



PUBLIC RESEARCH AND INNOVATION POLICY FOR THE GOOD OF SOCIETY: How To Assess The Way Forward?

Proceedings from IKED and VINNOVA Seminar

November 8 2004, Stockholm, Sweden



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INTERNATIONAL ORGANISATION FOR
KNOWLEDGE ECONOMY AND ENTERPRISE DEVELOPMENT



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PROCEEDINGS PAPER



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Proceedings from joint IKED/VINNOVA seminar
November 8, 2004, Berns Salonger, Stockholm

Sylvia Schwaag Serger

Background

Public research and innovation policy are now widely viewed as greatly important for growth and welfare. Many countries are increasing their investment in basic research while adjusting the role of universities to combine higher education, research, and interaction with society in knowledge-creation and -diffusion. While Sweden belongs to the countries that invest the most in R&D relative to GDP, however, the economic benefits of such a performance are uncertain.

In Sweden, the Government is in the process of preparing certain changes in the allocation of public support to R&D. It has also recently presented a plan for the upgrading of innovation policy. Among the other Nordic countries, Norway and Denmark overturned their past regimes for intellectual property rights a few years ago, and introduced shared ownership between individual researchers and institutions. For the European Union (EU) as a whole, strengthened conditions for R&D and innovation are at the core of the Lisbon agenda which aims to improve European competitiveness. While the objectives set in Lisbon 2000 appear increasingly difficult to fulfil, the potential opportunities that rest with an improved R&D and innovation policy remain high on the agenda.

The increasing focus on science and R&D as a growth enabler raises important and challenging questions. To some of these, good answers are extremely difficult to come by. In order to improve the situation, and if R&D and innovation policy is to truly make a stronger economic and social contribution than today, serious questions in turn need to be asked whether we need an upgraded and, in part, renewed *evaluation culture*.

Contemplating what is possible in this domain, could evaluation methods and practices be developed in ways that would help us design and implement more effective policy measures? Which methods could and should be applied, how, and by

whom? Measurement of social gains is tricky in this area, to say the least. Should we refrain from evaluations, and just invest in “free science”? To what degree can evaluation help us justify chosen investments in science and R&D? To what degree can evaluations help us determine which areas in science and R&D public funds should support? Which are the costs and benefits of establishing an “evaluation culture”? What are the concrete implications for policy implementation by Government, public authorities, and the private sector in regard to R&D, innovation, and growth?

Many countries are taking steps to improve the stringency and the quality of their policies and programmes in this area. What can countries learn from each other? What can Sweden and the other Nordic countries learn from the rest of the world, and vice versa?

Summary of the Seminar

The above were some of the questions addressed at the joint IKED/VINNOVA seminar *Public Research and Innovation Policy for the Good of Society: How to Assess the Way Forward?* which took place on November 8, 2004 in Stockholm and which brought together outstanding experts from different parts of the world (See Programme and List of Participants).

The seminar was opened with some introductory comments by **Per Eriksson**, Director-General of the Swedish Agency for Innovation Systems (VINNOVA), in which he linked the ascent of the knowledge-based economy to the growing importance of R&D for national competitiveness (See Presentation Nr. 1). He defined the innovation system perspective adopted by VINNOVA and the importance of linkages and interplay between key actors, also sometimes described in the notion of Triple Helix, for turning knowledge into economic growth and prosperity. He finished by highlighting some of the characteristics of the Swedish National Innovation System, such as the so-called Swedish Paradox (referring to the relatively low return in terms of economic growth from high national investments in R&D), the dominance of large international companies in business sector R&D and extremely low level of R&D investments by SMEs, and the dominance of universities in Swedish public sector R&D. In closing, Dr. Eriksson explained VINNOVA’s mission as promoting sustainable growth by financing need-driven R&D and developing innovation systems through various programmes and activities.

Thomas Andersson, President of IKED, focussed his presentation on the allocation of public investment in science and R&D and the need for adjustments in current approaches (See Presentation Nr. 2). Firstly, he reminded the audience of the ongoing collapse in transport and communication costs and their implication for globalization, the knowledge economy and firms’ and government strategies. He compared and examined both input indicators, such as R&D expenditures, output indicators, such

as patents and new products, in a number of countries. In order to understand how knowledge is generated and utilized, it is vital to abandon the linear model in which academics 'create knowledge' in isolation and then hand it over to firms which turn this knowledge into products. Thomas Andersson concluded by suggesting a number of factors which should be taken into consideration in designing systems for the allocation and evaluation of public investment in science and R&D, such as the fulfilment of objectives, the kinds of targets selected, and the various leverage factors that are present or could be used to optimize the allocation of public investments.

In the second session of the seminar, **Kjell-Håkan Närfelt**, Analyst at VINNOVA, suggested a new agenda for the evaluation of innovation and growth policies (see Presentation Nr. 3). He argued for a reorientation away from research needs and research councils and towards an approach rooted in identifying and seeking to remedy innovation system bottlenecks. On this basis, decision makers should be seen as, and view themselves as, innovation system investors. This reorientation necessitates a departure from evaluations as events or isolated incidents separated from the design and implementation of policies and programmes and the introduction of a system in which evaluations instead are primarily viewed as learning processes. Mr. Närfelt discussed the fundamental challenge of evaluation exercises, from a policymaker perspective, which is to weigh the anticipated benefits against the costs. He further noted the significant limitations, and sometimes unrealistic expectations, of many evaluation methods employed today. Mr. Närfelt listed three general objectives of evaluation, namely enabling operative learning, providing policy feedback and assessing systems impacts of policy measures and programme initiatives.

The idea of adopting a process-oriented and systemic approach to evaluation innovation and growth policies, introduced by Mr. Närfelt, was further developed by **Joakim Appelquist**, Project Officer, IKED. (See also presentation Nr. 4, and, in particular, the paper by Mr. Appelquist). Mr. Appelquist made a case for improving the formulation of programme models *ex ante*. He defined these as logically consistent descriptions of the design of a programme as well as of the expected impact of a programme, not only on a specific targeted group, sector, or objective but also on the effectiveness of the innovation system. He emphasized the value of having a clear intervention logic when designing programmes, and developing suitable indicators and planning for data collection. According to Mr. Appelquist, one of the prerequisites of efficient evaluation processes is to involve the actors and stakeholders in the planning of the evaluation process, the latter of which, in turn, should be an integral part of the programme model. He identified the capturing of dynamic effects that characterizes innovation systems as one of the greatest challenges of meaningful evaluation. Finally, and reiterating a point made by Mr. Närfelt, he addressed the difficult question of balancing the value of information, and particularly the added value of enlarging the scope of an evaluation, against its costs. In closing, Mr. Appelquist suggested some measures for enhancing the benefits of, and the value derived from, evaluation exercises. These include conducting evaluations that generate generally applicable information, evaluating failed projects

and programme rather than focusing exclusively on success cases, portfolio evaluation (that is, evaluations of a composition of different policies with a common objective), and creating arenas for distributing the information/insights derived from evaluation.

Commenting on the presentations by Mr. Närfelt and Mr. Appelquist, **Per Koch**, Deputy Director of NIFU-STEP, Norway. Per Koch underlined that, rather than being a pure control and audit mechanism, in order for evaluation to be meaningful it must be viewed and designed as an integral part of an ongoing process of policy learning (See Presentation Nr.5). Dr. Koch explained that the role and working realities of policy makers differ from those of evaluators and listed a few characteristics or caveats that one needs to be aware of when trying to put in place 'good' and policy-relevant evaluation systems.

The second discussant, **Lars Mathlein**, Assistant State Secretary, Swedish Ministry of Finance, offered some valuable insights from the perspective of top-level policymaking. He made the point that, according to his view, the innovation process and the dynamics shaping it are concepts that are still poorly understood, particularly among high-level policymakers. This can partially be attributed to the fact that many of the analytical models (for example the Keynesian model) that have been used by policymakers, fail to explain or even address the issue of innovations. As a result, innovations just 'exist' and are sometimes treated as an exogenous variable. Another challenge in any country with regard to innovation policy and evaluation is the issue of finding the optimal level of policymaking, that is, deciding on which aspects of policymaking and evaluation should be handled on national, regional and local level, respectively.

In the third session, international experts shared their views and experiences on evaluation. **Gernot Hutschenreiter**, Senior Economist at the OECD, provided an overview of the recent developments concerning evaluation of science and innovation policies in the OECD countries (see Presentation Nr. 6). Mr. Hutschenreiter showed that considerable progress has been made in the area of evaluation in many OECD countries, both regarding the awareness of and importance assigned to evaluation and the improvement in evaluation methodologies and data collection. The systematic and structured diffusion of good practices through organisations such as the OECD, and the European Commission, among others, has contributed to increasing the quality of evaluations. However, Mr. Hutschenreiter observed that, while considerable progress has been made, significant challenges remain and new challenges are surfacing that remain to be addressed. Issues noted in this context include improving the use of evaluations (e.g. by integrating evaluation firmly into new programmes), capturing better the linkages and interactions in innovation systems, and responding to the changing international environment and globalisation. Mr. Hutschenreiter also drew attention to the fact that, even among the OECD countries, there is still a large variation in the quality of and approach to 'evaluation cultures' and practices. Among the programmes currently

carried out by the OECD, Mr. Hutschenreiter mentioned in particular work on behavioural additionality.

David King, Director, Development Strategy at the Ministry of Economic Development of New Zealand, presented some of the unique challenges for innovation policy, both regarding design and evaluation, faced by a small country which is geographically and geo-politically relatively marginalized (see presentation Nr.7). He outlined some of the milestones of New Zealand's economic programmes, and particularly the substantial recent efforts to put in place a national framework for growth and innovation. Among other things, Mr. King pointed to ongoing initiatives to develop skills and talent, to increase global connections and to focus government resources on specific sectors. Mr. King concluded by providing some insight into how New Zealand works with policy and programme evaluation, involving both a number of quantitative indicators, used in a trend and benchmarking perspective, and a number of qualitative indicators focusing on interaction, networking and collaboration aspects.

Concluding the session on international best practices, **Elisabeth Waelbroeck-Rocha**, Director General at BIPE, focused on some of the pitfalls and difficulties associated with, and frequently encountered when seeking to, evaluate innovation policies. These include the time dimension (when should a policy be evaluated, and when should an impact be expected?), identifying causal relationships between policies and results, distinguishing between the evaluation of inputs, processes and results, and measuring trade-offs or opportunity costs. Identifying some of the mistakes frequently made in evaluations, Dr. Waelbroeck-Rocha warned of the danger of the measure becoming the target, in other words that the indicator of success that is selected for evaluation becomes the objective of policy. As an example, she listed the Lisbon strategy objectives, 3% R&D expenditure of GDP and 8 researchers per 1000 in 2010, which misleadingly have become the primary focus of policy. Turning to evaluation methodologies, Dr. Waelbroeck-Rocha listed approaches ranging from ad hoc exercises and survey-based evaluations to econometric analysis and modelling, and provided examples of each of the methodologies. She identified a number of best practices, and concluded by suggesting some guiding principles for a new evaluation approach. Overall she made a case for increasing the use of modelling in evaluation.

Commenting on the presentations and before the floor was opened up for discussion, **Lars Bager-Sjögren**, Senior Economist at ITPS had three questions/comments for the panelists. The first question addressed the issue of the reliability and validity of some of the indicators frequently used in the context of innovation policy, particularly indicators measuring R&D intensity and to what degree they can be used as a basis for / source of interpretation. Secondly, he questioned whether there was any evidence that the rules for monitoring and quantitative goal-setting, such as those included in the US Government and Procurement Act (GPRA), actually resulted in a better evaluation of innovation policy. He pointed to some studies that show that the GPRA had actually made government agencies more reluctant to set goals. Finally

Mr. Bager-Sjögren took up the question of developing evaluation standards, such as FTeval in Austria, and asked the view of the panelists as to whether this was a useful development that should be adopted by other countries.

The fourth session turned to the implications for policy implementation. Addressing the changing context of evaluation, **Jari Romanainen**, Executive Director, Strategy, National Technology Agency of Finland (TEKES) noted a trend towards a more systemic approach to innovation policy in a number of countries. According to Mr. Romanainen, the shift from the so-called 2nd to 3rd generation innovation policy implied a growing awareness of non-technical innovation, of the need to maintain a balance – between science and industry, between economic and social aspects and concerns, and between existing and new –, of the importance of innovation policy governance, and of the role of framework conditions and of creating the demand for innovative goods and services.

Concerning evaluation, Mr. Romanainen distinguished between three levels, performance (where the focus is on monitoring), impact, and policy. He retraced the development of programme evaluation at TEKES, which had evolved from performance evaluation and peer reviews to more sophisticated impact modelling and thematic evaluations, and, consequently, a better support for policy design. Mr. Romanainen also warned that, while evaluation plays a crucial role in ultimately improving the design of new programmes, there is currently a danger of information overload in policy design. Thus, he argued, today the problem is not so much that there isn't enough evaluation. Rather, policymakers are flooded by a rapidly growing number of evaluations, which, however, are of a highly varying quality and reliability. This threatens to erode the credibility of evaluation. As a result, there is a need to work towards improving evaluations and developing a greater understanding of the context of innovation policy, the need for continuity and learning in the evaluation process, of the functioning of impact mechanisms, and of the – often varying – functions that evaluations serve.

Christian Motzfeldt, CEO Vaekstfonden, Denmark argued that many developed countries have moved from achieving macroeconomic stability to improving microeconomic efficiency, to today's focus on innovative capacity. Vaekstfonden is a state backed investment company, providing funding to fast-growing Danish companies and act as a fund-of-funds investor in the private equity sector in the Nordic region. Having identified access to finance of innovation as one of the critical determinants of innovative capacity, he explained a model used by Vaekstfonden, which helps to structure 'helpers and hurdles for the innovation market'. In closing, Mr. Motzfeldt compared EU countries according to venture capital investments, the availability of capital and a number of framework conditions, and showed a possible positive correlation between framework conditions and the availability of capital for innovation.

