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EU Innovation Policy – Best Practice

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This paper provides case studies on best practice EU innovation policy. It examines the research and innovation systems of the three top performing EU Member States: Sweden, Germany and Finland

Key Points

The research and innovation systems of the three top performing EU Member States share the following characteristics:

- A higher level of business R&D expenditure;
- Good linkages between the science base and business; and
- They ‘excel’ in the commercialisation of their technological knowledge.

In addition:

...the overall good performance of the innovation leaders reflects a balanced national research and innovation system. While each country has its own specificities, policy responses should attempt not only to address relative weaknesses in national research and innovation systems, but also to have more balanced performances across all categories of indicators

A successful research and innovation can take a significant time to develop and must continually evolve in order to respond to challenges and prevent stagnation.

Executive Summary

This paper examines the research and innovation systems of the three top performing EU Member States: Sweden, Germany and Finland.

While it is evident that there is no single way to improve research and innovation performance, the three states do share characteristics, namely:

- A higher level of business R&D expenditure;
- Good linkages between the science base and business; and
- They ‘excel’ in the commercialisation of their technological knowledge.

Sweden

Swedish government policy on innovation and research is the responsibility of two ministries, the Ministry of Enterprise, Energy and Communications and innovation policy, and the Ministry of Education. There are also two significant government agencies: the Swedish Research Council; and the Agency for Innovation Systems (VINNOVA).

In Sweden 3.9% of GDP is invested in R&D. The sectoral distribution of R&D expenditure is weighted heavily towards the business sector; with enterprises accounting for approximately 80% of total research and innovation spend.

The country’s research and innovation system has a number of strengths:

- High-levels of investment in R&D – in 2009 total Swedish R&D investment amounted to 112bn Swedish Krone (SEK);
- A concentration of large global corporations with a culture of R&D investment;
- An internationally linked economy (although with some distance to market);
- An export orientated market that is fuelled by innovation; and
- A long tradition of cooperation within a ‘triple helix’ – Academia, Government and Industry.

From a policy perspective the region’s focus is on the health, biotechnology and transport sectors. Current policy prioritises promoting excellence in Universities; and linking academia to business. The *Research and Innovation Bill* (2008), commits to €500m investment in research and innovation – equivalent to 1% of all public funding.

Vinnova, the region’s principal agency for the delivery of innovation policy has five tools at its disposal:

- Investing in research and innovation;
- Improving the innovation capacity of SMEs – which includes coaching and facilitating their promotion in international partnerships;

- Promoting global links – through bilateral linkages and through participating in EU R&D programmes;
- Policy development; and
- Utilising the Country's innovation infrastructure – which includes a strong research and innovation environment, testing and demonstration sites, incubation facilities, and the relationship that exist amongst the *'triple helix'*.

Despite its strong position, Sweden faces a number of challenges relating to research and innovation:

- A strong dependence on a small number of large companies for investment
- The economic crisis' impact on Swedish industry; and
- A difficulty in ensuring that academia listens to and responds to the needs of business.

Germany

Germany's system of research and innovation governance is influenced by its federal government structure. The federal government and the 16 Länder (state government) each play a role in the system and share a number of responsibilities.

The ministries with principal responsibility for research and innovation at federal level are the Federal Ministry of Education and Research and the Federal Ministry of Economics and Technology.

Across Germany's governance system there are more than 20 programme executing organisations (which can be public, semi-public or private institutions) responsible for the implementation and administration of policy formulated at federal or state level.

Gross domestic expenditure on R&D (GERD) in Germany in 2007 was 2.53% (estimated at 2.64% for 2008). Industry was the largest funding sector by a considerable margin providing €41,761m of funding to the implementation sectors, the majority of which was fed back into industry

Germany is strong when it comes to producing innovative outputs and new technology. It has a high share of innovators, technological patents and its medium to high-tech manufacturing sector has high employment and is a strong exporter.

Current policy is a response to specific research and innovation challenges:

- Funding innovation - German policy is to offer a range of financial support mechanism to SMEs including venture capital (the High-tech start-up fund), loan programmes and grants. In 2008 the Central Innovation Programme for SMEs (ZIM) was launched. In 2009 and 2010 ZIM had an annual budget of €300m, rising to €500m from 2011.

- Keeping pace with global technology trends – federal government launched a series of 17 ‘Thematic R&D Programmes’, which target policy and funding at specific technological areas.
- Adapting Germany’s education system to meet the needs of rapidly evolving requirements of technology and innovation – the Federal Government has have reformed vocational training courses, introducing new, ‘modern’ courses and improving the supply of further education, including additional financial incentives for employees.
- Continuing the strong tradition of industry-science link ups – A number of policies have been adopted to ensure this tradition continues. The region has also introduced the Research Bonus to strengthen the ability of universities and public research institutions to co-operate with SMEs.

Finland

The Finnish research and innovation system is often viewed as a bench mark in many countries.

It is recognised by policy makers in Finland that its success was the result of many years of intervention.

There have been a number of facets to this development:

- Education, science and R&D have had high political status since the 1950s;
- Policy makers of the 1950s and 1960s were able to establish a long-term national restoration and growth programme based on strong public-private partnerships and strong public investments;
- Finland established a negotiation-based contract system in the labour market in the 1960s and 70s;
- Policy makers promoted infrastructure development designed to enhance economic and societal conditions that was later adaptable to a successful research and innovation system;
- The Technology Committee, which comprises of stakeholders from the public and private sectors, introduced a consensus-based long-term programme for raising technological capabilities of the country and increasing R&D in the early 1980s.

At departmental level the key players in the innovation system are the Ministry of Employment and the Economy and Ministry of Education and Science.

In 2009, R&D expenditure was equivalent to 4% of GDP. The largest proportion of expenditure has historically come from the business sector, with the public sector contributing a relatively small proportion.

