Science and Technology Policy in Finland

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Content

- Basic concepts: science policy, technology policy, innovation policy
- Post-WWII science, technology and innovation policy (STI) in general
- Finnish science, technology and innovation policy since the 1950s
- Finland: from a welfare state to a competition state
- Conclusion

Science Policy, Technology Policy

- **Science policy**
  - Policies that affect the conduct of scientific research, including sciences, social sciences and humanities
  - Main instruments: funding of universities and research organizations as well as research projects and posts, researcher training, centre of excellence policy…
- **Technology policy**
  - Policies that affect the development and use of new technologies, e.g. instruments and knowledge of their production and use
  - Developments of science and technology are closely integrated (e.g., biotech, ICT)
  - Main instruments: lower R&D costs through grants for public and private organizations and programs, R&D subsidies

Innovation Policy 1/2

- Technical innovation = not only invention of new products and processes but also their successful (commercial) use
- Social innovation = new ideas and ways of doing things that meet social needs of all kinds
- Combines elements of science, technology and industrial policy that aim at promoting the development and use of new products, services and processes in markets or inside organizations
- ”A set of policy actions to raise quantity and efficiency of innovative activities, whereby ’innovative activities’ refer to the creation, adaptation and adoption of new or improved products, processes or services.” (Cowan & van de Paal 2000 Innovation Policy in a Knowledge-Based Economy)

Innovation Policy 2/2

- Some policy instruments
  - supply side of innovation: support of research and development activities in public and private organizations (education, funding, grants, loans, subsidies, loan guarantees…)
  - demand side of innovation: a) establishment of information and communication networks between heterogeneous actors, providing consulting services, b) regulation (e.g. tax allowances, competition legislation) and standardization, c) innovative public purchases

Phases of Science, Technology and Innovation Policy 1/2

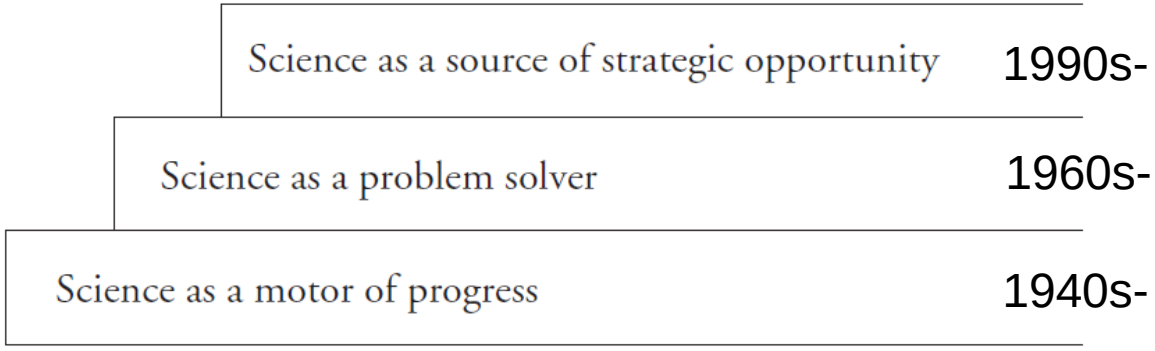
1) science as the motor of progress (1945–1960s)
   - the linear model of “science push”
   - mainly national science projects
   - scientists govern the science, government supports
   - emphasis on basic research, little demand for exploitation of research results
2) science as a problem-solver (1960s–1980s)
   - main concern is the demand from society: research problems come from different sectors of society
   - priority for government is applied research: money allocated for these objectives

Ruivo (1994) ‘Phases’ or ‘Paradigms’ of Science Policy? Science and Public Policy 21, 3, 157-64.

Phases of Science, Technology and Innovation Policy 2/2

3) science as a source of strategic opportunities (1980s-)
  - a complex policy model with a diversity of actors and processes
  - simultaneous internationalization and regionalization of policy
- research becomes strategic and is more interdisciplinary and collaborative in nature

Phases of policy as a series of layers:



Edqvist (2003) Layered Science and Science Policies. Minerva 41, 207-21.