Summing up the seminar, **Thomas Andersson** remarked that many countries are today increasingly realizing the importance of evaluation for improving science and

innovation policy, and they are rapidly improving the design and usage of evaluation. At the same time, however, he observed that much remains to be done to integrate evaluation better into a process of continuous learning and improved policy design. Here, he argued, there is a need for countries to learn from each others' experiences. Moreover, the rapid pace of change puts pressure on countries, organisations and individuals to adjust to new circumstances. This applies to designing new policies, as well as to scrutinizing, dismantling or adjusting existing policies, in order to enable countries to grow and prosper.



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BACKGROUND PAPER



Background Paper for IKED and VINNOVA Seminar

PUBLIC RESEARCH AND INNOVATION POLICY FOR THE GOOD OF SOCIETY: HOW TO ASSESS THE WAY FORWARD?

Background Paper at joint IKED/VINNOVA seminar
November 8, 2004, Berns Salonger, Stockholm

Thomas Andersson, Joakim Appelquist, Sylvia Schwaag Serger

1. Introduction¹

Economic growth has ceased to be viewed as determined solely by exogenous factors beyond the influence of policymakers. It is clear that both labour utilisation and labour productivity matter for performance, and that both may be affected by various policies as well as strategies by other key stakeholders.

In developed countries, perceptions are now that the key drivers of growth have to do with concepts such as “the knowledge-based economy”, “the new economy”, “the information economy”, etc. Science, technology, innovation, learning and human creativity are attracting particular attention. There is a vivid perception that policies matter greatly for setting the scene for capturing new opportunities in this respect. No easily defined optimal state for knowledge generation and diffusion exists in the market, and standard solutions are not readily available. Measurement of performance is tricky in this area. The contribution of technological change and associated factors is often approximated by total factor productivity growth (TFP) (Oliner and Sichel, 2000, OECD, 2001). Basically calculated as the residual when the contributions of other production factors have been controlled for, however, TFP is a shaky estimator. It is also difficult to generalise problems and solutions. Apparently each country needs to find its own way forward. At the same time, we are all in a position to learn important lessons from examining the success and failures of each other in this area.

¹ This document is a revised version of the background document for the seminar produced by IKED as part of the programme agenda for the project on “Towards Assessment of Systemic Innovation Policy”. Financial support from VINNOVA is gratefully acknowledged.

Over the years, policies relating to science, technology and industrial renewal have undergone significant changes. Today, we appear to be standing in the midst of yet another transformation of policy approaches. The shift potentially applies to a number of seemingly disparate institutions and policies. Beneath lies a realisation of the systemic nature of the innovation process. This implies that, in order to understand the specific challenges and opportunities confronting a certain society with respect to innovation, it is important to examine the way in which a range of actors, institutions and structures interact in influencing driving forces and capabilities for innovation. Clusters, networks, alliances, and various forms of combined competition and co-operation between related actors matter greatly.

A number of questions arise. What are the implications for government funding of science and technology, and for the design of structures for diffusing technology flows, upgrading skills, entrepreneurship, and for enhancing innovative performance? Even more fundamentally, how do we know which policies to put in place? How do we act so as to learn from past experience? How do we assess policies and programmes in the light of the systemic nature of the innovation process? How do we move from mapping innovation systems to an approach that is attempting to incorporate and capture dynamic effects of innovation and growth policy? How do we measure additionality or handle risk in this context? Which evaluations are needed, and what kinds of results should we expect?

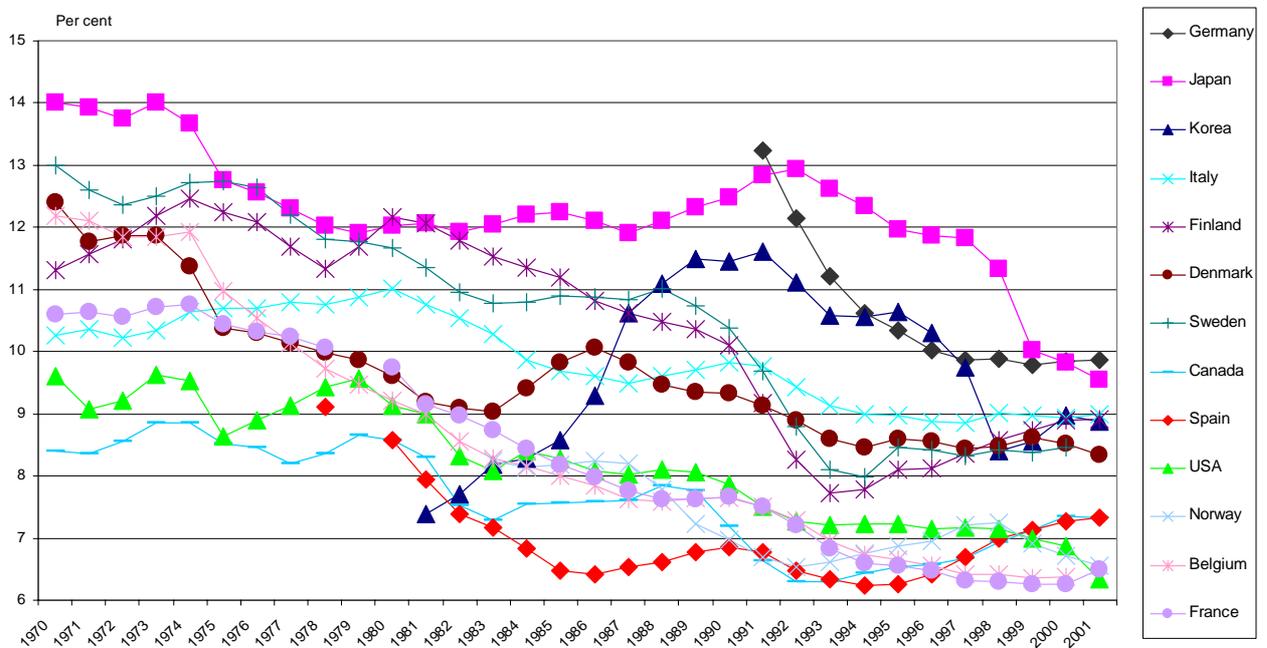
Gauging the socio-economic value of R&D, for instance, is extremely difficult. Should R&D be allocated with a view to uncertain linkages to economic payoffs, or is support of “free” science and research preferable? We cannot merely duck for such questions. Policymakers must make decisions on the allocation of public support for science and technology. If not, resources will be spread hopelessly thin, geographically, and across disciplines.

On November 8 2004, experts, practitioners and policymakers from several countries gathered to explore this agenda. The event drew upon collaborative work by IKED and VINNOVA to develop a better basis for comprehensive evaluations of systemic innovation policy. This paper represents a revised version of the main background document presented at the seminar. In Section 2, we reflect on the evolving agenda in systemic innovation policy, including rationale to apply for guiding policy. Section 3 addresses challenges in the field. In Section 4, we address ways of making systemic policy work, notably through sensible application of a process perspective. Section 5 concludes.

2. Rationale in an evolving policy agenda: Growth and Systemic Concerns

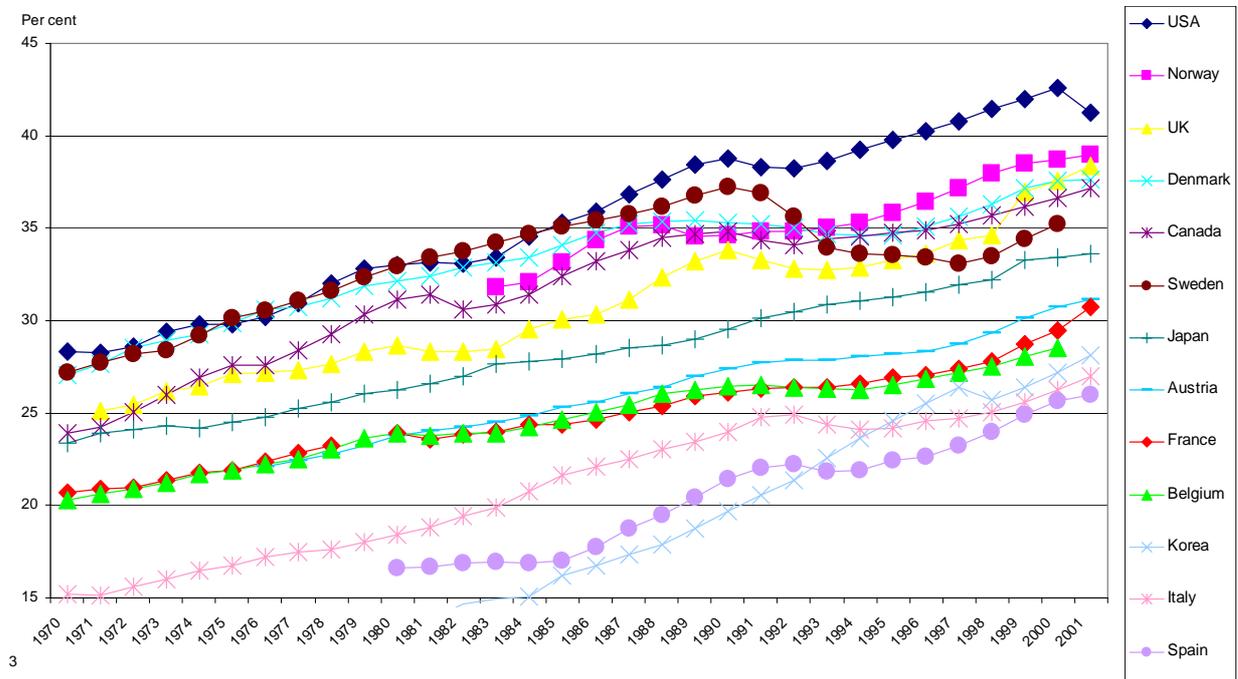
Many determinants of economic outcomes are beyond the scope of policymakers. At the present time, for instance, the developed countries are inevitably confronted with an ongoing decline in manufacturing industries, whereas the service sector is on the rise. This general pattern or trend can be observed in a number of developed countries, albeit to different degrees, as can be seen in Figures 1 and 2.

Figure 1: Share of total population employed in manufacturing, 1970-2001



Source: OECD labour force statistics (1992), STAN & MSTI (2003)

Figure 2: Share of the total population employed in services, 1970-2001



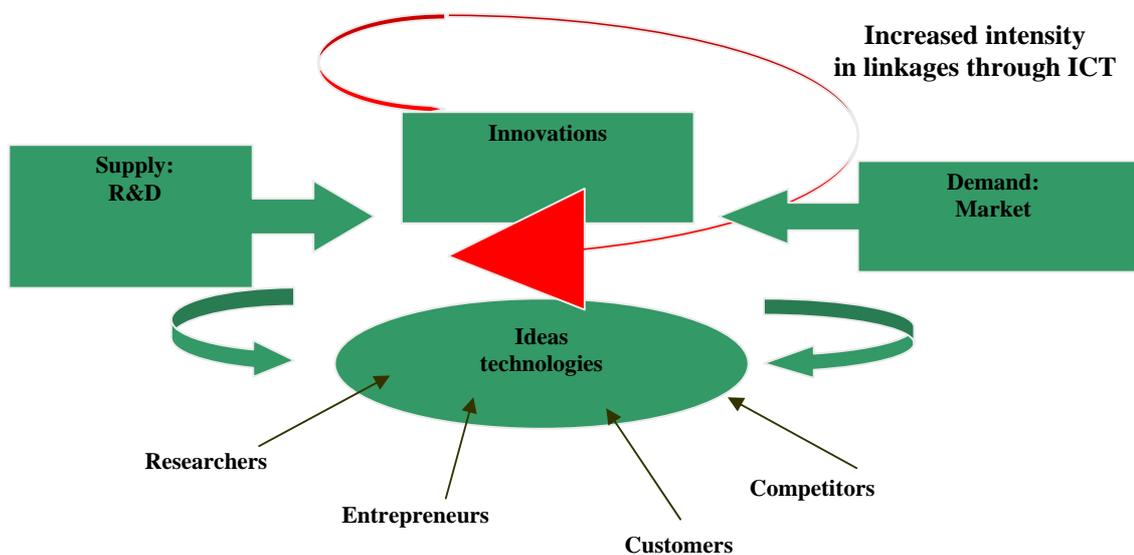
Source: OECD labour force statistics (1992), STAN & MSTI (2003)

There are varying opinions on whether the relative decline in manufacturing reveals serious difficulties for industrial competitiveness. While a certain reduction in manufacturing is inevitable in developed countries, due to high production costs compared to developing and transition economies, industrial performance is increasingly reliant on combining and linking different kinds of skills and operations. Technological and organisational changes are enabling a far-reaching decompartmentalisation of the value chain and more complex cross-border industrial restructuring processes. Rather than economies to scale, flexibility and the ability to proactively and efficiently engineer processes and products that fit specific customer needs are now critical for industrial competitiveness. Today, in this process, small and medium-sized enterprises (SMEs) are generating most new employment opportunities throughout the world.

With declining costs for diffusing, accessing and using information, new knowledge is becoming increasingly decisive for economic performance. This particularly applies to the opportunities for using combinations of information in creative ways, including for innovation. The ability of the economy to generate innovation is dependent on the interplay between various institutions, as laid out in the framework of innovation systems (Freeman, 1987; Lundvall, 1992).

This view has by now made a major difference in the hallmarks of policymaking and intermediary institutions. The linear model is supposedly dead – innovation and commercialisation is not merely the result of science and technology – there is a need for impulses and exchanges both ways! Innovations and new products will be most powerful when they result from the interplay between the supply forces of science, and the demand forces of the market place. With information and communications technology, these two forces are potentially interconnected more than ever, as illustrated by Figure 3. Despite the strength of such messages, it has proven greatly difficult to operationalise these insights.

Figure 3: Abandoning the linear model



Source: IKED

New questions are being asked how to reform various policies and institutions, and how to allocate public funding in areas such as research and education. Many countries are moving towards allocating research funding in new ways, altering intellectual property rights between individual and research institutes, rethinking investment in human capital, strengthening patent protection, strengthening linkages between research and education, strengthening the basis for new technology areas, brokering between players or raising complementary skills, making consumers more open to new technologies and products, and so on (Andersson et al., 2004; MAP-TN, 2004).