Finland performs well across a number of indicators:

- The region's human resource performance is strong;
- The region is marked by high business investments; and
- Finnish SME cooperation in innovation has been growing at a faster rate than the EU average.

Current research and innovation policy is outlined in the National Innovation Strategy (2008). It is based on ten principles:

- reinforcing the competence base;
- broad-based innovation activity;
- internationalisation of the innovation environment and operating in a world without borders;
- strong and networked innovation centres;
- internationally competitive system of training and higher education;
- developing the Finnish environment to support growth businesses;
- strengthening demand and user orientation;
- central government's corporate steering and a systemic approach;
- resources for innovation activity; and
- international review of the innovation system

VEKKES is the main Finnish funding agency. The agency provides grants totaling €600m annually.

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1 Introduction

The following paper provides background details on the research and innovation systems adopted by the three best performing EU member states – Sweden, Germany and Finland.

The paper makes use of policy assessments from Pro Inno Europe, an initiative of the European Commission's Directorate General of Enterprise and Industry which aims to be:

...the focal point for innovation policy analysis and policy cooperation in Europe, with a view to learn from the best and contribute to the development of new and better innovation policies in Europe.

2 EU Member State's Innovation Performance

Figure 1, which is sourced from the Innovation Union Scoreboard 2010, ranks European Union Member States by their innovation performance. The scoreboard is calculated based upon data across 24 indicators. Member States have been divided into four categories – Innovation Leaders, Innovation Followers, Moderate Innovators, and Modest Innovators.

The scoreboard identifies Sweden, Germany, Finland and Denmark as the four innovation leaders in the EU.

- The report notes that, although '*there is not one single way to reach top innovation performance*', these regions do share some common characteristics, namely:
- Each has higher levels of business R&D expenditure;
- They all have '*higher than average scores in the Public-private co-publications per million population indicator*', suggesting good linkages between the science base and business; and
- They all '*excel*' in the commercialisation of their technological knowledge.ⁱ

Significantly:

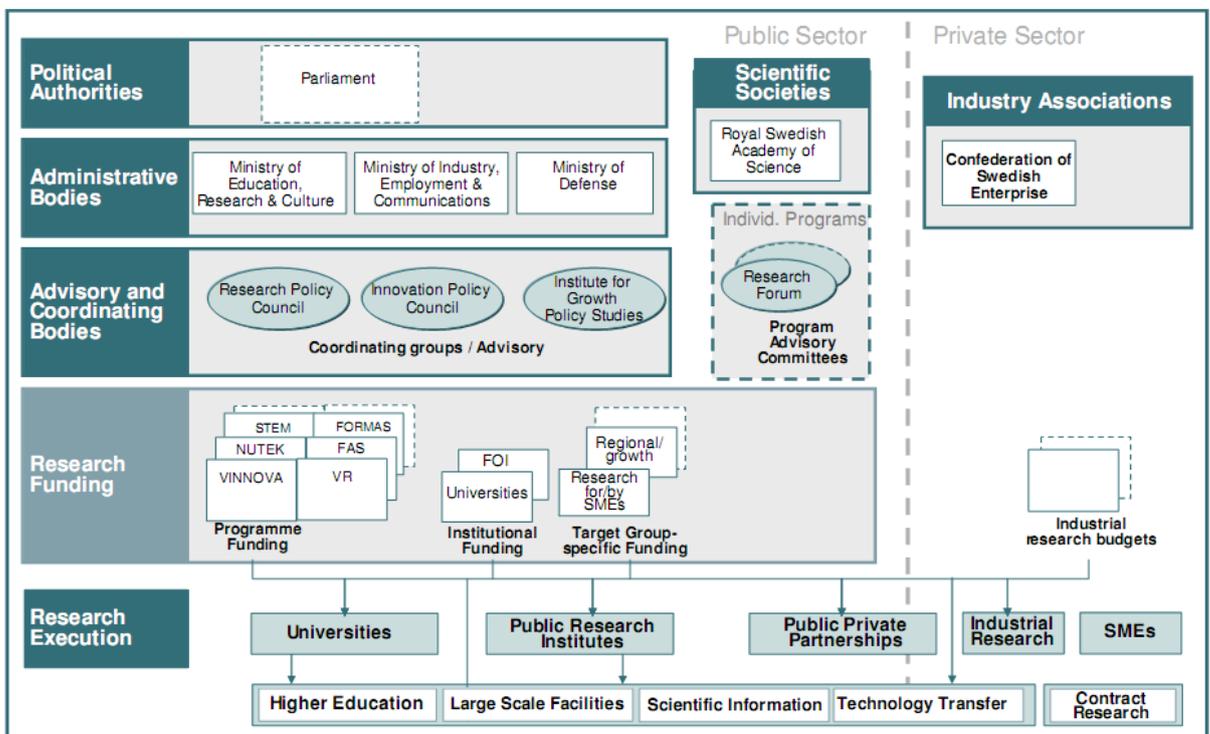
...the overall good performance of the innovation leaders reflects a balanced national research and innovation system. While each country has its own specificities, policy responses should attempt not only to address relative weaknesses in national research and innovation systems, but also to have more balanced performances across all categories of indicators.ⁱⁱ

This paper looks in detail at the research and innovation systems in operation in the top three countries – Sweden, Germany and Finland.