Finnish Science, Technology and Innovation Policy – Overview

- Until the 1950s: no coherent policy, universities were seen as contributors to the nation building and national culture in general (national sciences, useful sciences)
- From the late 1950s until the 1970s: beginning of the science and higher education (HE) policies, building of basic structures of the research system
- The 1980s: from science policy to science and technology (S&T) policy, strong orientation towards technology
- The 1990s and 2000s: integration of S&T policies with other policy areas, emphasis on innovation

Science and HE Policies in the 1950s: First Steps

- Finland – a poor country: small funds for research, no state responsibility for the advancement arts and sciences
- Universities were autonomous, self-steering organizations, professors as highest authorities in their fields
- Research funding councils (1950): 1) natural sciences and 2) humanities
- Regional perspective: discussion on centralization or decentralization of the university system – a long-time concern
- New organizations: 1) College of Veterinary Medicine (1945), 2) Turku Business School (1950), 3) University of Oulu (1958)

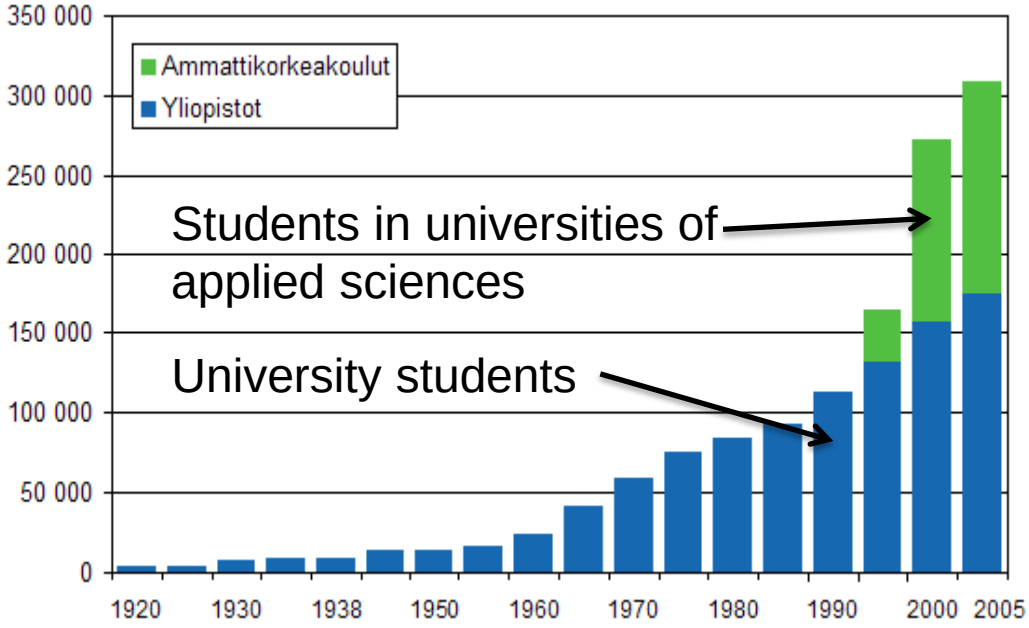
From the late 1950s to 1970s: Building Basic Structures 1/2

- Beginning of the modern science policy (1958)
  1. Academy of Finland (1961): more research funding councils, resources and researchers' posts → basic research benefitted, academic career professionalized
  2. Establishment of the Science Council of Finland (1963): a key consultative body in the S&T policy
  3. The Academy of Finland: from a community of high-level academics to a modern science funding agency (1970)
- Influence of the OECD: economic growth as an important goal of science policy, science funding = precondition for growth

From the late 1950s to 1970s: Building Basic Structures 2/2

- Beginning of the HE policy:
  1. Establishment of the Council of HE (1966)
  2. Expansion of the student number
  3. HE development law (1966): funding reform
  4. More professors: 541 (1966) → 2 278 (2000)
  5. Expanded and decentralized university system, importance of the regional perspective
- Central role of the state, expansion of the Ministry of Education, nationalization of private universities
- HE was regarded as a productive societal investment, balanced social development during a profound social change, building of the welfare state

Finnish University System



Universities established:

- 1640: 1
- 1848-1882: 4
- 1909-25: 5
- 1945-50: 2
- 1958-79: 8

Science Policy in the 1970s

- The Academy of Finland: an administrative body steering and coordinating science policy and allocating research funds
- Large research programs on socially relevant areas (OECD influence, Brooks report 1971):