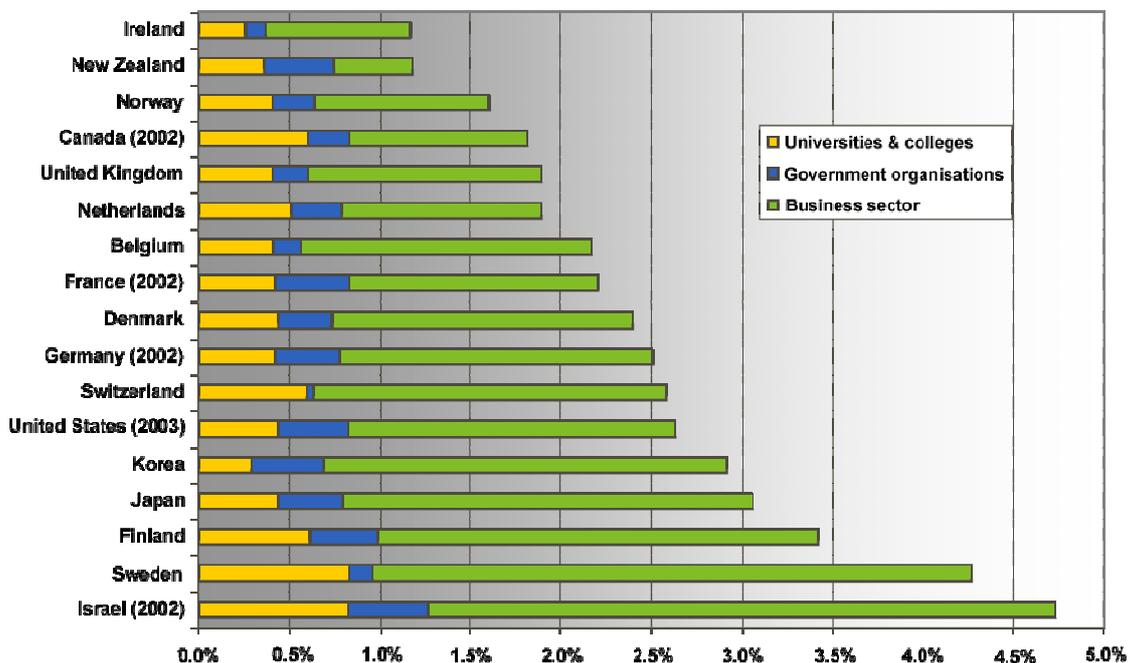
Traditionally, innovation policies were justified by the *market failure* argument. For instance, due to the high risk involved in developing and commercialising innovations, combined with problems of protecting infringements on intellectual property rights, investments tend to be lower than the optimal level, seen from a societal perspective. There is a rationale for public policy measures to boost R&D, because of the anticipated impetus in terms of positive

externalities. Other kinds of rationale traditionally sanctioned by economic theory includes transaction costs, the provision of public goods, and information asymmetries.

Market failure is, however, not sufficient as a ground for public intervention *per se*. Policy intervention must also be superior to market outcomes. In order to establish that a certain policy helps increase the efficiency of the economy, costs of intervention should be taken into account. Public intervention is typically associated with both direct (subsidies, tax deductions *etc*) and indirect (dead weight losses) costs, which must be weighed against the potential benefits.

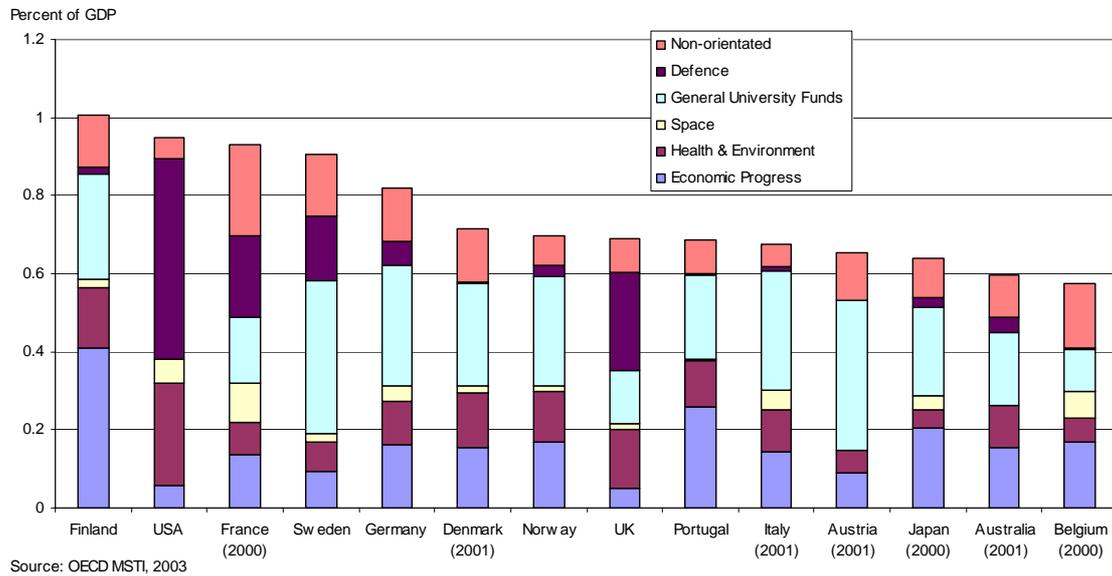
Consideration to market failures and *policy failures* remains important. Yet, with reduced information costs and an expanding knowledge base, they are not sufficient. Disparate regulatory frameworks may combine in impacting on the behaviour of relevant national and international actors (PREST, 2002). Besides the traditional types of rationale, *systemic failure* in the form of mismatch or inconsistencies as well as an untapped potential for synergies between different areas can serve as an important motivation for policy action (OECD, 1998; Smith, 2000). See also box 1.

Figure 4: R&D expenditure in relation to GDP, 2001



Source: OECD MSTI (2004)

Figure 5: Government R&D-financing in relation to GDP, 2002



Public support to R&D, for instance, underpins only a limited part of all R&D in the economy, especially in the countries with the highest R&D-intensity, as is indicated by Figure 4. The payoff of the public R&D-effort will greatly depend on what relations, and leverage, exist between the public and private efforts. The behaviour of private firms and other actors investing in R&D, and thus what additionality is achieved by public R&D-support, will be influenced by a range of conditions, including regulatory conditions and taxes as well as factors influencing the governance structure and driving forces of industry. Figure 5 shows the composition of government R&D-support in some countries.

Box 1: Systemic considerations in R&D support

Under-investment in R&D by market forces is often referred to as an illustration of proper policy rationale. An often favoured solution is to put in place a financial incentive to compensate firms for the externality arising from market failure. In effect, the aim is to calibrate an incentive which induces investors to raise the volume of R&D to the level where the marginal social costs and benefits become equal.

In reality, things are more complex. The precise level of social costs and benefits varies and is often unknown. The effectiveness of an incentive to actually raise R&D is doubtful, and the volume as well as properties of R&D may be distorted in unwanted directions. Besides acknowledging positive externalities from R&D and innovation, the adoption of a systemic approach may lead the policy maker to consider yet other issues. The value of incremental R&D may depend on national and international IPR legislation, on networks and collaboration between firms and academia, on the availability of complementary production and sales competencies in business, on the availability of professional service providers, on the mechanisms for spin-offs from the investing company, or on the capacity of financial institutions to manage risk, including in early stages of firm creation, *etc.* Due to limitations in such areas, fiscal compensation for the prevailing market failure may be ineffective in raising R&D, or in leveraging social returns that way.

Considerations to the broader framework may alter the conclusion what policy response is warranted. Perhaps existing support programmes should be removed and incentives for the development of professional service providers be supported instead, just to give one example. This illustrates the potential benefits of looking beyond a particularistic, piecemeal approach to policy, and of gaining the capacity to address limitations to innovation that emanate from across a truly relevant set of areas and policy domains.

3. On the challenges of evaluating systemic innovation policy

In order to succeed in operationalising and implementing a policy for enhanced growth and innovation based on the systemic approach, certain kinds of information and insights are crucially needed. The task is not for policymakers to get to know every piece of the puzzle, but to become better able to identify real sources of weaknesses, bottlenecks and points for leverage of policy adjustments. This provides opportunities as well as gives rise to challenges.

Considerable experience has been accumulated by now on what represent sound principles for evaluation, covering the process from ex ante formulation across monitoring to the stage of ex post impact assessment. Many years' peer review processes adopted for the purpose of evaluating research applications have eventually come together with the lessons from early experiences of assessing target-oriented public research projects (Boekholt *et al*, 2001, MAP-TN, 2004). Some of the widely respected insights include:

- *the evaluation methodology should be designed at the same time as the policy or programme, so that the necessary data and acceptance by the relevant parties of the evaluation procedures and criteria can be secured,*
- *evaluation should be user-oriented, serving the information needs of the different programme participants and clients,*
- *evaluations should use a combination of methods to satisfy different information needs, and*
- *the take-up of evaluation results should reach the adequate level of policy and decision making, encouraging public discussion of results and ensuring a response to evaluation results in terms of action for improvement.*

In relation to *evaluation methodologies*, the following is commonly embraced:

- i. Cost-benefit frameworks should be applied.
- ii. Quantifiable, measurable criteria should be strived for in determining success.
- iii. Evaluations need to try to take into account what would have happened in the absence of a programme or policy.
- iv. Evaluations need to take account of the temporal dimension of programmes and their impacts, developing *ex-ante preparations*, (technological forecasting, construction of

innovation systems scenarios) monitoring of ongoing programmes and retrospective *ex-post* evaluations.

- v. A combination of evaluation tools and approaches (both quantitative and qualitative) is desirable in order to optimise the evaluation process and increase the credibility of evaluation results and, by extension, the policy recommendations that emerge.

Beyond this, the application of a systemic perspective gives rise to additional considerations, e.g., with regard to what levels/issues need to be studied in a consistent manner. Questions arise how to approach, and link:

- firm effects,
- industry effects,
- collaboration effects,
- portfolio analysis,
- trade-offs between accountability of responsible actors and the ability to capture synergies between separate programmes and policy domains, and
- issues regarding consistency over time.

In designing suitable approaches, there is a need of vision how to sharpen objectives from the view point of innovation policy as a whole, and transmit them to the level of individual programmes and also projects. Then, the steps of connecting issues in monitoring, programme evaluation, and assessing more aggregate effects, including applying appropriate indicators of various outcomes, require attention.

The systemic perspective is not only about re-active pressure on policymakers to address weak linkages. It also raises questions about the need and options for pro-active strategies. This is because the interdependency between different policies, institutions and markets may not be realised spontaneously. Impediments at various ends of the playing field may be difficult to move in isolation, requesting synchronized portfolios of actions as a condition for fulfilling otherwise untapped synergies between initiatives in different domains (Kuhlmann, 2003).

As for methodological issues, efficiency remains important. However, effectiveness and relevance critically come into play, and various new demands are put on the toolbox available for evaluations (EPUB, 2002). Capturing impacts on the establishment of networks, trickle-down effects across sectoral boundaries, technology diffusion processes, the transmission of workers and skills across organisational boundaries, etc., gives rise to a host of challenges. Further, measuring additionality becomes particularly demanding. At aggregate level, counterfactual observations are sometimes not only difficult to come by but may virtually be impossible to obtain. Outcomes are difficult to observe since one has great problems knowing what would have happened in the absence of a certain measure (using a

“control group” to compare to is seldom practical or fully effective in this context). Nevertheless, effectiveness does need to be measured with a view to real impacts.

In other words, measures need to be evaluated on the basis of comprehensive criteria. Which criteria should be applied? There are various candidates:

- i. **Appropriateness:** Do the programmes address an objective that can be clearly related to policy rationale in terms of market, policy or government failure?
- ii. **Superiority:** Are the programmes more effective than other sets of instruments that might have achieved the same goals?
- iii. **Systemic Effectiveness:** How does the policy interact with other policies? Is there efficiency or suboptimality in the broader set-up?
- iv. **Efficiency:** Are the programmes cost-effective in achieving their specific objectives?
- v. **Adaptive Effectiveness:** To what extent do the results from evaluations feed back into policy design and implementation? Does policy design ensure a sufficient degree of flexibility enabling it to respond to the need for change?

As for the objectives, the emphasis may be placed at varying levels, notably:

- i. **Objectives of programmes** (which should be compatible with overall government objectives);
- ii. **Overall government objectives** (e.g. economic growth, job creation, enhanced competitiveness, export promotion, regional growth policies, etc.); and
- iii. **Framework conditions** (e.g. the tax system, overall macroeconomic conditions, regulatory environment, bankruptcy laws, competition policy, etc.)

Evaluations are needed at all levels. It is generally easier to determine accountability at the programme level, which is also where the precision of assessments will be the greatest. If effectiveness is only considered in terms of the programme level, however, there is a risk that policy will result in a piecemeal approach. The objective of a given set of programmes may overlap or be inconsistent with another one.

The distinction between objectives reflects the role of various actors. For those involved in the actual implementation and management of a government programme, the focus tends to be on internal programme design and efficiency, and on maximising the quality, responsiveness and delivery of a particular scheme. For policy makers determining which programmes and actions to invest in, fundamental incentive effects and aspects of resource allocation need to be assessed, in order to help guide the choice of policy instruments. Various information needs prevail for the sake of ensuring an adequate composition of project, programme or policy portfolios (OECD, 1998).

The following outstanding issues matter greatly for the application of evaluations to support a systemic approach to innovation policy:

- Specifying “rationale”, including an appropriate hierarchy of objectives, and examining whether the first best response is adopted (superiority criterium).
- Interpreting and examining relevant concepts of “additionality”, related to the difficulties to obtain contra-factual observations at the systems level.
- Avoiding traps of piecemeal approaches while enabling the capturing of relevant linkages, including in the form of externalities.
- Choosing the right level of evaluation (micro, sectoral, aggregate).
- Process objectives: deepening ex ante – ex post considerations, coming to grips with complex stakeholders effects, underpinning desirable incentive effects, motivating actors to report data and making evaluations feasible.