3 Sweden

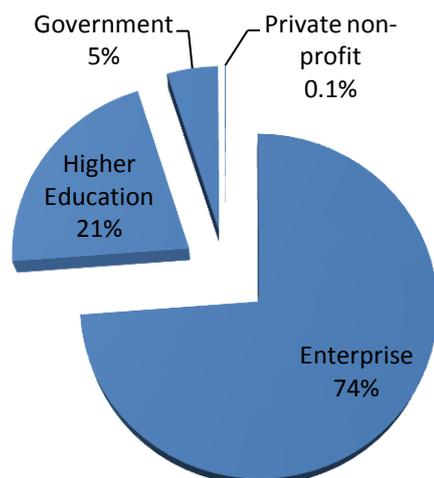
Swedish government policy on innovation and research is the responsibility of two ministries, with the Ministry of Enterprise, Energy and Communications, responsible for industrial and innovation policy, and the Ministry of Education, responsible for research policy. A high level of defence based research ensures that the Ministry of Defence has a role in the Swedish research and innovation system. There are also two significant government agencies: the Swedish Research Council, which facilitates *'fundamental research'*; and the Agency for Innovation Systems (VINNOVA) which focuses on *'applied, needs drive research and innovation'*.ⁱⁱⁱ Figure 1 illustrates the Swedish research and innovation system in more detail.

Figure 1: Diagram of the Swedish research and innovation system^{iv}



In Sweden 3.9% of GDP is invested in R&D^v. The sectoral distribution of R&D expenditure is weighted heavily towards the business sector. Figure 2 outlines the proportion of R&D performed by each sector in Sweden, Enterprise makes up 73.8% of all R&D activity, followed by higher education (21.3%).^{vi}

Figure 2: % of total R&D performed by different sectors^{vii}



The Swedish research and innovation system has a number of strengths:

- High-levels of investment in R&D – in 2009 total Swedish R&D investment amounted to 112bn Swedish Krone (SEK);^{viii}
- A concentration of large global corporations with a culture of R&D investment;
- An internationally linked economy (although with some distance to market);
- An export orientated market that is fuelled by innovation; and
- A long tradition of cooperation within a ‘triple helix’ – Academia, Government and Industry.^{ix}

With regard to industry sectors, Swedish policy emphasises the health and biotechnology sectors. The transport sector has had considerable attention in recent years, largely on account of the impact of the financial crisis on the national automotive industry. Current policy is less focussed on the ICT reflecting the fact that this is a mature field. The regions policy priorities are:

- Promoting excellence in Universities; and
- Linking academia to business through cluster building and public-private partnerships.^x

Less emphasis is placed on knowledge transfer, direct support to business, support to risk capital, and the mobility of its researchers. The region’s current policy, the *Research and Innovation Bill*’ (2008), commits to €500m investment in research and innovation – equivalent to 1% of all public funding. This investment is targeted at universities. Investment will be focussed on areas in which Sweden is already world class and where it is deemed that industry and wider society require new knowledge. A total of 150m SEK has been earmarked for the commercialisation of research results, the initiative places an obligation on higher education teachers to identify and inform their employers of patentable results in a bid to ‘*step up the commercialisation and utilisation of research results*’.

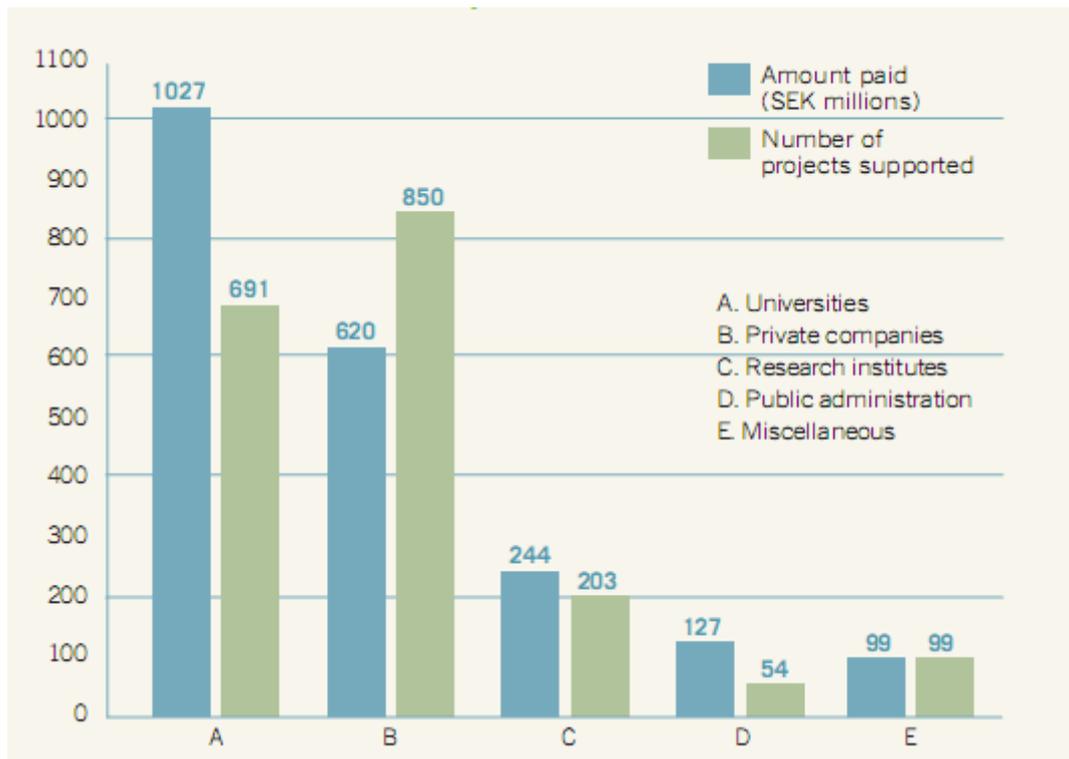
Current policy is unique in the history of Swedish R&D policy in the sense that it is the *'first decisive policy step in addressing innovation alongside research'* and that it promotes *'research and innovation policy interplay'*. The policy also strives to improve multi-level governance by introducing regional-national dialogue.