  1) industrial use of natural resources

  2) public health care

  3) structural problems of society

  4) environmental protection

  5) democracy and equality

1980s: Strong Orientation towards Technology 1/2

- From science policy to science and technology policy
- Knowledge set to the core of the national strategy → competitiveness through high-quality products & upgrading of the nation's technological capability
- Post-graduate training emphasised
- Focus on areas of strategic importance: e.g., biotech, ICT
- New organizations in the field of technology:

  1) The Finnish Funding Agency for Technology and Innovation Tekes (1983)

  2) Science and Technology Policy Council (1987-2009, Research and Innovation Council since 2009)

1980s: Strong Orientation towards Technology 2/2

- Basic division of labour in policy:

  1) Ministry of Education – universities, the Academy of Finland, HE and arts and science

  2) Ministry of Trade and Industry – technology programs of Tekes – the Finnish Funding Agency for Technology and Innovation

- R&D funding & post-graduate education – emphasis on fields that would enhance Finland's economic growth: ICT, biotechnology and material technology

1990s: Integrated Innovation Policy

- Shift in rhetoric: science and technology policy disappears from vocabulary and becomes replaced by innovation policy
- Focus on innovation, i.e., on commercialization of scientific inventions, creation of social innovations
- Acknowledges the importance of knowledge in creating economic value and social wellbeing
- Innovation policy becomes linked to other areas of public policy (economic, environmental, regional)
- Science policy reappears in the political agenda during the mid-1990s: graduate school system, centre of excellence program

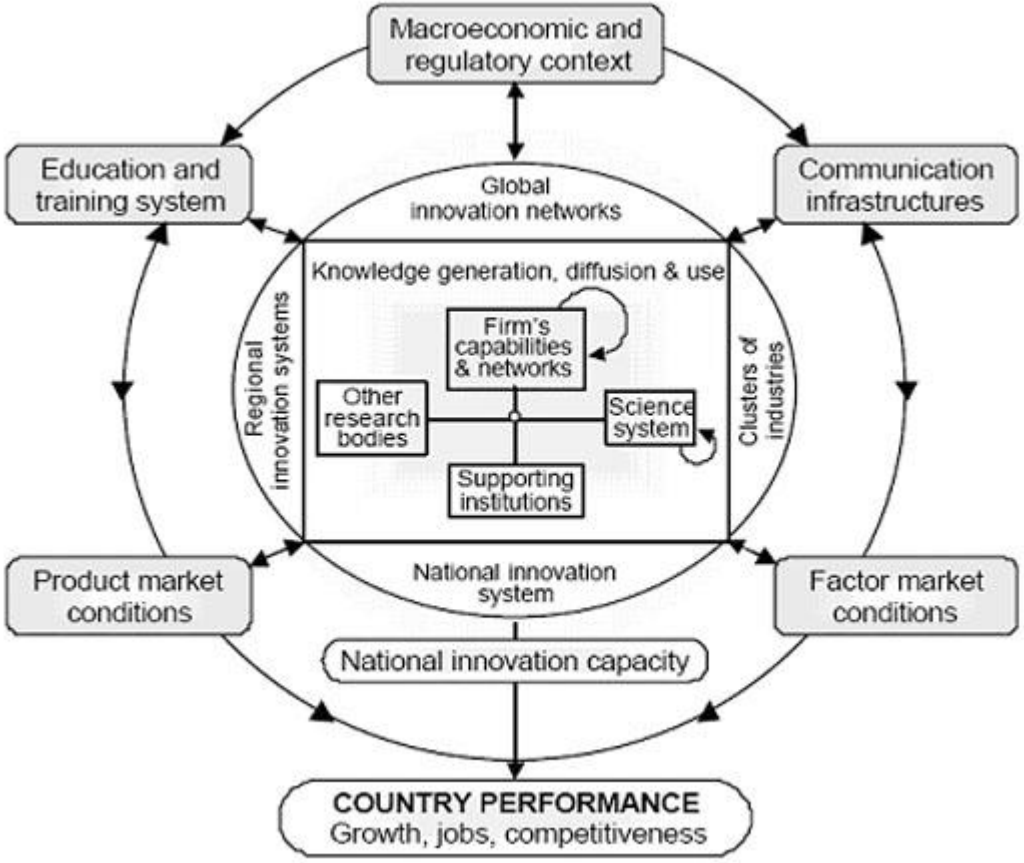
National Innovation System (NIS)

