** must be fulfilled for public intervention to be motivated in a market economy:

- (1) Private actors and markets must fail to achieve the objectives formulated; i.e. a '**problem**' must exist.
- (2) Public actors must have the **ability** to solve or mitigate the problem.

# Problem identification

- A **problem** occurs when private actors and markets do not automatically realize objectives
- Problems can only be identified through **comparative** analyses between **existing** systems of innovation (over time and space)
- Comparisons cannot be made between existing systems and optimal systems
- This is **contrary** to most policy analysis

# Comparative analyses

- The comparisons must be genuinely **empirical** and very **detailed**. If so, they can identify "problems" that should be subject to policy intervention.
- When the "problems" have been identified, we also need to know the main **causes** or determinants behind the "problems"
- This is the same as pursuing the analysis in terms of the ten **activities**

# Policy = division of labour

- Policy analysis can be seen as analyses of the division of labour between private and public actors with regard to the ten activities – one by one
- We can analyze the existing division of labour as well as how it should be changed to mitigate a certain "problem"
- We are currently pursuing such analyses of ten national SI's in Europe and Asia

# Uncertainty and timing

- Markets and firms perform least efficiently with regard to new activities, where uncertainty and risk are large.
- Large-scale and radical technological shifts rarely take place without public intervention.
- A minor intervention at an early stage in the innovation process may have a very large impact. A major effort at a mature stage may have only a small impact.

# Conclusion

- The policy discussion at each point in time should focus upon **changes** in the division of labour between the public and the private spheres or upon **changes** in those activities **already** carried out by public agencies
- This includes **adding** new public policy activities as well as terminating others. **Terminating** activities is not least important

# References:

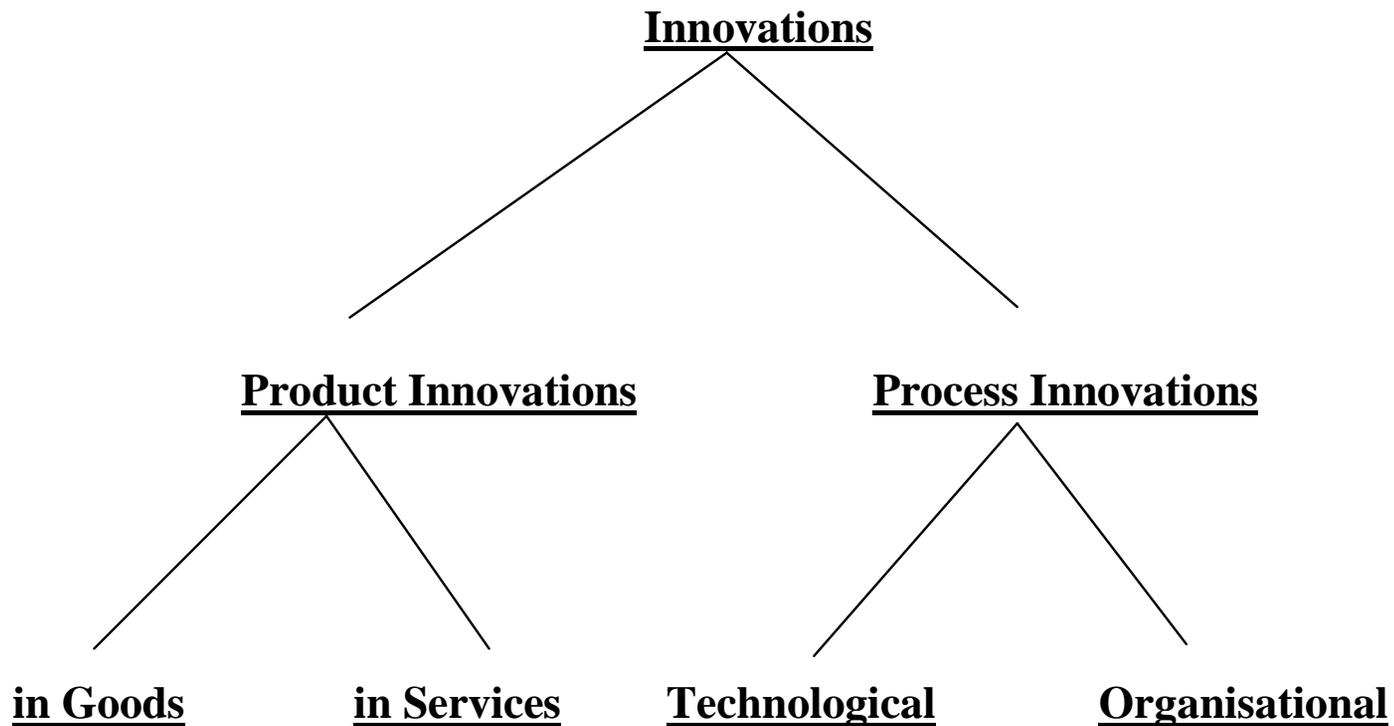
- Edquist, Charles. '**Systems of Innovation – Perspectives and Challenges**', in Fagerberg, Jan, Mowery, David, and Nelson, Richard (ed.) *Oxford Handbook of Innovation*, Oxford University Press, Oxford, November 2004, 27 pp.
- Edquist, Charles and Chaminade, Cristina '**From Theory to Practice: the Use of the Systems of Innovation Approach in Innovation Policy**', in Hage, J., and Meeus, M. (eds.) *Innovation, Learning and Institutions*, Oxford University Press, forthcoming, 2006, 32 pp.



# Objectives

- The objectives of innovation policy are politically determined.
- They can be economic, military, environmental or social
- If economic, they concern economic growth, productivity growth, employment and competitiveness

# A Taxonomy of Innovations



# A Taxonomy of Innovations

- **Innovations** are here defined as new creations of economic significance, primarily carried out by firms.
- They include **product** innovations as well as **process** innovations.
- **Product** innovations are new – or better – products (or product varieties) being produced and sold; it is a question of *what* is produced. They include new material **goods** as well as new intangible **services**.
- **Process** innovations are new ways of producing goods and services; it is a matter of *how* existing products are produced. They may be **technological** or **organizational**.

William J. Baumol: “The Free-market Innovation Machine – Analyzing the Growth Miracle of Capitalism”, Princeton University Press, 2002:

“It can be argued that virtually all the economic growth that has occurred since the eighteenth century is ultimately attributable to innovation” (p. 13)

He also mentions, though, investment in human capital and investment in plant and equipment, and then adds:

“For the bulk of the population of earlier periods of history, bare survival was the critical problem, and it left only minimal resources for investment in education and productive capacity. Only the productive surpluses that innovation began to make possible.....made feasible the enormous increases in investment in inanimate and in human capital that are widely judged to have contributed greatly to economic growth. (p. 13)

“...in key parts of the economy the prime weapon of competition is not price but innovation.” (p. ix)