In their evaluation practices, countries make progress in varying respects. While many have attempted to improve evaluation methods and practices to generate a better basis for innovation policy, all also display continued weaknesses. OECD (1998), which ranked the qualities of national evaluation practices (Table 1), found a number of strong performances, or “best practices”, but also plenty of deficiencies. These have been reflected in more recent examinations as well. Broadly speaking, the evidence points to sound use of numerical evaluation methods in Anglosaxian countries, such as the United Kingdom and Australia. Innovative strategies for capturing synergetic effects, bottlenecks, etc., are developed by countries such as Austria, the Netherlands, Finland, and Sweden. The EU’s innovation policy trend chart aimed to collect well-structured information on currently practices, but actually ran into problems to identify approaches that are effective in addressing systemic considerations.

There is, in fact, limited information on what is attempted in terms of applying evaluations to support learning processes in systemic innovation policy. In other words, to date there is scanty evidence of efforts in countries to put in place a comprehensive approach to evaluation of innovation policy from a systemic perspective.

Table 1: Best practices and weaknesses in evaluation

	Economic rationale and objectives, additionality	Evaluation of actors and institutions	Evaluation of innovation and technology programmes	Use of quantitative methods in evaluation	Use of qualitative methods	Institutionalised rules and procedures for evaluation	Regularity of evaluations	"Systemic" approach to evaluation	Policy feedback and learning
Australia	●	●	●	●		●	●	●	○
Austria	○	○	●	○	●	○	○	○	○
Belgium	○			○	●		○	○	
Canada	●	●	●	●	●	●	●	●	
Czech	○	●	○			○	○	○	○
Denmark		●	●			●	●		○
Finland	○	●	●	○	●		●	●	●
France	○	●	○		●	●	○	○	○
Germany		●	●	○	●		●	○	
Greece	○		○	○	●	○		○	○
Hungary	○	●	○			○	○	○	○
Ireland			●	○				○	
Italy	○				●	○	○	○	○
Japan	○		○			○	○	○	○
Netherlands	●	●	●	●				○	●
New Zealand	●		○	●			○	●	○
Norway	●			●					○
Portugal	○			○	●	○	○	○	○
Spain	○		○		●			○	○
Sweden	○	●	●	○	●		●		
Switzerland	●				●	●			●
United Kingdom	●		●	●	●	●	●	○	●
United States	●	●	●	●	●	●	●	○	○
European Union		●	●	●	●	●	●		●

Key: ● represents strengths (best practices); ○ represents weaknesses; no symbol signifies insufficient information or absence of major strength/weakness.

Source: OECD (1998).

4. Ways to make evaluation work: the process perspective

Innovation is not a top-down process. Policy design and implementation is not just about setting up a programme, evaluating it ex post, drawing lessons and instituting a new, improved programme. With innovation systems shaped through continuous interactive processes which engage multiple elements, it is difficult to ensure effective policy leverage. Ideally, clever application of evaluations may make a crucial difference in signalling to concerned actors what policy is all about, what the objective *really* is, what desirable side-effects are appreciated and which detrimental ones must be counter-acted, and so on. In this way, evaluations may play an important role in guiding management, supporting motivation, removing obstacles and detrimental resistance on the part of vested interests, and so on.

At the same time, application of the process perspective gives rise to concerns. Wrongly applied, active use of process methodology may make policymakers not only “pick-the-winner” in choosing the specific target of a programme, but also constantly engaged in enforcing it. If pursued aggressively, such a strategy could thus worsen the interventionist elements of policy. This underlines the importance of applying the approach only where there is clear-cut policy rationale, i.e., where policy has a distinct objective of rectifying existing failures. In that context, the process perspective should help make the true objective of policy more clear to the actors. They may thereby become less guided by ungrounded assumptions on what is aimed for. The participating actors could thus be induced to strive more consistently towards goals that are relevant from a socio-economic perspective.

Programme and policy evaluation experiences differ widely among countries. Each one tends to include a history of diverse evaluation instruments and institutional engagements. Extensive information is today available to governments on what needs to be done to strengthen the functioning of innovation systems. There is much less clarity on how policymakers can actually implement required changes in a coherent manner, so that effective results can be obtained. In this respect, standard answers are seldom available, and theory may mean little before tested in practice. Basically, the challenge in implementation tends to come down to one of generating, underpinning and sustaining motivation, and of ensuring commitment and reasonable consistency in strategies among key players.

Piecemeal reforms may have only a modest effect on their own unless they are consistent with and complemented by broader reforms. A policy which looks good on paper can in fact be detrimental if market actors anticipate it soon to be overturned. For policy to be consistent and credible, broad support within (and outside) governments for long-term objectives is important, as well as the presence of mechanisms to underpin long-term commitment to these objectives.

There is also a need to follow-up on reforms, so as to improve understanding of what works, and to learn from successes as well as failures in measures undertaken. Monitoring and

assessments should be part of the policy packages themselves, as they may be critical for providing incentives to various actors involved to follow-up and deliver on stipulated objectives.

In short, putting in place a policy framework conducive to evaluations and underpinning effective reforms meets with a number of challenges. These include:

- overcoming the resistance of vested interests,
- building institutional support,
- establishing a common understanding and language between actors in the innovation system,
- success in implementing a balance act between accountability on the one hand, and openness to synergy and coordination on the other hand,
- enabling learning processes, upgrading competencies, acceptance of division of labour that is conducive to communication and common understanding of evaluations, as well as the implementation of resulting recommendations for changes.

Evaluations are not without cost. How far can – and should – evaluations go? If they are too ambitious, this will result in markedly diminishing returns. Decisions need to be made so that those programmes for which evaluation is most important are in fact evaluated, as well as initiatives consisting of measures of great interest to other actors in the innovation system. However, to date, evaluation remains at a fairly modest level in all countries relative to the cost of the policies and programmes to be assessed. The key task at this juncture is to increase awareness of the benefits as well as the costs of not evaluating, and to encourage governments to adopt an “evaluation culture”. This process requires commitment from the “supply side”, i.e. the actors receiving public support and being evaluated, as well as the “demand side”, i.e. policy makers who use the information from evaluations in the policy design process. This will entail developing a critical attitude towards methodologies and outcomes of evaluations, but also an awareness of the issues at stake.

It is important to understand better the causes of failure, and how to foster a process enabling improvement. Putting in place an evaluation culture requires, among other things, an exchange of views underpinning a common understanding of the costs and benefits of evaluation. Regarding the costs, these could be lessened by:

- respect for time and the importance of other tasks for those that are evaluated,
- raising competencies in performers of evaluations,
- sound priority-setting what information is most valuable and why,
- reduction of political resistance.

Benefits could be increased by:

- the introduction of methods that make it easier to interpret and apply the results,
- improving the institutional setup in ways that strengthen the capacity to make effective use of the results,
- strengthened process effects of evaluation.

If properly applied, a process perspective may help both reduce the costs and increase the benefits of evaluation. Broadly speaking, in many cases, resources invested in concentrating resources on *ex post* evaluations and occasional mid-term monitoring, could be better spent by instigating evaluation processes. By redistributing resources forward in the policy cycle, there is the possibility of lowering costs by comprehensive policy design *ex ante* and thorough planning of data collection. At the same time, the provision of information early on to the relevant actors, and their engagement in the design as well as – in an appropriate manner - the implementation of the evaluation itself, is likely to result in various benefits. This transformation of evaluations from a necessary control mechanism to a powerful learning tool is essential for informed decisions on policy in the future.

An important issue concerns what relationship should be arranged for between evaluators and those that are to be evaluated, and also in regard to the clients that are supposed to be the main users of the results. In one sense, the process perspective may motivate a fairly close connection so that the evaluators are in a position to understand the objectives of policy and communicate them to the various stakeholders involved, in ways that can facilitate or strengthen policy implementation. On the other hand, a too close relationship might lead to fraternisation. There will then be a lack of integrity and ability on the part of the evaluators to disclose serious deficiencies. This problem is far from trivial. The community of qualified evaluators is a thin one, applying to most individual countries as well as to the international community, or the European Union level. The candidates around are in need of obtaining new jobs at steady pace, and coming up with unexpected, perhaps unwanted, results, could endanger future business. Adding to this, the limitations in terms of time and resources available, as well as the lack of in-depth knowledge or preparedness on the part of most policymakers to penetrate the results of evaluations with care for the purpose of applying them in policy revision, are likely to further reduce their motivation to do a comprehensive job.

These caveats point to the importance of putting in place professional practices and playing rules for the procurement and implementation of evaluations, as a platform for the establishment of an “evaluation culture”. Doing so will require some systematic preparations, execution, and signalling to the consultancy market that well prepared evaluations marked by independent judgement are indeed wanted. On that basis, such an environment will allow evaluators to get closer to the projects and the actors that are subjected to assessment, allowing for more interaction and communication of objectives and behavioural parameters and supporting process contributions from evaluations, at lesser risk of capture by vested interests.

5. Towards new recommendations on evaluation of innovation policies

Innovation policy today and in the future must take into account the systemic nature of the factors that influence innovative performance, including the driving forces of and interactions between multiple players within and across different economies. The systemic approach, if applied appropriately, must not serve as an excuse for the government to pursue less clearly underpinned and well motivated measures. On the contrary, the framework should function as an instrument to become better at identifying and addressing key weaknesses, wherever they appear across the spectrum of relevant policy areas. How do we increase our understanding of how to apply the systemic approach? How do we underpin it by including the systemic perspective in evaluations?

Evaluating innovative performance, and the efficiency and effectiveness of policy measures in this area, is intrinsically difficult. Some evaluations are costly and consume time without leading to useful results, or without the results leading to any meaningful use. What evaluation tools are developed and how they can be applied deserve careful attention. Not only should evaluations be designed in ways that provide useful information of measures undertaken, but also so as to enable more effective adjustment in the design and implementation of future policies and programmes. The mere knowledge of how a program is to be evaluated may serve as an incentive for various relevant actors to pursue programmes so as to sharpen their views and strategies with respect to rationale, efficiency, and so on. In this sense, evaluation policy may develop into an instrument for guiding processes, as well as for carrying out ex post assessment. For this to be the case, an integrated approach needs to be adopted in regard to programme design, implementation and evaluation. How do we strengthen the relevance of the evaluations conducted and integrate them into the policy process?

Encouraging stronger innovation activity in the knowledge-based economy transcends traditional delineations of political responsibility. In many cases, broader, more constructive co-operation within governments will be important for achieving relevant and effective policy outcomes. The involvement of multiple societal stakeholders is also important for laying the basis for adequate policy design and delivery, not least since the most difficult concerns, associated with the dominance of vested interests, otherwise risk being neglected. How do we arrange with arenas that can promote commitment to the innovation policy agenda and an understanding of the value of effective evaluation processes?

International co-operation and exchange of experience can serve to focus attention on the importance of critical examination and assessment of relevant policies. Measurement of policies is difficult in this area but it is important to intensify our methods for learning, and raise our ability to draw real lessons from the experience of others.

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Paper presented at IKED and VINNOVA Seminar

PUBLIC RESEARCH AND INNOVATION
POLICY FOR THE GOOD OF SOCIETY:
How To Assess The Way Forward?

November 8 2004, Stockholm, Sweden

**THE NEW AGENDA FOR EVALUATION OF
INNOVATION AND GROWTH POLICIES:
Methods for a Process-oriented
and Systemic Approach**

Joakim Appelquist, IKED



IKED

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THE NEW AGENDA FOR EVALUATION OF INNOVATION AND GROWTH POLICIES: Methods for a Process-oriented and Systemic Approach

Proceedings from joint IKED/VINNOVA seminar
November 8, 2004, Berns Salonger, Stockholm

Joakim Appelquist, IKED

1. Introduction

During the last 15 years the analysis of the innovation process has changed drastically. One of the reasons behind the transformation has been the introduction of the concept of innovation systems (Freeman, 1987, Lundvall *et al*, 1992, Nelson, 1993). The main building blocks of this concept are presented below.¹

Knowledge is the basic production factor. In order to sustain long term competitiveness and growth it is crucial to secure superior conditions for the production and commercialization of knowledge. Hence, learning becomes the most important process for the creation of value.

Innovation is a dynamic process. The introduction of new innovations does not only result in isolated shifts of supply curves. Instead they give rise to dynamic processes due to the large number of actors and the complex linkages between them. The adoption of a systemic perspective means recognizing the fact that innovation systems are constantly changing, which means that evaluations of innovation policy must handle issues of uncertainty and risk.

Innovation processes can only be understood in a context. Innovation processes are formed in the interplay between actors, organizations, institutions, regulatory frameworks and markets. Due to the complexity of these interrelations every innovation system must be analyzed as a unique construct. In order to develop efficient innovation policy there is a need to understand the incentives of the actors in the specific innovation system. However, this does not mean that traditional economic theory and evaluation methods are not applicable, only that they have to be modified and used in a fashion which manages the variations between different systems.

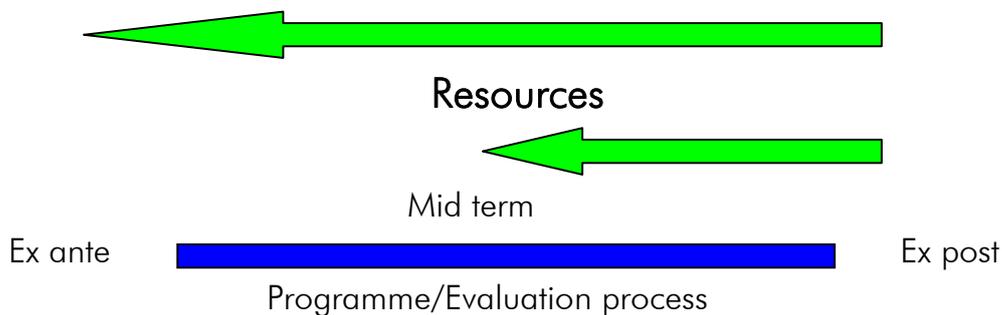
¹ For further discussions and efforts to classify different aspects of the innovation system concept see OECD (1998), Boekholt *et al* (2001) and Lundvall *et al* (2002).