- Since the 1990s, NIS reformulated the S&T policy by providing a concept within the limits of which all the relevant areas (research, education, technology, industrial R&D) could be addressed
- Background in OECD workshops: 1) to explain differences in the economic growth rates between countries, 2) to move from linear to interactive model of innovation
- Science and Technology Policy Council of Finland: NIS = “all the factors that influence the development and utilisation of new knowledge and knowhow”
- From a tentative conception to an established term, visionary strategy and object of public planning

National Innovation System

Definition: “...the elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge ... and are either located within or rooted inside the borders of a nation state”

(Lundvall 1992 National Innovation Systems: Towards a Theory of Innovation and Interactive Learning)



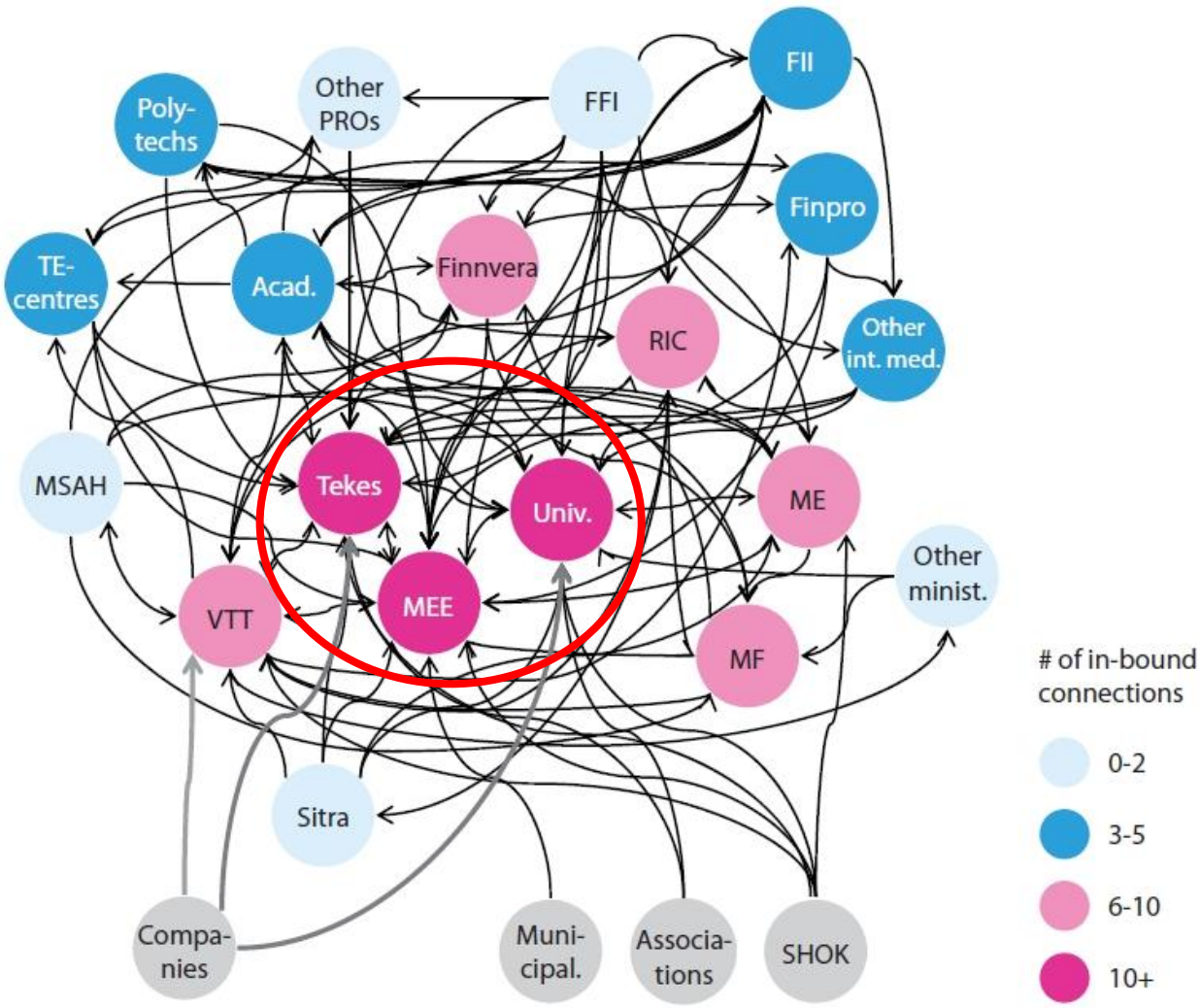
OECD (1999) *Managing National Systems of Innovation*, OECD, Paris.