Vinnova, the Country's principal business orientated research and innovation agency, has a central aim of increasing the *'competitiveness of Swedish researchers and companies'*. This is achieved by the funding of *'needs-driven research and the development of effective innovation systems'*. The agency has an investment budget of €220m per year. Projects funding by Vinnova required co-financing bringing annual investment to €440m per year.^{xi}

The agency has five *'tools'* to promote research and innovation:

- Investing in research and innovation;
- Improving the innovation capacity of SMEs – which includes coaching and facilitating their promotion in international partnerships;
- Promoting global links – through bilateral linkages and through participating in EU R&D programmes;
- Policy development; and
- Utilising the Country's innovation infrastructure – which includes a strong research and innovation environment, testing and demonstration sites, incubation facilities, and the relationship that exist amongst the *'triple helix'*.

Figure 3 outlines the sectoral distribution of Vinnova's project financing in 2010. Again, there is a significant emphasis on the promotion of University projects.

Figure 3: Vinnova's project financing in 2010

Source: Vinnova

Despite Sweden's position at the top of the EU innovation scoreboard its strong position hides a number of weaknesses in its national research and innovation system, as well as a number of difficulties in the wider economic system. The Swedish economy's dependence on export market specialised in capital goods^{xii}, led to it being particularly affected by the economic crisis. The resulting restricting of the major export industries has limited their ability to invest in research and innovation. In 2008, Sweden was overtaken by Switzerland in the EU Innovation scoreboard, a situation since redressed.^{xiii}

A number of structural challenges have been identified in the region's research and innovation system:

- A strong dependence on a small number of large companies for investment – over the last decade the 20 largest companies in Sweden have consistently accounted for approximately 62% of industry R&D. As noted above these companies have been affected by the economic crisis. This has not only limited their ability to invest it has been passed along the supply chain with knowledge intensive SMEs, research institutes and universities facing a downturn in demand for their services. A further problem is that R&D performers are becoming increasingly globalised, more than 40% of Swedish business R&D is performed by companies with headquarters outside Sweden. This is problematic in the context of continuing global economic difficulty as Sweden can no longer be considered a guaranteed a natural choice for

locating should these companies reevaluate their survival strategies and the location of their business activities.

- The economic crisis' impact on Swedish industry, as mentioned above, has been significant. The impact has been felt acutely by the motor industry which employs 5% of all private sector workers. The economic crisis, which has impacted demand, is coupled with the longer term problem of over-capacity in global car manufacture. The failing of one major motor company would have serious implications on the ability of component suppliers to reach the critical mass necessary to develop and manufacture components in Sweden.
- Sweden is also marked by a lack of policies that support non-technical forms of innovation (innovation in services for example). The countries strong focus on university innovation and the linking up of academia with business driven by a desire to 'get research results out' rather than a desire to communicate the needs to business to academia.^{xiv}

4 Germany

Germany's system of research and innovation governance is influenced by its federal structure. The federal government and the 16 Länder (state government) each play a role in the system and share a number of responsibilities – financing, education, and research and innovation initiatives.^{xv}

The federal government is, however, the principal actor in system. It has responsibility for:

- Ensuring an innovation-friendly framework through legislation, macro-economic conditions, and competition;
- Implementing a strategic R&D vision, directing both public and private R&D activities;
- Providing the majority of institutional funding; and
- Operating programmes to assist SMEs in research innovation activities.^{xvi}

The main responsibility of the Länder is to fund universities, including some industry linkages and innovation programmes in universities. A range of programmes are offered at both government levels, including R&D grants, financing technology start-ups, venture capital programmes and providing loans for innovation projects.

At federal level the two main actors are:

- The Federal Ministry of Education and Research (BMBF) – responsible for the financing of top-level R&D projects in enterprises and public sciences, coordinating and funding basic and applied research at public research authorities and tertiary education; and

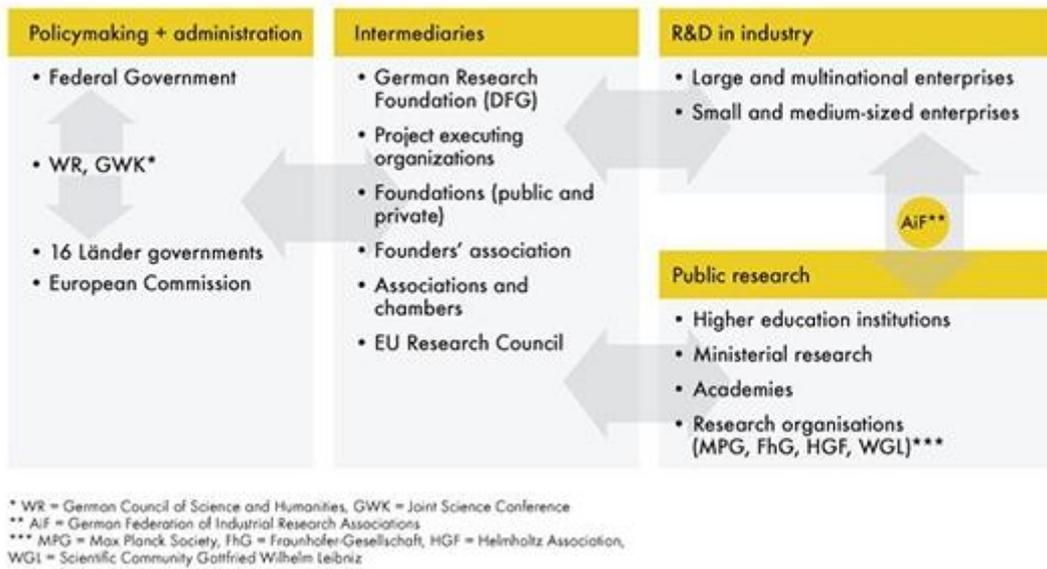
- The Federal Ministry of Economics and Technology (BMWi) – responsible for designing appropriate framework conditions for innovation including competition policy, the legal setting and conditions aimed encouraging entrepreneurship, providing direct financial support to SMEs through grants, loans and venture capital, providing infrastructure support to the business sector; providing grant funding to the public and private sector for application-oriented thematic and sectoral research programmes.^{xvii}