The new outlook on the innovation process also poses a number of challenges for evaluations. What answers are needed to shed light on the development of innovation policy from an innovation system perspective? What methods should be used by the evaluation community to meet the challenges of capturing dynamic effects? How do we measure impact in systems characterized by constant change? The outstanding challenges are great and in order to meet them IKED have been commissioned by Vinnova to put together a handbook on the evaluation of innovation systems. In this paper some methodological suggestions on how to address these challenges are put forward.

The work with the handbook has resulted in the formulation of two main themes: 1. Methods for strengthening a process-oriented approach to evaluations. 2. Methods for addressing systemic effects. Some preliminary insights from the work with these two themes will be presented in the paper. In a third and final section the importance of balancing the cost and benefits of evaluation is addressed.

2. Strengthening a process-oriented approach to evaluation

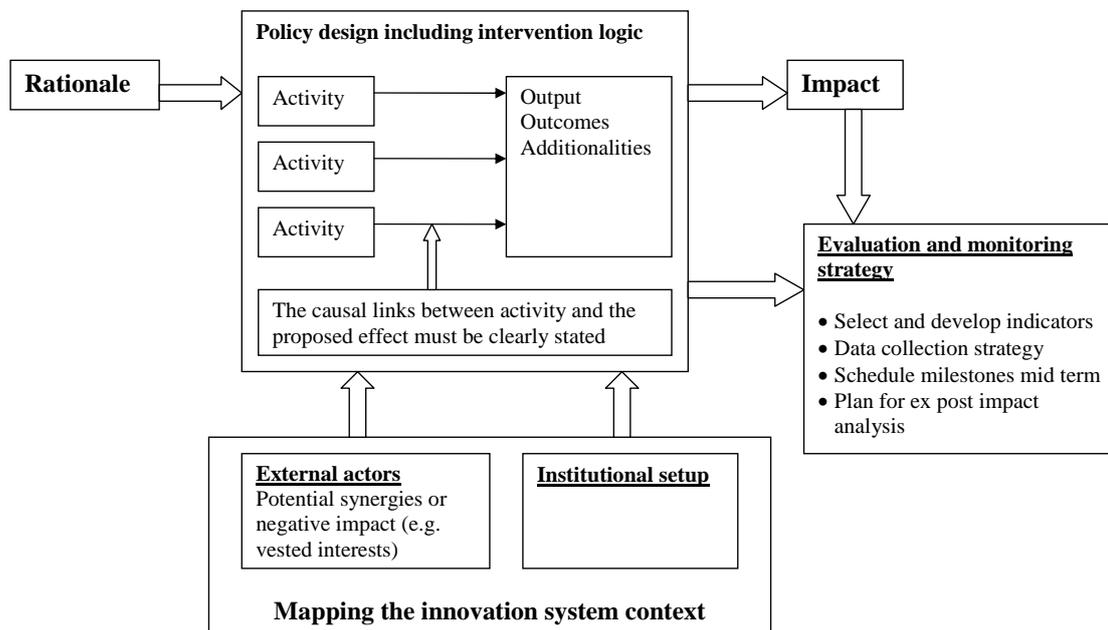
One way of making evaluation more flexible and securing the production of policy relevant information is to move away from evaluations as isolated events and initiate evaluation processes. In order to facilitate these processes it is necessary to redistribute resources forward in the evaluation process. This means allocating resources from *ex post* evaluation towards strengthening monitoring and evaluation *mid term*, and especially the planning and design of evaluation processes *ex ante*.



To facilitate effective *ex ante* planning the following principles and tools should be used.

Develop extensive and explicit programme models. A programme model is defined as a logically consistent description of the design of a programme as well as the expected impact on the effectiveness of the innovation system. This means that the models must include the rationale of the programme, clearly stated intervention logic with explicit descriptions of the causal links between proposed activities and the expected effects, the expected impact from other actors and institutions, and a monitoring and evaluation strategy. Figure 1 presents a stylized version of a programme model.

Figure 1: Stylized programme model



From an evaluation perspective there are a number of advantages of formulating programme models *ex ante*.

- a. **Intervention logic.** The intervention logic forms a crucial basis for the planning of the evaluation process, because it forces the participants to clearly specify targets and objectives early in the policy process.
- b. **Impact from other innovation system actors and institutions.** Including a requirement to map the innovation system in which the policy will be introduced is an important step towards a deeper understanding of the innovation process. It is used to support a move away from a *black box* perspective, where evaluations only try to establish correlations between input, i.e. policies, and impact, towards a *white box* approach, where evaluations aim to answer the question what really happens when a policy is introduced. It is only when studying actual processes and actors that it is possible to capture and understand impacts in ever-changing environments.

Finally, the programme models can be described as a way for policy makers and other actors to formulate operational hypotheses on the function of innovation systems and their ability to increase their effectiveness. Evaluations can, in turn, be used to investigate the validity of these hypotheses.¹

¹ The importance and advantage of using impact modelling techniques were stressed at the seminar both by Elisabeth Waelbroek-Rochas, Director General, BIPE, France and Jari Romanainen, Executive Director, TEKES, Finland.

Development of suitable indicators. One important aspect of the evaluation process design is the development of suitable indicators and the planning for data collection. This is necessary to avoid evaluation becoming a sub discipline to archaeology, i.e. spending resources on establishing the development of a programme and its impact *ex post* instead of continuously recording events and collecting data.

Involve the actors. In order to make the evaluation process efficient it is important to involve the actors in the planning of the evaluation process. One way is to make the formulation of a programme model an obligatory part of all applications for public grants. This will force the actors to clearly state the objectives of the programme and, as mentioned before, to formulate causal links between activities and expected effects. Since these models include the identification of relevant target and objectives it makes the actors think in terms of evaluation right at the beginning of the policy process. By involving the actors at such an early stage and giving them a greater influence on the selection of indicators and appropriate methods for measuring impact the relationship, between the evaluator and actors being evaluated, is changed. Changing this relationship is, in turn, an important step towards moving from a paradigm where evaluations are mainly seen as an instrument for control to a situation where evaluations are seen as learning processes.

3. Addressing systemic effects

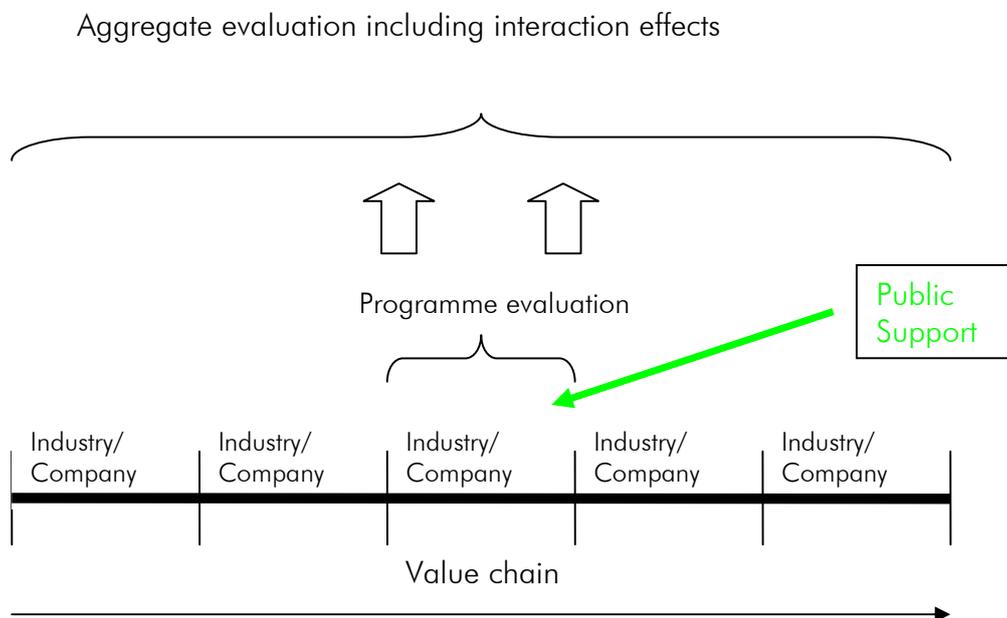
The introduction and rapid diffusion of the innovation system concept, both in the realm of academia and policy making, has increased the need to include systemic effects when designing evaluations. However, so far the attempts to systematically analyze the concept of systemic failures, and to develop methods to incorporate these when investigating the performance of implemented policies, are few (Smith, 2000, O'Doherty & Arnold, 2003). As a contribution to this discussion the handbook lists a number of challenges. These challenges are also intended to serve as an instrument to structure the extensive concept of systemic effects in order to make it operational when designing evaluations.

Identifying policy mismatch and potential policy synergies. One obvious challenge is to develop methods which can assist in identifying policy mismatch (“Bottlenecks”). Was the performance of the programme affected negatively by existing vested interest? Could there have been larger impact with changes in the institutional set-up? However, the effects from other actors in the innovation system and existing institutions are not only negative. Therefore, another important aspect of evaluations is the ability to identify possibilities of policy synergies. For instance, how do we involve actors from academia in order to further strengthen the competitive edge of a programme stimulating investments in small and medium sized enterprises? How do we change tax schemes in order to increase the impact of public support further by stimulating input additionalities? The challenge is to estimate the impact from other actors and institutions when conducting evaluations with the objective of increasing the overall effectiveness of the innovation system.

Choosing the right level of aggregation – Capturing additionalities and portfolio evaluations. When applying a systemic perspective to the analysis of innovation and growth policies it is important to think about what kind of impact one wants to capture and choose the appropriate level of aggregation. Due to the complex interaction between the actors in the innovation system it is not certain that the impact of a programme will affect the participating actors. Instead, it may be realized in other part of the innovation system. In order to support future policy development it is crucial to capture these additionalities. One way to capture additionalities is to aggregate the analysis and investigate a larger number of actors.

Supporting an industry which is part of a value chain illustrates the need to aggregate the level of evaluation in order to capture relevant effects. If a company or a number of companies participates in a publicly supported programme it is not necessary that the profit or largest impact will be on the participants. Instead, due to competition or other forms of interaction between the actors throughout the value chain, the impact might be realized up streams or down streams. In order to understand the effects of the public support there is a need to aggregate the analysis to include parts of or the entire value chain (see figure 2).

Figure 2: Where in the value chain is the profit/impact realized?



Incorporating risk – Portfolio evaluations. Another reason for aggregating or expanding the scope of evaluations is the high level of risk associated with innovative activity. This well established fact has been further stressed by the focus on the constantly changing character of the innovation system of today. Due to the high level of risk there is an expectation that a certain number of the projects that is initiated inevitably will fail. Therefore it is not meaningful to focus impact studies on specific projects. Instead they must be valued and examined as a portfolio, i.e. is you must look at the success rate or impact of a larger number of projects taken together (OECD, 1998). Was the composition of projects suitable for the specified objectives? Were there any additionalities which were not achieved due to the composition of programmes chosen by a specific authority?

Capturing dynamic effects. One of the greatest challenges of including a systemic perspective in evaluations is the dynamic nature of the innovation system. As described in the example of the value chain above, every intervention in the system gives rise to a number of reactions from other actors in the system. The dynamic effects can be short term as is the case with user-producer relationships, technical and knowledge spill-overs, the interaction in regional clusters and so forth. But even more challenging is the long term or delayed impact of most public support. The character of the support given by public actors is often given on the basis that they will influence the function of the innovation system over a long period of time. Behavioural additionalities, support for basic research, financing the creation of research networks are just a few examples. In these cases the challenge is to develop short term indicators of long term effects.

4. The scope of evaluations – Balancing the value of information and the cost of evaluation

The discussions above concerning the importance of strengthening the entire evaluation process and the importance of including systemic effects are both indicating a need for more extensive evaluations. But since there is a fierce competition for the resources in the public sphere the possibility of a large increase of the resources available for evaluations is limited. Instead there is a need to use the existing resources more effectively.

One way to think about this challenge is to recognize that there are both costs and benefits when conducting evaluations. Increasing the scope of an investigation through the inclusion of dynamic aspects, impact of external actors, using multiple methods and so forth are in most cases associated with higher costs. Therefore, the decision to widen the scope must always be measured against the expected value of the additional information as an input in the process of developing new projects, programmes and policies. In our work with the handbook we have identified a number of ways to increase the efficiency of evaluation both through lowering the costs of evaluation and through the increase of the value of the collected information.

Below are some examples of guiding principles for more efficient evaluations

Measures to enhance the benefits from information generated by evaluations

Conduct evaluations that generate generally applicable information. The main reason for conducting evaluations is to gather data that will improve the design of future innovation policy. That is why one always has to consider the value of the information in the policy development process when selecting the candidates and deciding on the scope of the evaluation. Generally it can be stated that information which can be used in the development of a large number of projects and programmes (for example a new way of addressing a common problem) has higher benefits than evaluations of projects and programmes which are highly dependent on specific contextual variables for their performance.

Failed projects and programmes. There is always risk to merely focus on the success cases when selecting projects for closer scrutiny. Even though it is important to learn from these cases it is equally important to understand what went wrong with projects and programmes that in some respect have failed in order to avoid mismanagement with resources in the future.

Portfolio evaluation. Evaluations of the composition of a number of different policies with a common objective support a more efficient allocation of public resources through the identification of policy mismatch and potential synergies between policies of different actors and agencies.

Create arenas for information distribution. A prerequisite for achieving benefits from an evaluation is to make sure that the information is distributed in an efficient manner to as many actors in the innovation system as possible. Failing to secure this stage of the evaluation process will drastically decrease the value of performing evaluations. The most effective way to distribute the information varies according to the type of projects and programmes that is being evaluated, the methods used and the character of the result. Making use of existing networks of actors in different parts of the innovation system and setting up web portals are just two different strategies discussed in the handbook (see also Kuhlmann, 2002).

Measures to lower the costs of evaluation

Develop standardized indicators. One way to lower the cost of more complex evaluations, such as econometric studies, is to develop a set of common indicators which all actors involved in public supported projects are obliged to collect. By making the collection of these data obligatory it is possible for the actors to develop efficient routines and include the gathering of this data in existing information systems. The availability of common indicators in several projects might also increase the benefit of this information since it makes it possible to conduct comparative studies between different projects and programmes.

Integrate the development of indicators in the design process. Another way to lower the cost of evaluation is to integrate the development of indicators, both standardized, but especially project or programme specific indicators, in the overall design process. This is an important aspect of the redistribution of resources forward in the evaluation process.