The complexity of the Finnish NIS

Exhibit 22: The complexity of the Finnish innovation system.
Importance of various public actors as evaluated by other actors within the system.

From the point of view of the other actors in the system, the *universities* and T*ekes, the Finnish Funding Agency for Technology and Innovation*, are the core public institutions of the Finnish innovation system.

Note: A connecting link is established if the relevance is 3.5 or higher (on a scale of 1 to 4). Grey circle actors have only out-bound links. A dark grey line indicates a threshold of 3.0 (only for companies). A light grey line indicates a threshold of 3.0 (only for large innovative companies). Abbreviations: **Acad**, The Academy of Finland, **FFI**, The Foundation for Finnish Inventions, **FII**, Finnish Industry Investment, **ME**, Ministry of Education, **MEE**, Ministry of Employment and the Economy, **MF**, Ministry of Finance, **MSAH**, Ministry of Social Affairs and Health, **Other int. med.**, other intermediatries besides TE-Centres, **Other minst.**, all other ministries bedies ME, MEE, MF, and MSAH, **Other PROs**, Public Research Organisations (sectoral research) besides VTT, and **RIC**, The Research and Innovation Council.
Source: Kotiranta *et al.* (2009).



http://www.tem.fi/files/24928/InnoEvalFi_POLICY_Report_28_Oct_2009.pdf

Use of NIS in Policy-making

- Usefulness of a loose, visionary concept: with the help of the term a whole variety of actors can speak with one another, a conceptual tool for boundary spanning
- A productive tool: secured funding for S&T even during the serious recession of the early 1990s
- Vehicle for national consensus in the era of globalization: NIS as ”an offer one cannot refuse” = necessity

Broad-based innovation policy

- Introduction of broad-based innovation policy in Government's National Innovation Strategy in 2008
- Innovation as "an exploited, competence-based competitive asset" rather than commercialized invention
- Expansion of the concept of innovation from technologies to services, organizations and social life in general
- Introduction of innovation policy in new sectors: social and health care, education, energy, transport, information society and regional development
- The rise of demand-based policy measures (vs. old supply-based measures): public sector as an active developer, applier and user of innovations

