

The Swedish National Innovation System

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Innovation System Approach

- Diffused rapidly, academically, in policy contexts and among firm strategists
("Innovation system" had 795 000 hits at Google by Nov 2008 + 541 000 for "System of innovation")
- Innovation systems may be national, sectoral and regional

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. Instead **comparisons** between existing systems are crucial

Components and Activities in Systems of Innovation (SI's):

- In the traditional systems of innovation approach the focus was strongly on the COMPONENTS in systems of innovation, i.e. organisations (the players) and institutions (the rules of the game).
- More recently some of us have focused more on what HAPPENS in the systems, i.e. on the **ACTIVITIES** in the systems. It gives a more dynamic view and is useful for policy purposes.

Activities

- The overall purpose of SI's is to develop and diffuse innovations, i.e. new products and new production processes.
- The factors that **influence** the development and diffusion of innovations are here called the **activities** in SI's.

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)

The role of demand:

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** to understand innovation processes – and to design innovation **policy**.

Are some of the 10 activities more important?

- It is **not** possible to single out one or two activities that have been most crucial for all countries
- They **all** have to be present (although the support services may be less basic)
- Their relative importance depends on the **place** and **time** = context-dependent
- There are **multiple** paths to innovation and growth, but not an infinite number of paths = the **combination** of activities is crucial

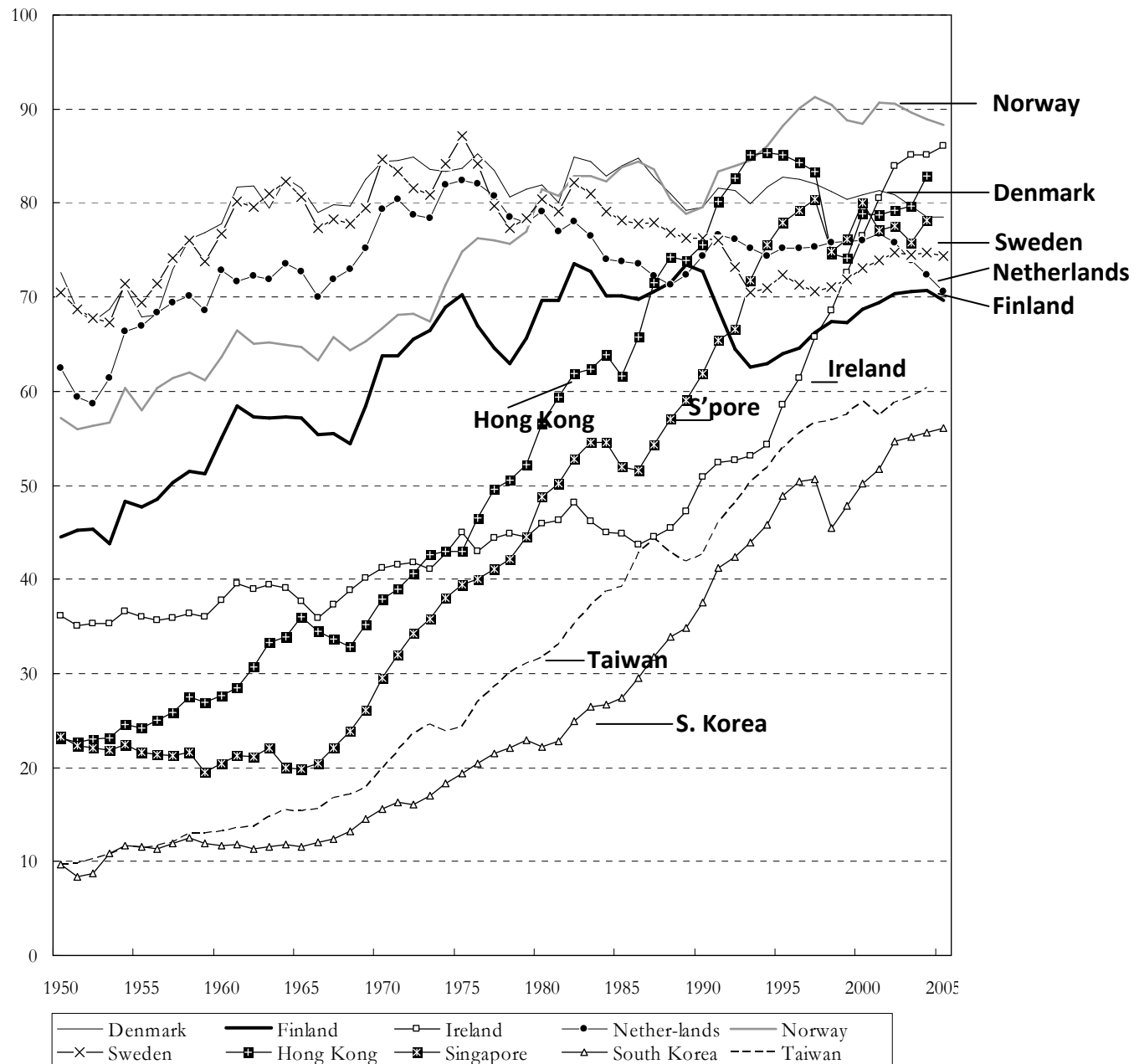
Comparisons!