5. Conclusions

The increasing use of the innovation system concept as a basis for innovation policy design requires new evaluation methodologies. To support the development of new evaluation instruments Vinnova has commissioned IKED to develop a handbook on the evaluation of innovation system. One of the approaches introduced to strengthen evaluation is the process-oriented approach, which requires reallocation of resources forward in the evaluation process. It is especially important to secure the *ex ante* planning of the evaluation process, through the development of extensive and explicit programme models, the development of suitable indicators and securing the involvement of the actors in the planning process. Another aspect which is addressed in the paper is the challenge to capture systemic effects when conducting evaluations. In order to achieve this it is crucial to:

1. Develop methods that identify policy mismatch and policy synergies
2. Choose the right level of aggregation when evaluating.
3. Develop methods to handle risk and support portfolio decisions
4. Develop methods to capture short and long term dynamic effects.

Finally, the paper includes a discussion on the need to limit the scope of evaluation. This is achieved by weighing the costs of evaluation against the expected value of the information that is generated.

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Paper presented at IKED and VINNOVA Seminar

PUBLIC RESEARCH AND INNOVATION
POLICY FOR THE GOOD OF SOCIETY:
How To Assess The Way Forward?

November 8 2004, Stockholm, Sweden

THE INTERNATIONAL RECORD IN EVALUATING INNOVATION AND GROWTH POLICIES

Elisabeth Waelbroeck-Rocha
Director-General, BIPE



THE INTERNATIONAL RECORD IN EVALUATION INNOVATION AND GROWTH POLICIES

Proceedings from joint IKED/VINNOVA seminar
November 8, 2004, Berns Salonger, Stockholm

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1. Introduction

In today's world, companies are faced with new challenges which call for an adaptation of their strategies and the development of new strategic responses. The response strategies place a greater emphasis on innovation as a key success factor for growth and competitiveness.

In its broad sense, innovation encompasses not only new product development, but also process innovation (in production, marketing, commercialisation and distribution) and innovation in management and organisation. By focusing on innovation, firms seek to reduce production costs, enhance productivity, respond to new demands from customers (such as demands for security, mobility, quality, reliability, environmental protection) and penetrate, or even create, new markets.

Although such focus on innovation is not new, it has recently taken wider proportions. With the development of competition and globalisation, companies seek to bring new products to markets ever more quickly in order to gain or preserve market shares, in effect reducing the average life cycle of products. Yet, there are indications that (some) consumers are becoming wary of the rapid pace of innovation, and that basic factors such as sensitivity to price and reliability of products and services are again growing in importance. For example in France, in a recent survey on attitudes to innovation⁴, although 40% of the people interviewed indicated that they are attracted to innovation, and 35% would even consider paying a higher price for an innovative product, only 20% said they would buy an innovative product as opposed to an existing, well tested, product. The latter percentage is actually lower than was recorded in the same survey in 1998, confirming that consumers are becoming more cautious with respect to innovations and are less willing to buy products or applications that are being put on offer too early, i.e. without having being thoroughly tested and re-tested. In other words, choice criteria such as reliability and price remain very important.

⁴ Les Français et les produits innovants : une attirance teintée de prudence, Le 4 Pages du SESSI, N°187, mars 2004.

This underlines the fact that **innovation is not an end in itself, the fundamental objective being growth and competitiveness.**

A first difficulty associated with the evaluation of innovation policies is therefore to define the object of evaluation: is it the policy, the process or the result of innovation that is being evaluated? This is, however, not the only challenge in evaluating innovation policies. In effect, the challenges are as follows:

The time dimension: innovation is a process that is implemented in order to attain certain objectives. The results of innovation are, however, only noticeable - hence measurable - in the long, sometimes very long, run.

Defining the results that are to be measured: as all policies, innovation policies have direct effects (on markets, products, competitiveness) and induced or spill-over effects. For example, an innovation policy implemented at local or regional level can lead to the development of new molecules or new applications for a given material or equipment, hence foster new production, sales and exports; but this can also increase the region's attractiveness as a research centre, leading to immigration of quality researchers (example of induced effect). And, the new discoveries can generate spill-over effects onto other regions or other sectors/areas of the economy than those initially targeted by the innovation policy.

A third challenge related to evaluating innovation policy is to clearly ***distinguish inputs, processes and outputs.*** Measuring expenditure on R&D for example is only a measure of the inputs into the research and development process. Measuring the number of persons with university degrees or the number of scientists who work in a given region is also only a measure of inputs. Even the number of patents registered is not an adequate output measures, rather it is a measure of intermediate results. Examples of measures of the process are evaluations of the efficiency of R&D expenditure or the number of companies or institutions involved in a cooperative R&D effort. None of these are measures of the result or success of R&D.

Measuring the causal relationships between policies and results is often very complicated: many policies interact, and many factors influence outcomes. Ideally, one should be able to compare the results achieved as a result of the policy implementation, with those observed in the absence of such policy, for example through a control group. This is, however, not necessarily always feasible, nor desirable given that one of the chief objectives of innovation policies is the diffusion of innovation...

Similarly, *assessing the relative benefits of policies* can be a challenge: innovation policies can take many forms and address many aspects of the innovation process, and their objectives can differ. For example, some innovation policies are organised in such way as to foster basic research, with the hope that this will eventually diffuse into the economic system, whereas other policies are application driven, i.e. aimed mainly at pulling together resources involved in, and the outcomes of, basic research, in order to develop new solutions to existing problems (for example, operating certain equipment under extreme climate conditions). How does one evaluate in which model the money invested is best spent?

To address the above problems, approaches adopted in other areas of policy evaluation consist in comparing the outcomes '*all other things being equal*', in particular the amount of effort engaged. Environmental policies for example have been assessed by looking at the net effect on the economy of taxes on energy or CO₂, assuming that the government balance remains unchanged. In other words, the overall economic impact of the tax was assessed under the assumption that the tax revenue would be spent by the government on other aspects deemed important to policy makers, such as social or employment policy, or tax reductions for low income groups. Although the choice of the alternative budgetary policy is clearly not neutral, this does give 'some' measure of the relative effectiveness of public efforts.

A last challenge in evaluation innovation policies consists in measuring the effectiveness of public spending by taking into account the *possible crowding out effect* that this may have – in other words, by controlling the 'inputs' into the process. Indeed, with innovation policies as with other policies, government efforts may come as a complement to private sector efforts, but may also substitute part of the efforts that would otherwise have been undertaken by the private sector itself. This problem of additivity of public policy is extremely important when it comes to innovation policies, both because the primary beneficiaries are the companies themselves, and only through them society. Hence, the questions are whether the public policies are really complementary or only a substitute to private initiatives, and whether public funding does not just contribute to financing less profitable, as opposed to more risky, projects.

In addition to these key policy evaluation challenges, there are two common mistakes that have to be avoided. The first is that **the measure becomes the target**, in other words that the indicator of success that is selected for evaluation becomes the objective of policy. This is what happened for example with the Lisbon strategy objective, which has defined two objectives for 2010:

- a 3% R&D share in GDP in 2010, and
- a rise in the number of researchers per 1000 inhabitants from 5 on average in 2000 to 8 by 2010.

Clearly, meeting these targets is no guarantee at all that by 2010 the EU will be the fastest growing knowledge based economy, yet all the focus of policy is on these targets and not on the end-result.

The second mistake is to **choose a potentially *misleading* indicator**, such that one may actually misinterpret the signal that it sends. For example, a rise in the number of new products to the market is not necessarily a sign of higher innovativeness, or of ‘quality’ innovation, but may simply reflect the fact that, confronted with a certain sense of urgency, products are brought to the market that are not thoroughly tested or, worse, that do not meet the market’s needs. Hence, they have to be replaced prematurely. The real test is whether there is a demand for the innovative products or services, and whether this is additional demand, or whether the product is just cannibalising an existing product. The same holds for the product turnaround time: shorter product life cycles and faster turnaround times may signal product inadequateness and not a faster pace of innovation. Similarly, the amount spent on innovation is not an indicator of the effectiveness of innovation...

2. The importance of ex-ante analysis for policy formulation and policy evaluation

There are three dimensions for evaluation that must not be confused. These are:

- The quality of inputs,
- The process
- The results

Where the latter dimension can be assessed either in terms of *direct impacts* on the defined policy target (has a new application been developed), in terms of the *spill-over effects* on other areas of the economy (what implications does this have on other areas of the economy, such as regional, attractiveness, new company generation or other), and in terms of the *diffusion effects* (what other developments are possible thanks to this new application, what other functions can this new application help to fulfil, what other problems can be solved).

One pre-requisite for evaluation, however, is to clearly define the objectives of policy through a thorough analysis of the problems/deficiencies. Such ex-ante analysis can not only help to confirm the policy needs but can also help to identify the indicators that will most appropriately signal improvement and help interpret the indicators correctly. For example, in France, one of the objectives of innovation policy has been to provide funds to SMEs in order to supplement the (scarce) resources that they can spontaneously mobilise. Yet, a survey of investors undertaken by BIPE in association with AFII⁵ in 2004 indicates that the amount of funding available for new projects seems to be available, and it is projects that are lacking. The risks, when the true underlying problem is not correctly identified, are first to see public funds substitute private funds for those few projects that are launched, and second that the public funds simply reduce the rate of return above which projects are launched, as opposed to addressing the underlying problem, which is a lack of innovative projects.

⁵ Association Française des Investisseurs Institutionnels

3. Characterising the policy instruments is another pre-requisite to evaluation

Even where the policy objective has been clearly defined, on the basis of a thorough investigation of the underlying problem(s), there are still multiple instruments of policy that can be applied, and there are multiple vehicles for policy. Within the context of the Technopolis programme, a typology of R&D support measures has been developed which illustrates the wide range of tools and actors that can be mobilised. Policy measures are classified along three dimensions, characterised by the type of actor involved (the public sector alone, the private sector, or some form of public-private partnership), the type of incentive (non-financial, for example by providing access to certain research infrastructure, or a programmed financial incentive (reimbursable loan), a neutral financial incentive, or a direct financial assistance, such as a subsidy or grant) or policy that is applied; and, the target of the incentive, i.e. the knowledge creator, the knowledge user or a network.

Ideally, the effectiveness of policy should be assessed within this 3-dimensional system. For a given policy objective, was the appropriate instrument selected? Applied to the appropriate economic actor or stakeholder? In a cost effective way? Was it the most efficient way to achieve the measured result?

In practice, measuring the effectiveness of policy under these three dimensions is, however, very difficult, if only because the three levels interact.

4. Evaluation methodologies

The methodologies that are presently being used to evaluate innovation policies can be grouped in five families of approaches, ranging from ‘ad hoc’ policies to scoreboard approaches, surveys, econometric analyses seeking to define causal relationships, and more complex modelling approaches. Among these, the first two are most commonly used, the third (survey-based evaluation) is occasionally used, and the last two are really only emerging.

Ad hoc approaches consist in defining a particular indicator or a set of indicators, and measuring the impact of policy on that indicator or tracking changes in the indicator over time. Examples of this approach are the Excellence Index in Life Sciences, which measures the percentage of publications of different research institutes in scientific publications whose impact factor is above 20, or indicators of the degree of attraction of countries/regions to researchers, measured by migration flows of certain categories of personnel to and from the country/region. Such indicators are designed to measure a *given* variable or factor, defined as being relevant given the type of policy being evaluated.

Surveys typically also seek to give indications of the effectiveness of policy by focusing on measures not available through general statistical information collection procedures, generally also covering more qualitative aspects.

Scoreboard approaches are more complete, even if they often tend to mix ‘input’ and ‘output’ indicators. This is the case for example of the EC Innovation Survey, which combines indicators of innovativeness and indicators of the amount of effort undertaken into composite measures designed to capture the amount of ‘product innovation’ or ‘process innovation’ of given sectors or regions.

In contrast, **econometric approaches** are aimed at describing the causal relationship between inputs and outputs: changes in measures of outputs of innovation policies are explained as a function of various combinations of ‘inputs’, such as the amount of R&D expenditure, the intensity of human resources involved in the R&D effort, or other. Measures of output can be growth, number of patents, number of new products brought to the market, etc. Two draw-backs of this approach are first that it measures causal relationships ‘all other things being equal’ – when we know that all other things are never entirely equal - and second that is very data intensive.

There are ways to enhance these evaluation methodologies, drawing from other fields of economic analysis. Indeed, if the present approaches owe much to traditional methodologies designed to assess competitiveness - by distinguishing the factors that *drive* competitiveness from the *results* of competitiveness policies as measured in terms of trade developments, prices, employment or growth - there are other fields of economic analysis

that could be drawn from in order to enhance the methodologies to evaluate innovation policies. Among these are the methodologies to evaluate cluster processes, methodologies to evaluate start-ups and methodologies to evaluate intangible investments: all three indeed have to address more qualitative aspects of policy making and have to assess the process through which certain inputs lead to certain results.

Cluster policy evaluation methods are not totally formalised yet. Given that the main benefits of clustering are the quality interactions that are supposed to develop between the various stakeholders in the cluster, cluster evaluation methodologies seek to define some sort of measurement of the number, variety and quality of linkages within the cluster. They typically involve a combination of data analysis and qualitative surveys, and distinguish evaluations of the process (the cluster initiative) from the assessment of the benefits of clustering (measured in terms of employment creation, new company creation, growth or other). There is, however, no consensual approach to measuring the quality of interactions between players yet.

Methodologies used for the *valuation of start-ups* combine approaches from the fields of finance and accounting, with the more qualitative aspects that are essential to measuring the risk associated to investments in an uncertain environment.

Finally, methodologies for *quantifying intangible investments* aim to define a new accounting and reporting system that would better take into account the 'true' value of firms than do existing accounting methods. As for cluster evaluation processes, the development of methodologies and approaches to measure the value of intangible investments are, however, only at an emerging state of development. Yet, from this field too there are interesting ideas that could be drawn from in order to define more appropriate methods to evaluate the results of innovation policies. Indeed, among the 'intangible assets' that these approaches seek to quantify are the quality of human capital, social capital, and innovative capital. Future discounting techniques are applied to take into account the time dimension and the uncertainty associated with the future value of these intangible assets.