The Rise of the Competition State

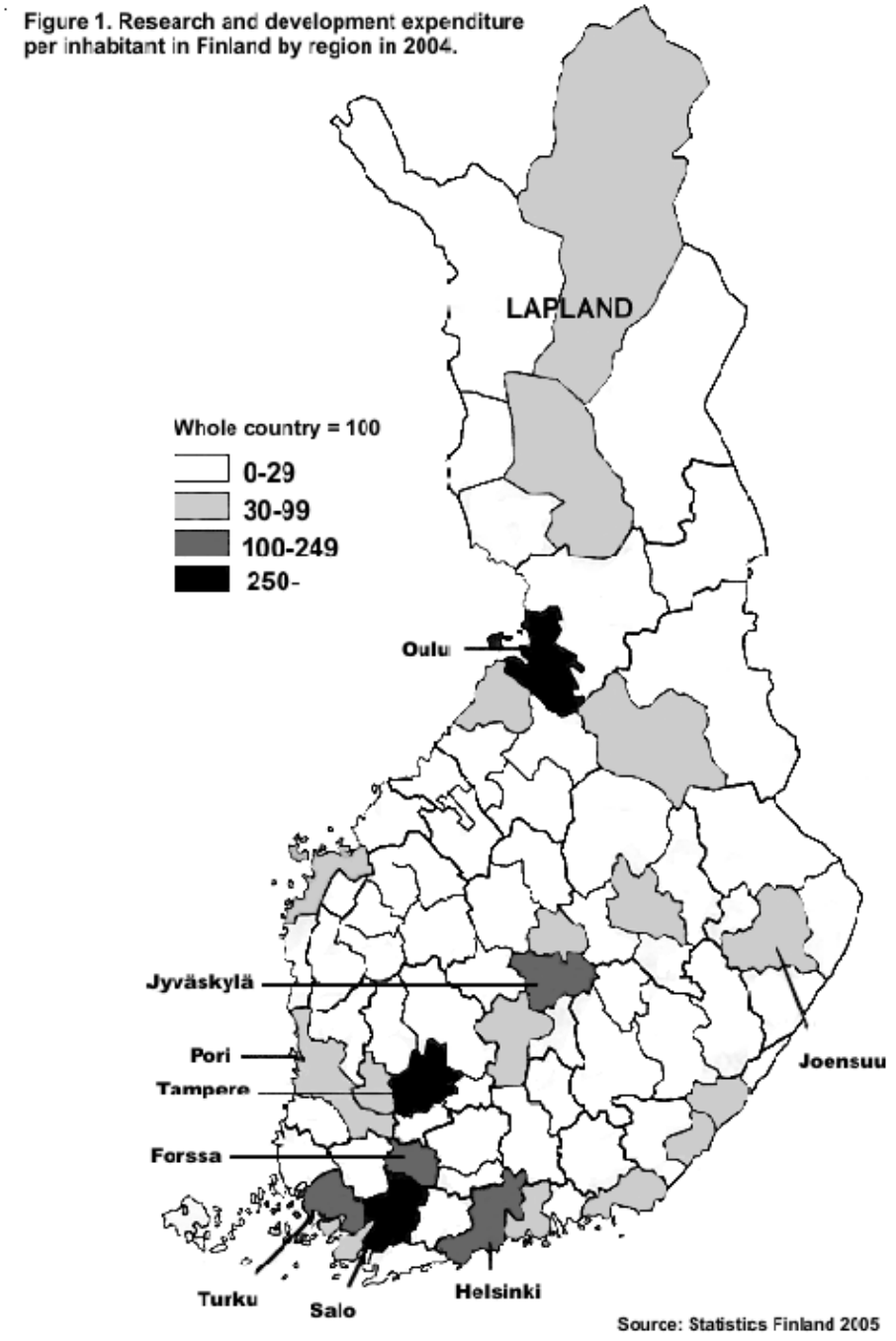
- Shift from a welfare state (Kosonen 1995)…
  - emphasis on equality and redistribution of resources among people, universal social rights of different kinds to everybody
  - focus on full employment and provision of infrastructure to support mass production and consumption
- …to a competition state (Brenner 2004, Jessop 2002)
  - response of the state to the challenges of globalization: a) internationalization of the economy, b) integration of markets, c) growing capital mobility and d) rapid technological change
  - innovation and competitiveness core goals of state policy
  - knowledge-based economy as a key goal: prioritisation of high technology sectors, an attempt to increase the knowledge-intensity of the economy

(Pelkonen 2008)

