Fostering Breakthrough Research: A Comparative Study

“Excellensutredningen”
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Mål: Att svara på varför svensk forskning tappar internationell konkurrenskraft på nivån “genombrottsforskning”
Worlds most highly cited countries
among 55 countries with > 1000 publ./yr
Mean for 2008-2010
Development of the top 10 %-index between 1990 and 2011 for Sweden and the five reference countries.

For comparison the national mean citation rate is shown as a grey curve and the grey horizontal line shows the world average. The curves are based on 3-year moving averages.
<table>
<thead>
<tr>
<th>Country</th>
<th>No of fields selected</th>
<th>No of subject fields where</th>
<th>Contribution to total national output of fields where</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Top10%-index &lt; 0.8</td>
<td>Top10%-index &gt;1.5</td>
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<tr>
<td>Denmark</td>
<td>123</td>
<td>14</td>
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</tr>
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<td>Finland</td>
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<td>Switzerland</td>
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</tr>
<tr>
<td>United Kingdom</td>
<td>242</td>
<td>20</td>
<td>43</td>
</tr>
</tbody>
</table>
Frequency distribution of the top10%-index for all organisations producing at least 50 publications per year. Dark blue = universities and university hospitals, light blue other organisations (mainly institutes, hospitals and businesses). All organisations with an index above 2 is shown in the rightmost bar.
Renewal rate versus impact in 48 journal subject fields. The 48 fields are selected based on size (the largest fields)
Differences do not depend on:

- Different proportion of publications not receiving any citations.
- Different ratio between national and international authors on publications.
- Different degree of collaboration with other countries.
- Different degree of interdisciplinarity.
- Different degree of self citation.
- Different proportions between subject areas.
Why has Sweden’s research with major international impact undergone a relative decline compared with that of Denmark, the Netherlands and Switzerland?

20 year historical perspective

- Priority-setting at national level
- Direction and funding of research
- Governance of universities
Denmark - catching up and staying ahead

- Strong focus on project and program support initiated by individuals with novel ideas.
- Financing bodies with clear profiles: free basic research, strategic research, research and innovation.
- Relatively good career opportunities for young researchers; could be further improved.
- Strengthened academic leadership at all levels; focus on building creative environments.
- Emphasis on international recruitments.
- Ratio university block funding/external funding 60/40.
- A culture of academic elitism.
Finland - a model in crisis

After the economic crises early 1990, a massive investment in research and innovation (“The Nokia syndrome”).

- Big CoE programs for research and innovation in strategic fields, clusters.
- International evaluations.
- Weak support for individual proposals and careers.
- National research policy linked to economy rather than academic values.
- Relatively weak international exchange.
- Ratio university block funding/external funding 40/60.
The Netherlands - excellence within restricted means

- Renewal within a relatively constant national budget for R&D (0.8%).
- Strong culture of academic elitism; scientific quality governs prioritising.
- Strong academic leadership at all levels; quality of recruitment high on the agenda.
- No faculty positions on external grants.
- Strong national career program (Veni, Vidi, Vichi) run by NWO.
- PhD education within 120 National Graduate Schools.
- Ratio university block funding/external funding 70/30.
- KNAW advisory body to Government.
Switzerland - sustaining excellence over time

- Strong emphasis on international recruitment
- Strong academic leadership at all levels.
- No faculty positions on external funding.
- Strong consensus (Government, Universities, Research Council) how to develop and maintain academic excellence.
- Universities tend to specialize; relatively autonomous.
- Ratio university block funding/external funding 80/20.
Sweden – a research system with structural problems

- Universities with heterogeneous tasks in education and research, often with conflicting goals.
- A relative decrease of investigator initiated projects/program.
- An increased support to “strong” environments, strategic areas and networks.
- Weak recruitment policies causes inbreeding; loss of mobility.
- Very weak career system for young researchers.
- Weak academic leadership at all levels; tendency to chose managers rather than strong academic leaders (scholars).
- External funding strong effect on university prioritizations (“research hotels”)
- More and more faculty positions on external funding.
- Ratio university block funding/external funding < 50/50.
The Universities are the weak link in Swedish research

We need:
- Strengthen the academic leadership at all levels.
- Leadership needs to regain full control of recruitment to build strong environments.
- Establish an internationally competitive career system.
- Reorganize universities to better handle different goals and tasks.
- Strengthen university block funding relative external funding; but linked to the onset of necessary reforms.
- More focus on the quality level aiming for breakthroughs; better support to individuals with novel ideas.
Key factors to foster academic excellence

- Strong academic leadership with focus on establishing creative environments.
- Full control of recruitment; high on the agenda
- Good career opportunities, emphasise mobility.
- Review regularly and prioritize towards excellence.
- External, competitive funding with long term perspectives; clear missions.
- Support individuals (environments) with novel ideas.
- Floor funding/external funding > 3/2.
Threats to the Danish Academic System

- Strong academic leadership must not become hierarchical and bureaucratic; emphasise legitimacy among leading scholars.
- A worrying increase of the number of researcher employed outside the established career system (develop a tenure track system).
- Although tempting, never embark on the mode of funding faculty positions on external funding.
- Do not allow the ratio of floor funding/external funding to fall below 3/2.
- Increasing number of (conflicting) goals; increased complexity after inclusion of sectorial research; do not link research and innovation in the national policy.
- Scale and mission become a competing goal with scientific quality.
- Do not expand higher education without adequate recourses; link it to the establishment of a competitive tenure track system.