5. Best practices

International experience with evaluation policies currently points to the following best practices, which clearly have to be started totally upstream from the process:

- Define clearly the policy objectives;
- Characterise the innovation policies, by defining the instrument, the means *and* the process through which the measures are deemed to result in given outputs;
- From this characterisation, derive the variables or units of measurement that will be used to monitor the effects of policy, and characterise these based on whether they are input indicators, process indicators or policy targets;
- Measure these variables before the inception of policies (constitute a historical track record whenever possible);
- Track changes over time and geographies;
- Measure the results on all dimensions *ex post*.

Although there seems to be a broad consensus on the above, the various analyses of innovation policies that have been reviewed when preparing this presentation typically measured *either* the degree of innovation based on the intensity of effort undertaken, *or* the results (along only few dimensions), but none really sought to analyse the *relative effectiveness* of policies. Also, none sought to analyse the *additionality* problem.

6. Towards a new approach to policy evaluation

There seems to be a need to go back to the very rationale for policy support to innovation, and to define ways to analyse whether the form taken by policy support is the most appropriate given the underlying objective. One is, in fact, forced to admit that there is a potential conflict between the individual objective of a firm and the policy objective, taken here to be the good of society. Indeed, whereas the public objective is generally the creation *and* diffusion of technology in order to generate as much spill-over and diffused effects as possible into the economy, the private (company) objective is to gain an edge on competitors, hence keep innovation exclusive in order to maximise the return on investment.

With this in mind, one could think of developing a new approach to evaluation, that would draw on methodologies from other fields of economic analysis, in this case from methodologies used to allocate the costs of multi-product firms across product lines. Indeed, public policy makers fostering innovation typically seek to meet multiple goals, and this is done by applying simultaneously a variety of instruments, each of which targets a given aspect of research and innovation. Evaluating the effects of innovation policies on the objectives thus requires integrating this complexity and assessing how the combination of policies has affected the final objective(s), i.e. applying a systemic approach to evaluation.

One approach that seems worth investigating would be to build a control model that would describe the expected (planned) effects of each policy and then to measure the actual combined outcome of an appropriate set of policies against the expected outcome. Developing an explicit model of that type would force one to think through the mechanisms that will lead to the given outcome most effectively, and to clarify the expected aggregate effects, given the amount of effort put in. The outcome of policy can then be measured against the 'planned' or desired effect, such that major diversions between the expected and actual outcomes can lead to re-adjustments in individual measures as well as in more aggregate strategies.

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Proceedings from IKED and VINNOVA Seminar

PUBLIC RESEARCH AND INNOVATION
POLICY FOR THE GOOD OF SOCIETY:
How To Assess The Way Forward?

November 8 2004, Stockholm, Sweden

SEMINAR PROGRAMME



PUBLIC RESEARCH AND INNOVATION POLICY FOR THE GOOD OF SOCIETY: How To Assess The Way Forward?

Seminar Programme for joint IKED/VINNOVA seminar
November 8, 2004
Strindbergsalen, Berns salonger, Stockholm

8.15 Registration & morning coffee

8.45 – 9.15 “Allocation of public investment in science and R&D: towards a new approach?”

- *Per Eriksson* Director General, VINNOVA,
- *Thomas Andersson* President IKED and President of Jönköping University

9.15–10.00 “The new agenda for evaluation of innovation and growth policies”

Speakers

- *Kjell Håkan Närfelt* Analyst, VINNOVA
- *Joakim Appelquist* Project Officer, IKED

Discussants

- *Per Koch* Deputy Director, NIFU STEP
- *Lars Mathlein* Assistant State Secretary, Ministry of Finance, Sweden

10.00 – 10.15 COFFEE

10.15 – 12.15 “The international record: best practices and outstanding issues”

Speakers

- *Erik Arnold* Managing Director, Technopolis, United Kingdom
- *Gernot Hutschenreiter* Senior Economist, Science and Technology Policy Division, OECD
- *David King* Director, Ministry of Economy, New Zealand
- *Elisabeth Waelbroeck-Rocha* Director General, BIPE, France

Discussants

- *Lars Bager-Sjögren* Senior Economist, ITPS
- *Sylvia Schwaag-Serger* Director, IKED

12.15 – 13.30 LUNCH

13.30 – 15.00 “Implications for policy implementation”

Speakers

- *Christian Motzfeldt* Director General, Vaextfonden, Denmark
- *Jari Romanainen* Executive Director, Tekes, Finland
- *Per Eriksson* Director General, VINNOVA
- *Thomas Andersson* President IKED and President of Jönköping University

15.00– 15.15 “Closing of meeting: How do we proceed?”



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PARTICIPANTS LIST



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Participants List for joint IKED/VINNOVA seminar
November 8, 2004
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Joakim	Appelquist	IKED
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Lars	Bager-Sjögren	ITPS
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Kenneth	Billquist	KTH Innovation
Tobias	Billström	Sveriges Riksdag
Sture	Blomgren	Formas
Enrico	Deiaco	SISTER
Gunnel	Dreborg	VINNOVA
Arne	Ericsson	
Björn	Eriksson	Ekebacka Konsult AB
Per	Eriksson	VINNOVA
Carl-Otto	Frykfors	VINNOVA
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Hanna	Haarup Thomsen	Danish Ministry of Science, Technology and Innovation
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Helena	Karlsson	SCB
Christian	Ketels	Harvard Business School

David	King	Ministry of Economic Development, New Zealand
Keiko	Kjellsson-Sampe	JETRO
Per	Koch	STEP
Heikki	Kotilainen	TEKES
Staffan	Larsson	NUTEK
Göran	Lindqvist	Handelshögskolan
Bertil	Ljung	Lunds Universitet
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Ingrid	Pettersson	SCB
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Ylva	Sjönell	VINNOVA
Michael	Sohlman	Nobelstiftelsen
Reija	Tuomaala	Albero Communications Ab
Elisabeth	Waelbroek Rocha	BIPE, France
Torbjörn	Winqvist	VINNOVA



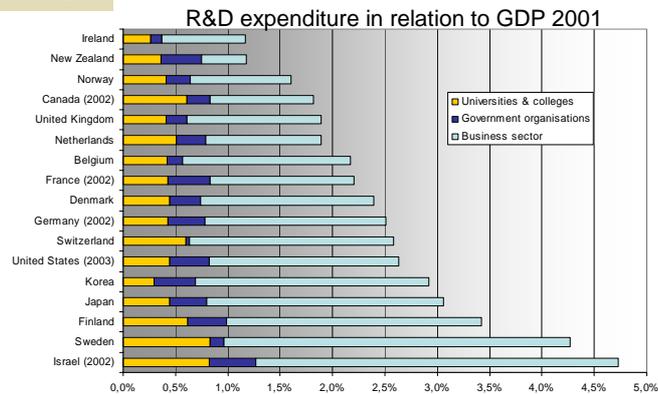
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APPENDIX SELECTED POWER POINT SLIDES





Source: OECD MSTI, 2004

Investments in R&D are high but the pay-off in economic growth is low – a Swedish R&D-paradox! Why?

- The R&D-investments are not well chosen? *Weak need-driven R&D!*
- The innovation system is not effective, weak interplay between companies, university and politics? *Weak Triple Helix Interplay!*
- Some important actors are to weak and create bottlenecks in the innovation system? *SME and Research Institutes are weak in R&D!*
- Some regulations create hinders? *Taxation and Bureaucracy!*
- Attitudes? *Entrepreneurs should be heroes! Less Humboldt and more Entrepreneurial Universities are needed!*

Swedish National Innovation System Characteristics:

- The economy strongly internationally linked
- The big international companies dominates the R&D-system
- SME invest very little in R&D
- Universities dominates the public R&D-system and they have a third task, to cooperate with companies and society
- Small sector of Research-institutes
- Government invests very little R&D-money in companies (most to universities)

Efficient innovation systems

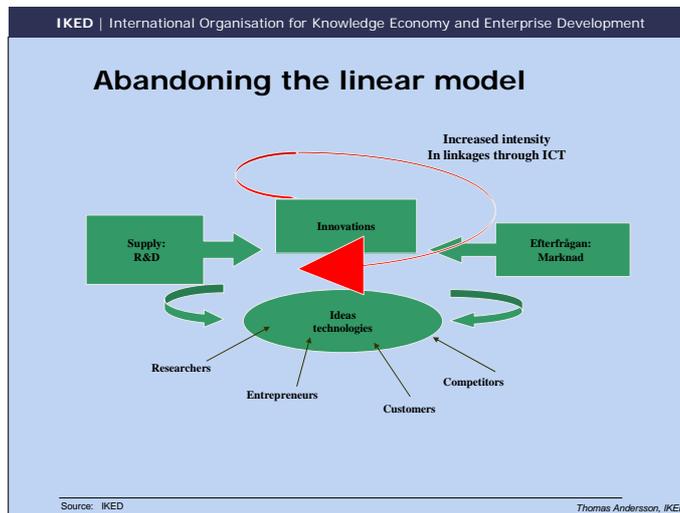
Sustainable growth requires interaction between business, research, and policy/the public sector – Triple Helix. Entrepreneurs moves between these actor groups

The interactions result in new products, services, and processes.

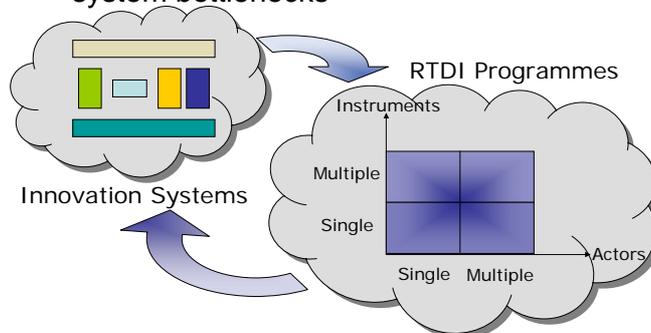


Interaction between

- Business
- Research
- Policy/Public Sector



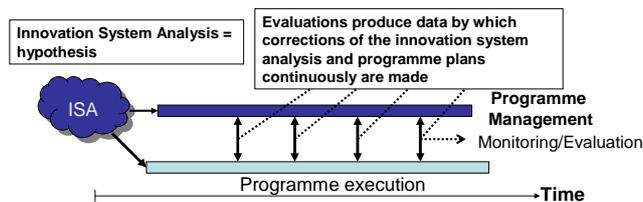
From research needs to innovation system bottlenecks



From research councils to innovation system investors

- Project Selection/Portfolio Creation
⇒ *Ex-ante evaluation*
- Investment follow-up
⇒ *Active monitoring and evaluation of result development and result effects*
- Value-adding support activities
⇒ *Evaluation of agency additionality*
- Measurement of investment returns
⇒ *Impact analysis of systems and programmes*

From evaluations as events to evaluations as learning processes



"Timing is everything!"

Issues and challenges

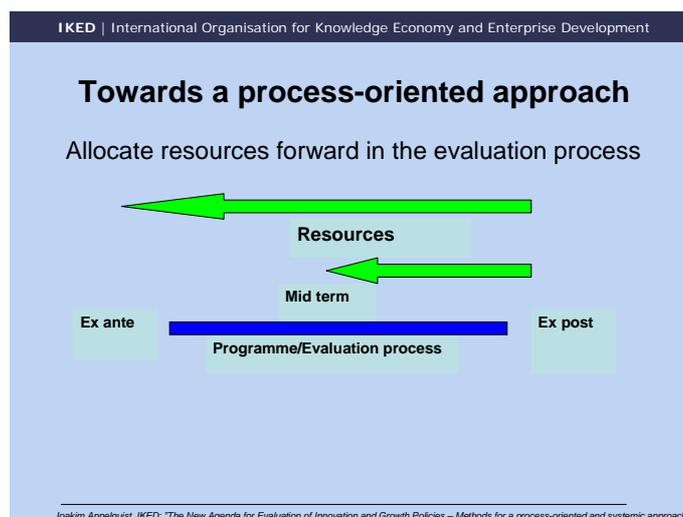
- The ability to observe system level effects of multi-actor-multi-instrument programmes
- Cope with a dynamic and non-deterministic context (genuine uncertainty)
- Balance cost vs value of evaluations!
- Manage the "delivery gap"!

Evaluation – General Objectives

- Operative Learning
 - Improve the design and implementation of VINNOVA's internal operations ("effectiveness, efficiency, quality")
- Policy Feedback
 - Guide the design of policies and programs so that the efficiency and effectiveness of the national innovation system is improved
- System Impact
 - Determine the outcome and impact of policy measures and programme initiatives

The Strategic Vision

- On the Policy Level:
 - Make evaluations and impact studies an integral part of the strategic policy planning and implementation process
- On the Program Level:
 - Include plans for evaluation and impact assessments in the design, planning and implementation of innovation programs
- On the Project Level:
 - Include relevant data collections implied by the policy and program level so that the requirements of monitoring, evaluation and impact assessments are fulfilled



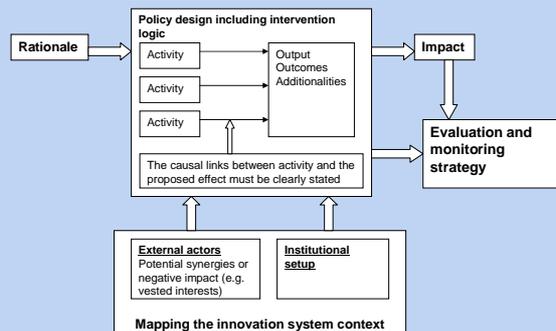
Ex ante planning of the evaluation process

1. Develop extensive and explicit programme models
Programme models are logically consistent descriptions of the design of a programme and the expected impact on the effectiveness of the innovation system
2. Develop and plan for the collection of suitable indicators
 Avoid making evaluation a subdiscipline to archeology
3. Involve the actors and stakeholders
 Move from a paradigm of evaluation as control to evaluation as learning

Joakim Appelquist, IKED: "The New Agenda for Evaluation of Innovation and Growth Policies – Methods for a process-oriented and systemic approach"

Ex ante planning of the evaluation process

Stylized programme model



Joakim Appelquist, IKED: "The New Agenda for Evaluation of Innovation and Growth Policies – Methods for a process-oriented and systemic approach"

Addressing systemic effects

Challenges for evaluation

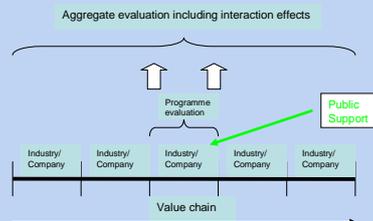
- Identifying policy mismatch and potential policy synergies
- Choosing the right level of aggregation
- Incorporating risk – Portfolio evaluations
- Capturing dynamic effects (Short term and long term)

Joakim Appelquist, IKED: "The New Agenda for Evaluation of Innovation and Growth Policies – Methods for a process-oriented and systemic approach"

Addressing systemic effects

Choosing the right level of aggregation

Where in the value chain is the profit/impact realized?