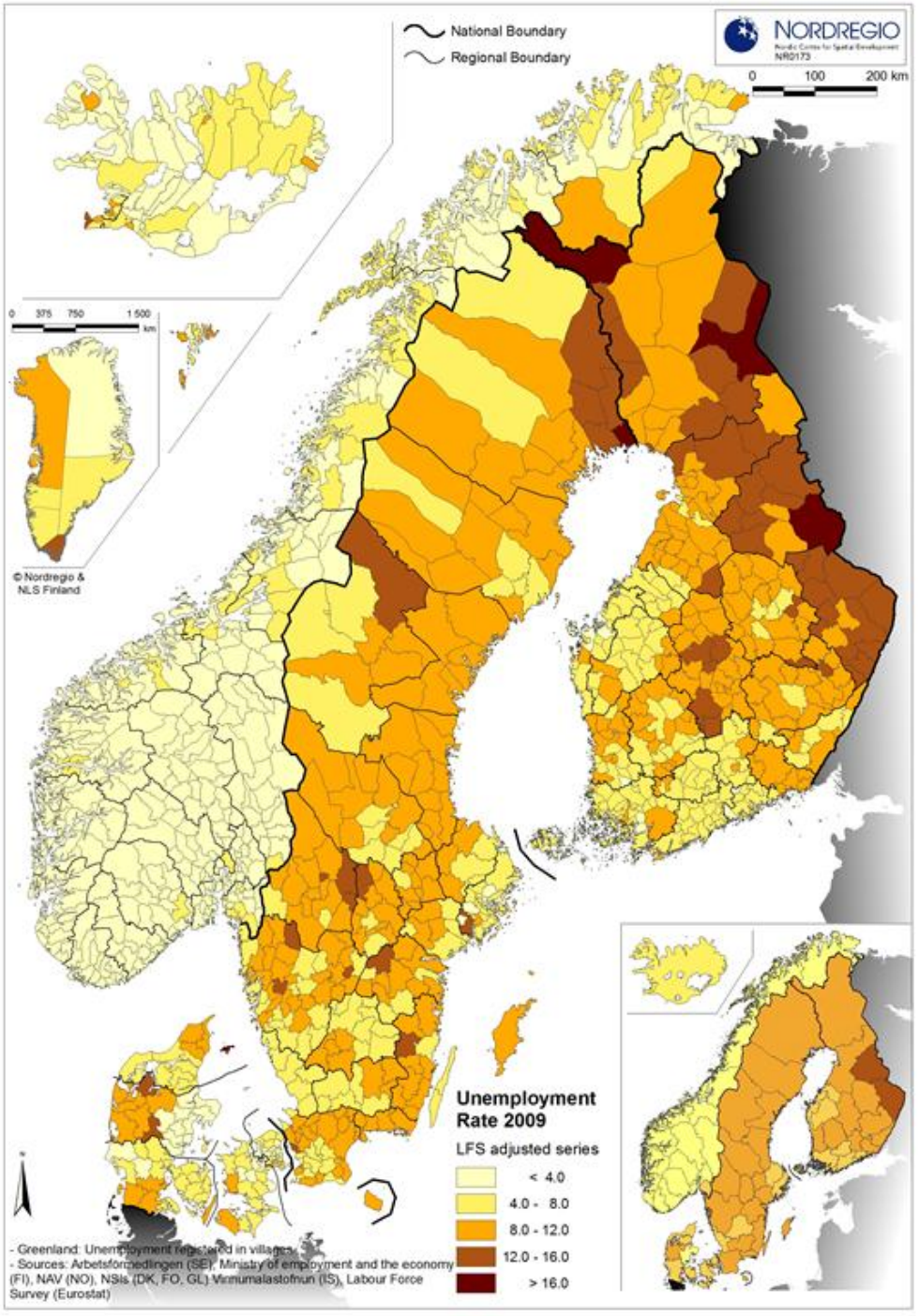
Effects of the Transition since the 1990s

- Many regions turn entrepreneurial: economic competitiveness becomes a central concern for urban policy-making
- Social goals largely subordinated to economic ones
- Growth of regional differences
  - high-tech growth in a few localities (Helsinki, Tampere, Turku)
- Growth of social inequality: income differences have grown due to
  - high level of unemployment (early 1990s: 16 %, later: 6-7 %)
  - reforms in the tax system (lower tax for capital income)