Across Germany's governance system there are more than 20 programme executing organisations (which can be public, semi-public or private institutions) responsible for the implementation and administration of policy formulated at federal or state level. The most important of these organisations are:

- PT Jülich (Biotechnology, energy, new materials/nanotechnology, environmental technologies and climate, maritime technologies, basic research in science, technology transfer and start-ups);
- DLR (ICT, space, health, services, workplace design, research in education, environment/ culture/ sustainability);
- PT Karlsruhe (manufacturing technologies, sustainability research); and
- VDI/VDE Innovation and Technology (microsystems, cooperative R&D programmes for SMEs).^{xviii}

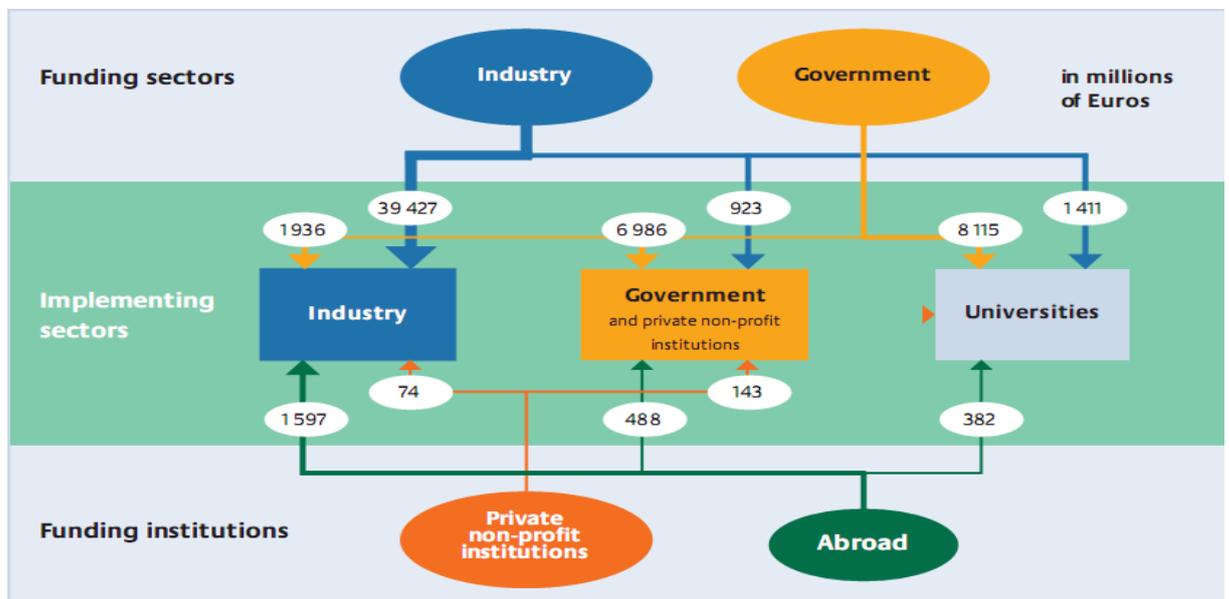
Figure 4 provides more detail on the intricacies of the Germany research and innovation system.

Figure 4: Germany’s research and innovation system^{xix}



Gross domestic expenditure on R&D (GERD) in Germany in 2007 was 2.53% (estimated at 2.64% for 2008). Figure 5 provides a breakdown of GERD in 2007 showing the flow of financial support to the three major implementing sectors – Government, Industry and Universities. Industry was the largest funding sector by a considerable margin providing €41,761m of funding to the implementation sectors.^{xx}

Figure 5: GERD by implementing and funding sectors 2007



Germany is strong when it comes to producing innovative outputs and new technology. The country has a high share of innovators, technological patents and its medium to high-tech manufacturing sector has high employment and is a strong exporter. The region has long-established links between business and academia, facilitating technology transfer. This is evidence by the proportion of funding universities receive from industry (see Figure 5).

The country's strong innovation performance masks a number of weaknesses. This is particularly true in those areas which are viewed as a '*long-term determinants of an economy's innovative potential*', such as human capital and financial investment in new technologies. Pro inno Europe's 2009 assessment of the German research and innovation system also noted that:

Areas of concern include the low share of science and engineering (S&E) and social science and humanities (SSH) graduates among the younger population, a low share of youths that have attained at least upper secondary education, low lifelong learning activities of enterprises and a low level of VC [venture capital] investment.^{xxi} [Recent policy changes suggest that a number of these are being addresses, see below]

Despite its short comings Germany's research and innovation system is one of the strongest in Europe and it is one of two Innovation Leaders identified as having the strongest growth of those within their grouping in the 2010 Innovation Union Scoreboard (the other being Finland).^{xxii}

Current policy is a response to specific research and innovation challenges:

- Funding innovation – German policy recognises a number of problems face businesses and other institutions seeking to finance R&D or other innovation related activities:
 - That financial markets tend to be cautious when financing investments which have uncertain outcomes;
 - That the economic crisis has placed restrictions on lending that has reinforced the above; and
 - That SMEs are particular limited by the above due to having fewer internal funds and higher exposure to risk should an innovation product fail.

In response to these constraints German policy has been to offer a range of financial support mechanism to SMEs including venture capital (the High-tech start-up fund), loan programmes and grants. In 2008 the Central Innovation Programme for SMEs (ZIM) was launched. In 2009 and 2010 ZIM had an annual budget of €300m, rising to €500m from 2011.^{xxiii}

- Keeping pace with global technology trends – Germany's innovation success has been, to an extent, predicated on mature technologies that retain little scope for future growth (automotive, machinery, and chemical and electrical engineering). In contrast, Germany's performance in high-tech sectors with expected growth

potential (biotechnology, nanotechnology and health and medical technologies) is weaker. In response, federal government launched a series of 17 ‘Thematic R&D Programmes’, which target policy and funding at specific technological areas.