- Measurements of innovation intensities must be comparative – that is the only way to say if the intensity is high or low in a certain system.
- Such comparisons can be made between the same system over time or between different existing systems.
- The comparisons can not be made between existing systems and an 'optimal' system.

Small Country Innovation Systems Book

- Denmark, Finland, Hong Kong, Ireland, Korea, the Netherlands, Norway, Singapore, Sweden and Taiwan
- To **refine and operationalize** the SI approach
= increase usability
- To actually **use** the approach in empirical and comparative studies
- To **draw policy conclusions**

Figure 1: GDP per capita 1990 GK \$, USA = 100. 10 European and Asian Countries.



Possible innovation output indicators:

- 1. Introduction of a product or process innovation**
- 2. Intro of new processes**
- 3. Intro of new to the firm products**
- 4. Intro of new to the market products**
- 5. Turnover due to new to firm products**
- 6. Turnover due to new to the market products**

The Swedish Paradox: High inputs and low output = low productivity

- Input: **High investments** in R&D and innovation efforts (mainly by private organisations) = R&D intensity has been more than 4 % of GDP for many years = much higher than comparable countries
- Output: Out of six indicators of innovation output, **Sweden performed badly on five**

Innovation output indicators for Sweden:

(Compared to Denmark, Finland, Ireland, Netherlands and Norway)

- 1. Introduction of a product or process innovation: Rank 4 of 6**
- 2. Introduction of new processes: Rank 4/5 of 6/5**
- 3. Introduction of new to the firm products: Rank 4 of 6**
- 4. Introduction of new to the market products: Rank 4 of 5**
- 5. Turnover due to new to firm products: Rank 1 of 5**
- 6. Turnover due to new to the market products: Rank 3 of 4**

Additional conclusions on Sweden:

- **Small firms** performed much **better** than large ones (smaller inputs – larger outputs)
- Swedish firms are **better at imitation than at creation**
- Performance was better in **services** (finance, trade) than in manufacturing
- The domination of **large manufacturing firms** is a problem

Why not efficient = explanations to the Swedish paradox:

- Sectoral allocation of R&D (and other policy support) is problematic
- There are structural obstacles to knowledge transfer from R&D to production
- Globalisation means that the innovation results of Swedish R&D is increasingly exploited abroad

What to do = Policy (1)

- Growth is associated with reallocating resources into growth sectors – which are also often innovation intensive sectors. Allocate more R&D resources to such sectors! This should be combined with demand-side policy instruments.
- Public policy is almost always selective. Make the right choices: **Pick the winners and avoid supporting the losers.** This is what firms must do – and so should public agencies!
- Develop **sectoral** policies - in a knowledge intensive direction!(Initiated in 2004, in spite of historical failures.)

What to do = Policy (2)

- Enhance knowledge transfer from R&D to production: Develop the **Third Task** plus make large **firms diversify** (+ enhance spin-off).
- Provide more support to **small firms** in new sectors and less to large ones.
- To profit from globalisation: Develop a **policy of attractiveness** as part of innovation policy, i.e. induce foreign firms to locate high productivity activities (e.g. R&D) in Sweden.

A focus on only R&D (Barcelona target) will not deliver the results in terms of socioeconomic development:

- **It represents a linear view (not taking feedback processes and demand into account)**
- **It is an input measure, i.e. it does not address the results of the research or its efficiency**
- **It is one-dimensional, i.e. it does not take other factors influencing R&D, growth and job creation into account**
- **If the intentions are to make research contribute to the creation of sustainable growth and jobs – then not only R&D can be focused: All the ten factors that influence innovation processes should be accounted for.**

Objectives of Innovation Policy

- 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

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.

Causal analysis:

- However, an identification of a problem only indicates **where** and **when** policy intervention is called for – it says nothing about **how** it should be pursued.
- To design an appropriate innovation policy, it is also necessary to know the **main causes** behind the problem.

Is more innovation always better?

No, but we cannot know the optimum = a dilemma!

The **direction** of innovation processes is as important as the **number** of innovations.

Again, taxonomies of Innovations are important.

There has to be some balance between categories of innovations. This includes balance between innovations with different objectives.

How?

Three strong empirical findings:

- Growth **is** associated with reallocating resources into growth sectors - which are often also innovation intensive sectors
- State policy has been crucial in all five growth countries
- Policies for changing the production structure have been crucial

Policy **instruments** that have changed production structure in a growth direction include:

- Allocation of public R&D resources to new sectors of production
- Credit rationing and subsidies
- Education policies esp. in engineering
- Targeting production for export
- Rewarding high export performers
- Etc, etc

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 Hommen, Leif (eds.) '**Small Country Innovation Systems: Globalization, Change and Policy in Asia and Europe**', Edward Elgar Publishing, 2008, 544 pp.
- Edquist, Charles '**Design of Innovation Policy through Diagnostic Analysis: Identification of Systemic Problems (or Failures)**', CIRCLE Discussion Paper, December 2008.

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