R&D Expenditure per Inhabitant in Finland by Region in 2004

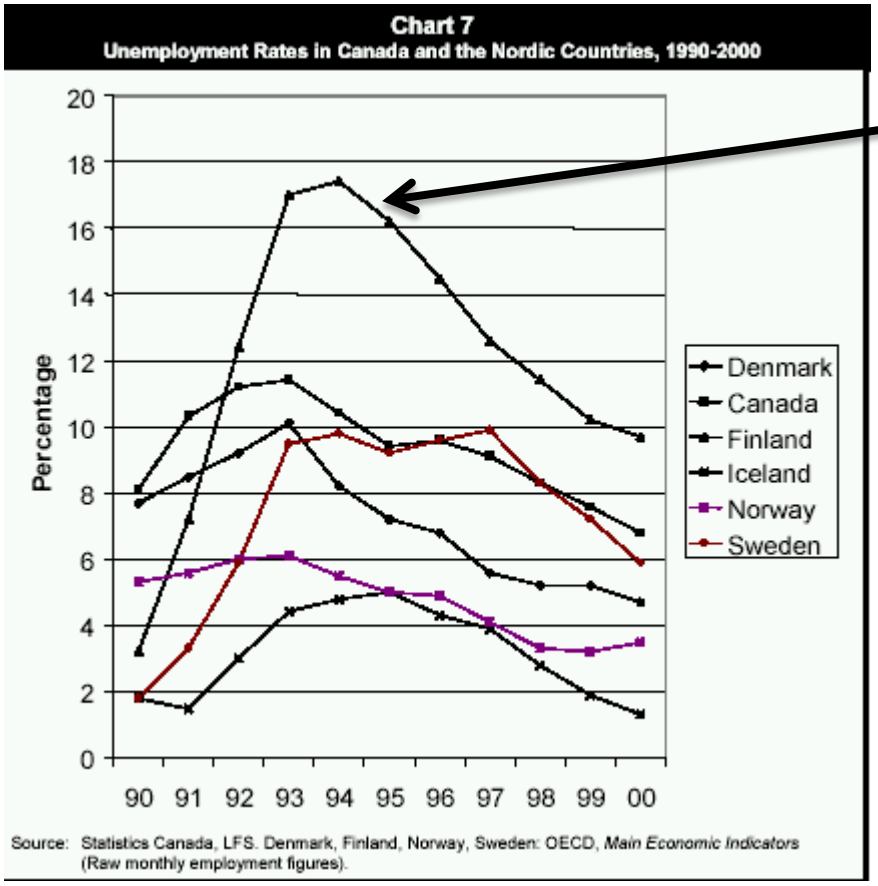


Unemployment Rates in the Nordic Countries in 2009



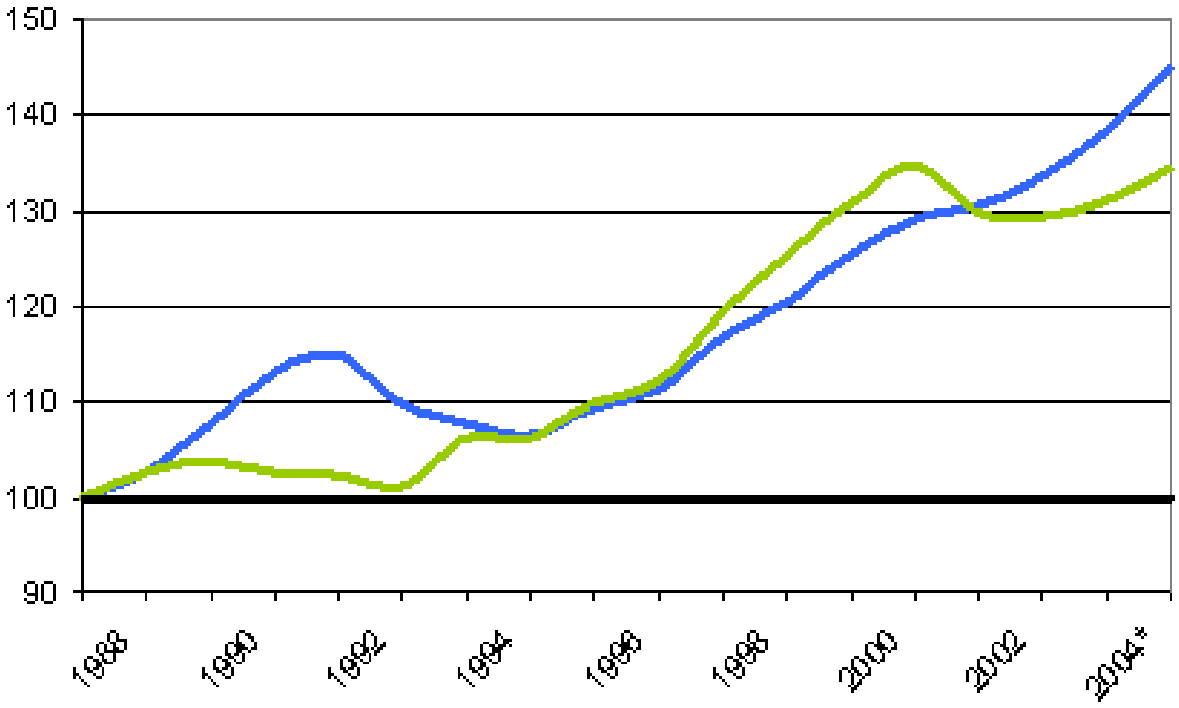
http://www.nordregio.se/en/Maps--Graphs/

Unemployment rates in Nordic Countries and Canada 1990-2000



Finland

Development of Real Incomes and Income Differences of Finnish Households 1988-2004



Blue: real income
Green: income differences

Conclusion

- A gradual shift in state policy from the emphasis on social welfare towards global economic competition
- Permanent perspective: advancement of the Finnish nation and economy – shift of emphasis from arts and humanities to technical and natural sciences
- Strong influence by OECD throughout the history
- Steady increase in the role of the state in steering and financing science, technology and innovation – high trust in top-down approach
- Steady increase in expenditure on HE and R&D
- Enduring connection between regional policy and HE and STI policies