- A third challenge is adapting Germany’s education system to meet the needs of rapidly evolving requirements of technology and innovation. A future shortfall in qualified skilled later is recognised as potential barrier to maintaining a successful innovation system in the future. However, the split in education responsibilities between federal and state government has complicated the policy response to this challenge. The federal government’s influence extends to vocational education and training. In this area they have reformed vocational training courses, introducing new, ‘modern’ courses and improving the supply of further education, including additional financial incentives for employees.
- Despite already having established strong linkages between academia and business, the German government retains a strong focus on industry-science linkups. Innovation programmes often focus on funding collaborative R&D and innovation projects, such as the Thematic R&D Programmes and the Central Innovation Programme for SMEs (ZIM). The Research Bonus is intended to strengthen the ability of universities and public research institutions to co-operate with SMEs. Additional policy activities aim at establishing better management of intellectual property at universities and to foster spin-offs from public research. Furthermore, the Top Cluster Programme funds regional thematic clusters that bring together public research and enterprises to further develop high technologies in various areas. In each of the three funding rounds up to five clusters will be selected for funding (€200m is earmarked for each round).^{xxiv}

5 Finland

The Finnish research and innovation system is often viewed as a benchmark in many countries. Of the four Innovation Leaders identified in the Innovation Union Scoreboard, Finland, like Germany, has been also been identified as a growth region. It is recognised by policy makers in Finland that its success was the result of many years of intervention. In answering the question:

How was it possible for Finland – while being limited in its human and capital resources – to become a high tech intensive knowledge-based economy (with world-class STI policies) so quickly during the second half of the 1990s?^{xxv}

A spokesperson for the Innovation Department of the Ministry of Employment and the Economy noted:

The Finnish STI success story of the Finnish STI system did not get realised that quickly. Actually, the case is the opposite: it took a long time to build up the system.^{xxvi}

There have been a number of facets to this development:

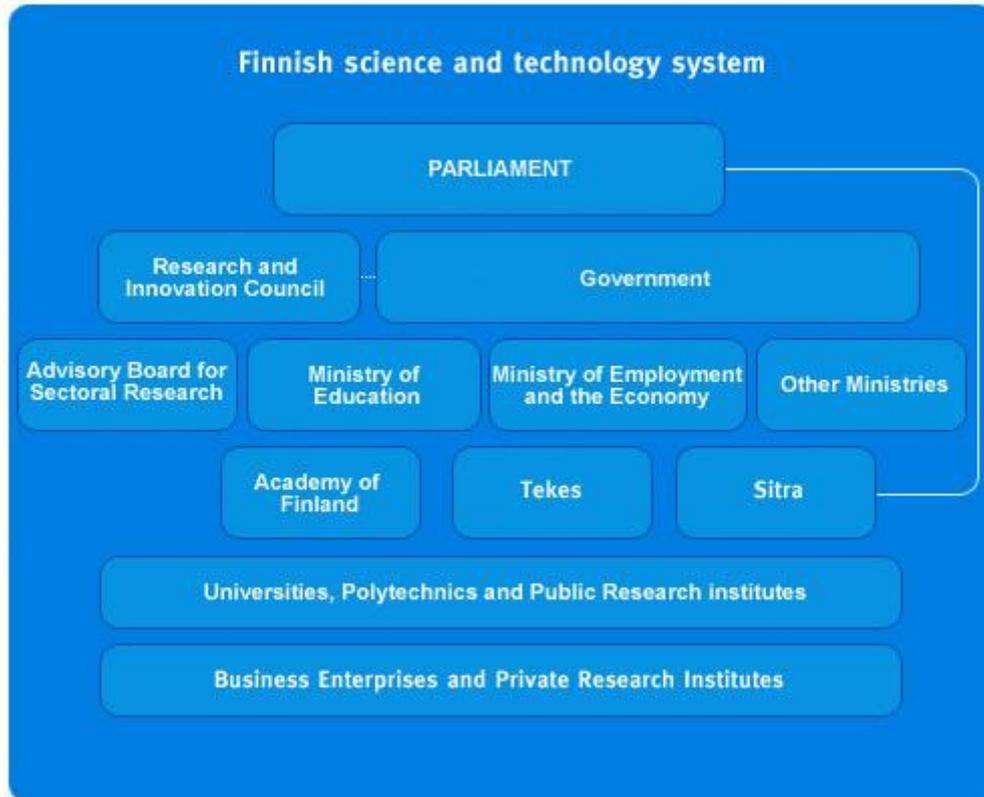
- Education, science and R&D have had high political status since the 1950s;
- Policy makers of the 1950s and 1960s were able to establish a long-term national restoration and growth programme based on strong public-private partnerships and strong public investments;
- Finland established a negotiation-based contract system in the labour market in the 1960s and 70s;
- Policy makers promoted infrastructure development designed to enhance economic and societal conditions that was later adaptable to a successful research and innovation system;
- The Technology Committee, which comprises of stakeholders from the public and private sectors, introduced a consensus-based long-term programme for raising technological capabilities of the country and increasing R&D in the early 1980s.^{xxvii}

Innovation governance in Finland is enshrined throughout the government hierarchy. At parliamentary level, the Committee of the Future assess societal policy trends in general but also has a focus on innovation policy. The main research and innovation focussed government body is the Research and Innovation Council which is responsible for the strategic development and coordination of Finnish science and technology policy as well as of the national innovation system as a whole. A number of key ministries have responsibility for elements of the research and innovation system, the most significant of which are:

- The Ministry of Employment and the Economy – which is responsible for research and innovation at industrial level, it oversees TEKES, the Finnish Funding Agency for Technology and Innovation and a number of public innovation organisations and research institutes; and
- The Ministry of Education and Science – oversees education and training, science policy, institutions of higher education, and the Academy of Finland.^{xxviii}

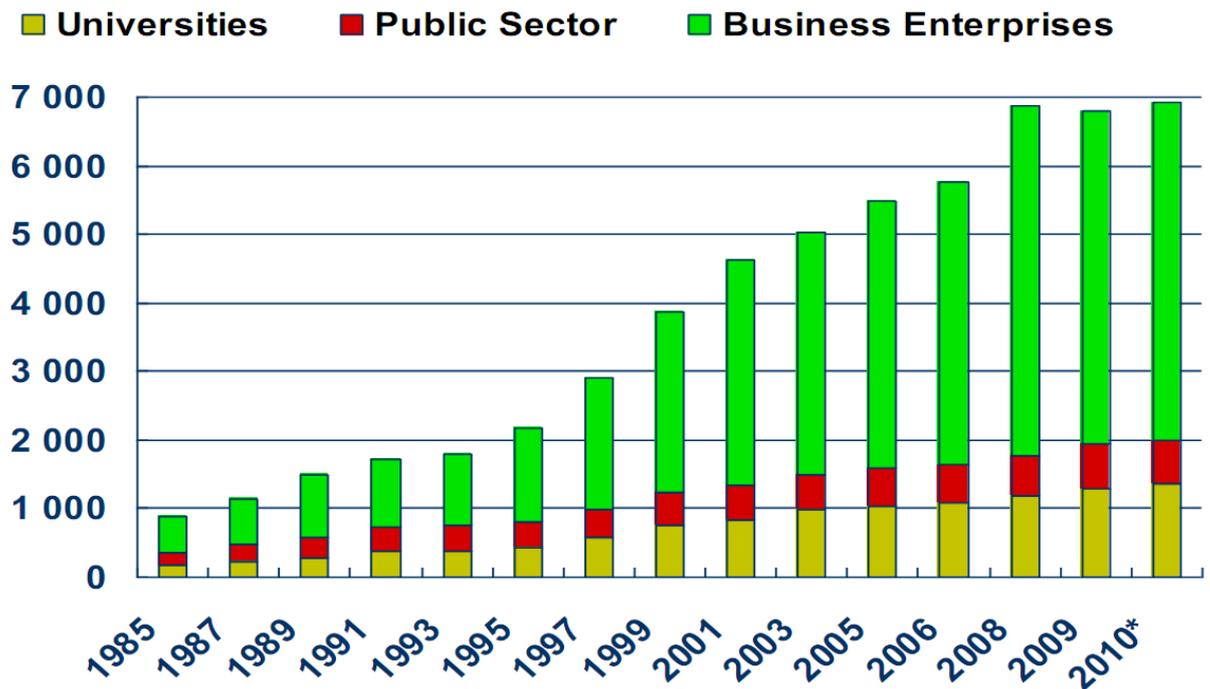
These two ministries distribute 80% of Government funding for research and innovation. Figure 6 illustrates the Finnish research and innovation system in great detail.^{xxix}

Figure 6: The Finnish research and innovation system



In 2009, R&D expenditure was equivalent to 4% of GDP.^{xxx} As evidenced in Figure 7, the largest proportion of expenditure has historically come from the business sector, with the public sector contributing a relatively small proportion.^{xxxi}

Figure 7: Finnish R&D Expenditure 1985-2010 (€m)



Finland performs well across a number of indicators:

- The region's human resource performance is strong and is particularly focussed on education. Growth in this area is below the EU average, although, this is due to the region being in a strong starting position;
- The region is marked by high business investments, in 2009 it was among the EU member states which had the highest proportion of enterprises indicating that they had increased innovation spending and projected they would continue to do so; and
- Finnish SME cooperation in innovation has been growing at a faster rate than the EU average; there have also been improvements in the number of SMEs taking part in in-house innovation.^{xxxii}

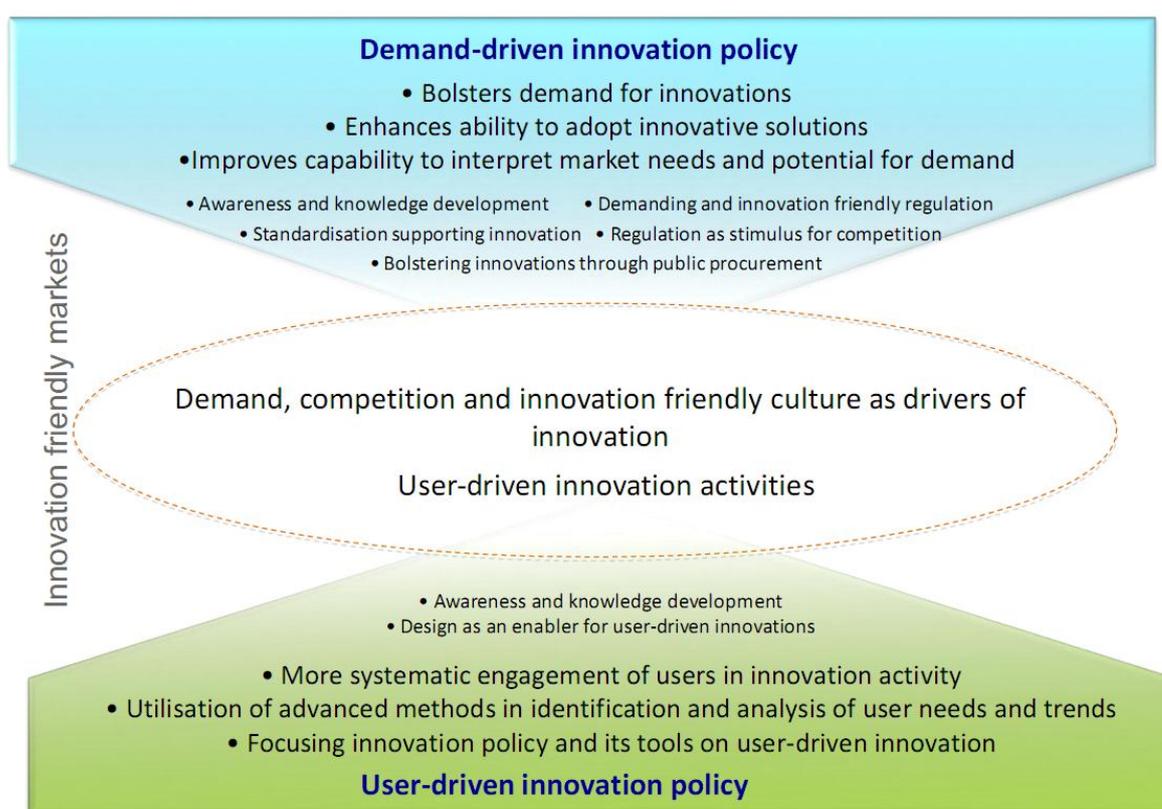
Current research and innovation policy is outlined in the National Innovation Strategy (2008). The strategy covers three broad areas of focus – know-how, demand and users. The policy has ten guiding principles by which it will seek to shape the future of Finland's research and innovation system:

- reinforcing the competence base;
- broad-based innovation activity;
- internationalisation of the innovation environment and operating in a world without borders;
- strong and networked innovation centres;
- internationally competitive system of training and higher education;
- developing the Finnish environment to support growth businesses;

- strengthening demand and user orientation;
- central government's corporate steering and a systemic approach;
- resources for innovation activity; and
- international review of the innovation system.^{xxxiii}

Pro Inno Europe's review of Finland's research and innovation system argues that the most significant and unique element of this new strategy is the focus on developing a demand and user orientated system. Figure 8 illustrates how this will work in operation. The policy intervention seeks to exploit market incentives to encourage innovation amongst enterprises and other community organisations, and to develop lead markets.^{xxxiv}

Figure 8: Finland's demand and user orientation model^{xxxv}



VEKKES, the main funding agency within the Finnish research and innovation system developed its current strategy in line with the broader national strategy. The agency provides grants totalling €600m annually aimed at: developing know-how and innovative products, process, services and business concepts; facilitating collaboration between SMEs and larger business, industry and academia, public and private sectors, and global, national and regional organisations; and encouraging foreign companies to operating in the Finnish market place to engage in R&D and other innovative activities.^{xxxvi}

- ⁱ Pro Inno Europe *Innovation Union Scoreboard 2010 – The Innovation Union’s performance and scoreboard for Research and Innovation* (1 February 2011) http://ec.europa.eu/research/innovation-union/pdf/iu-scoreboard-2010_en.pdf
- ⁱⁱ *Ibid*
- ⁱⁱⁱ The Ministry of Enterprise, Energy and Communication *Swedish Research and Innovation Policy – perspectives on policy interaction* http://www.spri.es/wNS/docs/publicaciones/ponencias/MARIE_IVARSSON.pdf
- ^{iv} Europa *Private Sector Interaction in the Decision Making Processes of Public Research Policies: Country Profile: Sweden* http://ec.europa.eu/invest-in-research/pdf/download_en/psi_countryprofile_sweden.pdf
- ^v Vinnova *A Key actor in innovation* <http://www.vinnova.se/upload/EPiStorePDF/vi-11-06.pdf>
- ^{vi} The Ministry of Enterprise, Energy and Communication *Swedish Research and Innovation Policy – perspectives on policy interaction* http://www.spri.es/wNS/docs/publicaciones/ponencias/MARIE_IVARSSON.pdf
- ^{vii} *Ibid*
- ^{viii} Vinnova *A Key actor in innovation* <http://www.vinnova.se/upload/EPiStorePDF/vi-11-06.pdf>
- ^{ix} The Ministry of Enterprise, Energy and Communication *Swedish Research and Innovation Policy – perspectives on policy interaction* http://www.spri.es/wNS/docs/publicaciones/ponencias/MARIE_IVARSSON.pdf
- ^x INNO-Policy TrendChart – *Innovation Policy Progress Report Sweden* (2009) <http://www.proinno-europe.eu/page/innovation-and-innovation-policy-sweden>
- ^{xi} Vinnova *About Vinnova* <http://www.vinnova.se/en/About-VINNOVA/> (accessed 19/10/11)
- ^{xii} Capital goods are defined as: buildings, machines, and equipment that are used to produce products or provide services <http://dictionary.cambridge.org/dictionary/business-english/capital-goods>
- ^{xiii} Vinnova *About Vinnova* <http://www.vinnova.se/en/About-VINNOVA/> (accessed 19/10/11)
- ^{xiv} INNO-Policy TrendChart – *Innovation Policy Progress Report Sweden* (2009) <http://www.proinno-europe.eu/page/innovation-and-innovation-policy-sweden>
- ^{xv} INNO-Policy TrendChart – *Innovation Policy Progress Report Germany* (2009) <http://www.proinno-europe.eu/page/innovation-and-innovation-policy-germany>
- ^{xvi} *Ibid*
- ^{xvii} *Ibid*
- ^{xviii} *Ibid*
- ^{xix} Research in Germany *Participants in the German research and innovation system* <http://www.research-in-germany.de/dachportal/en/research-funding/research-funding-system/bilder-grafiken/59946/participants-in-the-german-research-and-innovation-system.templateId=popup.html>
- ^{xx} Federal Ministry of Education and Research *Federal Report on Research and Innovation* (2010) <http://www.research-in-germany.de/dachportal/en/downloads/download-files/60110/bmbf-bufi-2010-abstract.pdf>
- ^{xxi} INNO-Policy TrendChart – *Innovation Policy Progress Report Germany* (2009) <http://www.proinno-europe.eu/page/innovation-and-innovation-policy-germany>
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- ^{xxiii} Pro Inno Europe *ZIM, the Central Innovation Programme for SMEs Peer review report* (2011)
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