Joakim Appelquist, IKED: "The New Agenda for Evaluation of Innovation and Growth Policies – Methods for a process-oriented and systemic approach"

The scope of evaluations – Balancing the cost and benefits of evaluations

- The resources for evaluation are scarce
- Increase the effectiveness of evaluation through
 - Enhancing the value of the information generated by evaluations
 - Decreasing the cost of evaluations

Joakim Appelquist, IKED: "The New Agenda for Evaluation of Innovation and Growth Policies – Methods for a process-oriented and systemic approach"

Measures to enhance the value of information

- **Generate generally applicable information**
- **Evaluate “failed” projects and programmes**
- **Portfolio evaluation**
- **Create arenas for information distribution**

Measures to lower the cost of evaluation

- **Develop standardized indicators**
- **Integrate the development of indicators in the design process**

Joakim Appelquist, IKED: "The New Agenda for Evaluation of Innovation and Growth Policies – Methods for a process-oriented and systemic approach"

There is no objective truth

- Innovation takes place in complex systems of companies, knowledge institutions, financial institutions and within a extensive regulatory, social and cultural framework.
- Innovation is based on complex learning processes involving a large number of persons, all with different educational backgrounds and experiences.
- Innovation thrives on spill-overs and unexpected combinations of persons, existing knowledge and technologies.
- **This complexity prevents easy solutions to the evaluation problem.**



On evaluation and policy learning

- The old paradigm:
 - evaluation as a pure control and audit mechanism
 - policy learning as an adaptation of research based, “objective”, analysis
- The new paradigm:
 - evaluation as a part of the ongoing process of policy learning
 - policy learning as a hermeneutical process involving all experts: researchers, analysts and policy makers



The role of policy makers

- Policy makers need time and resources to make use of evaluations and research:
 - Time for reading and analysis
 - Internal workshops
 - Project and programme board membership
 - Participation in international fora (OECD, EU, Nordic Council etc.)
 - Theoretical and methodological studies
- This will make them better evaluation, project and programme designers



The role of evaluators

- Researchers and innovation policy analysts need to develop their understanding of policy development
 - The social and cultural context of policy development (a different rationality from science)
 - Non-academic presentation of results
 - The development of concrete policy advice – or at least: discuss alternatives
 - Institutions for research and analysis should recruit people with policy experience
 - Researchers and policy makers should take part in the same for a and share some meals



Independence and integrity is useless if there is no interaction and common learning

Give the evaluators a decent basic funding to avoid suspicion of fraternisation

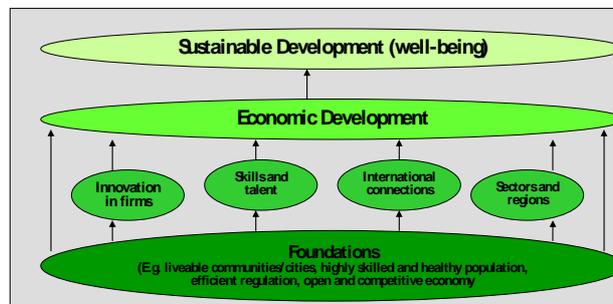


Make room for meta-evaluations

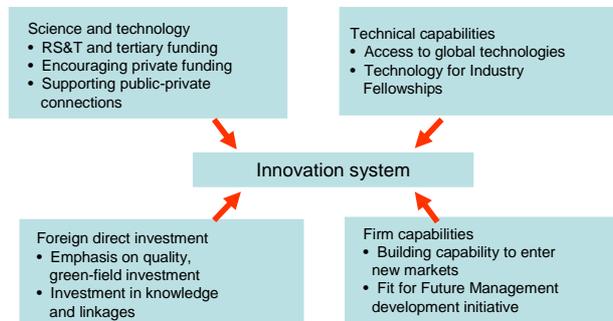


- In all the Nordic countries there are a lot of evaluations that end up in drawers.
- Fund projects where researchers, analysts and policy-makers make use of existing material to develop foresight exercises
- Develop more policy learning arenas for policy makers and evaluators

Building a Sustainable Economy



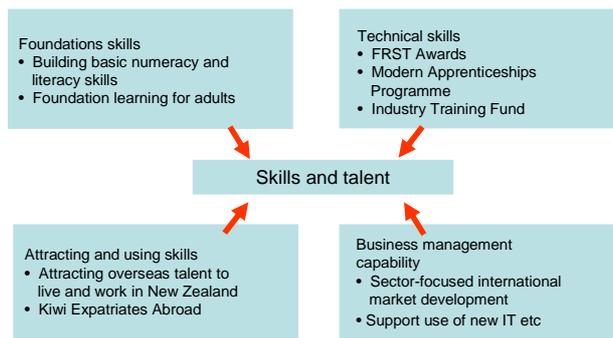
Enhancing the innovation system



Growth and Innovation Framework

David King, NZ Ministry of Econ. Dev.: "The Growth and Innovation Framework: New Zealand's Economic Development Strategy"

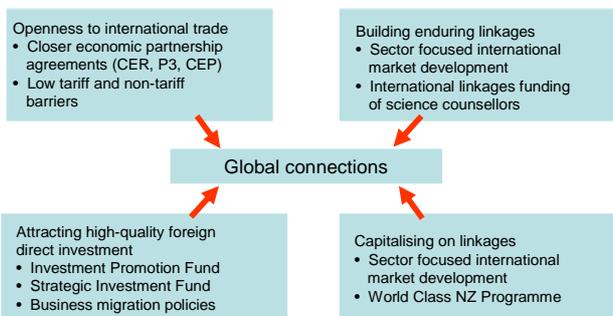
Developing skills and talent



Growth and Innovation Framework

David King, NZ Ministry of Econ. Dev.: "The Growth and Innovation Framework: New Zealand's Economic Development Strategy"

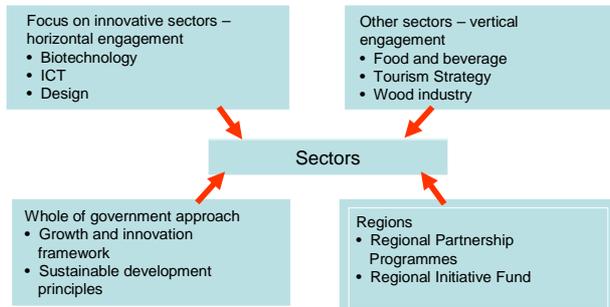
Increasing global connections



Growth and Innovation Framework

David King, NZ Ministry of Econ. Dev.: "The Growth and Innovation Framework: New Zealand's Economic Development Strategy"

Focusing government resources



Growth and Innovation Framework

David King, NZ Ministry of Econ. Dev.: "The Growth and Innovation Framework: New Zealand's Economic Development Strategy"

Evaluation (1): Programme level

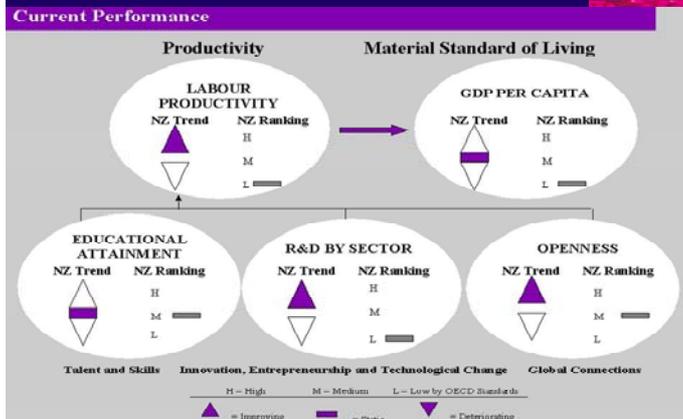


- Evaluation of many programmes is still relatively new: attribution, data quality, clarity of programme objectives, time lags etc are all issues
- Require further analysis of how government information and assistance can target firms in order to produce the largest benefits, and to minimise provision of services that compete directly with the private sector and other providers.
- Require a more focused use of enterprise development programmes in competencies where businesses are particularly weak.
- Require greater awareness of the information and assistance available through government agencies. The public sector and related entities are seen as less valuable than other sources of information and assistance for improving business performance.

Growth and Innovation Framework

David King, NZ Ministry of Econ. Dev.: "The Growth and Innovation Framework: New Zealand's Economic Development Strategy"

Evaluation (2): Indicators



Evaluation (3): Qualitative



- Emerging positive signs are:
 - Increased focus on innovation by firms and business commentators
 - Increased collaboration and networking between firms
 - Enhanced collaboration between firms and industry organisations, tertiary education providers and research institutes
 - Greater agreement on economic development directions within regions
 - Considerable uptake in industry training
 - Better alignment of government resources

Growth and Innovation Framework

David King, NZ Ministry of Econ. Dev.: "The Growth and Innovation Framework: New Zealand's Economic Development Strategy"

The challenges in evaluating innovation and growth policies Difficulties associated with evaluating innovation policies

- Relation to time (time dimension)
- Direct versus induced or spill-over effects
- Clearly distinguishing inputs, processes and outputs
- Identifying causal relationships between policies and result
- Measuring the relative benefits of different support systems whose objectives are different
 - ▶ R&D → application or application need → R&D ?
- Measuring the trade-offs
 - ▶ Compare to another use of same amount of investment
- Avoiding biases
 - ▶ Public funding can substitute private funding, not necessarily complement it
 - ▶ Public funding can help finance less profitable as opposed to more risky projects



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The challenges in evaluating innovation and growth policies Potentially misleading indicators

- Number of new products to the market
 - ▶ Is there a demand
 - ▶ Degree of cannibalisation of existing products/markets (ex: autos)
- Degree of rotation of products
 - ▶ Shelf-life
 - ▶ Attitudes to innovation change
- Amount of funding for innovation
 - ▶ Look at efficiency of financing...



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Different approaches to evaluation

Methodologies to evaluate innovation and growth policies

- Methodologies for competitiveness analysis
 - ▶ Surveys
 - ▶ More or less sophisticated scoreboards
 - ▶ Econometric
- Methodologies to evaluate cluster processes
 - ▶ Interest = measuring the quality of interaction
- Methodologies to value start-ups
 - ▶ Combination of financing/accounting and qualitative aspects
- Methodologies for the valuation of intangible investments
 - ▶ Towards a new accounting and reporting system



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Different approaches to evaluation

What does one measure?

- Inputs
- Process
- Direct outputs on the defined targets
- Indirect (spill-over) effects (on other areas of economy directly linked to first area)
- Diffusion effects (2d order effects)



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Different approaches to evaluation

Measuring the impact requires defining clearly the policy goals (1)

- On the economy:
 - ▶ Turnover and value added
 - ▶ Direct, indirect and induced employment
 - ▶ Balance of payments
 - ▶ (Relevant) Market growth rate
 - ▶ Intensity of competition
 - ▶ Generic or diffusion effect of technology
 - ▶ Relative competitiveness of national firms
 - ▶ Role of R&D in sector competitiveness
- On the social and regional dynamic:
 - ▶ Attractiveness of regions for R&D
 - ▶ Anchor firms onto the territory
 - ▶ Valuing the region's assets (natural resources, HR,...)
 - ▶ Create conditions for the development of a technology cluster



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Different approaches to evaluation Measuring the impact requires defining clearly the policy goals ... (2)

- On independence, security and national cohesion:
 - ▶ Internal: Education, health, justice
 - ▶ External: Diplomacy, defense
 - ▶ Private: security of persons and goods
 - ▶ Contribution to national cohesion



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Best practices : the international experience Lessons learned

- At best, the indicators measure the degree of innovation, not the effectiveness of innovation nor the degree of efficiency of policies
- There is a need to go back to the rationale for policy support to innovation
- There are differences between public goals and private goals:
 - ▶ Public goal = diffusion of innovation
 - ▶ Private goal = exclusivity and profitability
- Towards a new approach?



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Towards a new evaluation approach Principles of a new evaluation approach

- Build a 'model' of the regional economy structure that takes into account the characteristics of firms/sectors, using existing data & accounts
- Characterise policy instruments and who they target
- Define desired effect, size the potential externalities hoped for
 - ▶ Number of spin-offs
 - ▶ Increase in efficiency of research
 - ▶ Economies of scale
 - ▶ Increased returns on training hence on the quality of resources
- Calculate the impact of these effects on the system
 - ▶ Build a 'benchmark' for the future
- Assess the effect of policy against the desired (target) model, as opposed to the existing situation



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OECD  **OCDE**

The role of evaluations

- Evaluation in the area of science, technology and innovation is highly important, and is growing in importance across OECD countries
- Major reasons:
 - Increasing recognition of innovation as a driver of growth (OECD Growth Project and aftermath)
 - High potential impact of policies on innovation performance, depending on their design and implementation
 - Increased need to strengthen the foundations for sound decision making at various levels
- Evaluation studies – an important source for OECD's assessments of instruments, institutions and national S&T policies at large

Gernot Hutschenreiter, OECD: "Evaluation in Science and Innovation – the OECD Context"

OECD  **OCDE**

Recent developments in the OECD area

- Improvements in evaluation methodologies, concepts, data collection, etc.
- Diffusion of good practices in the past decade
 - OECD Proceedings on Policy Evaluation in Innovation and Technology: Towards Best Practices (1998)
 - Countries with initially little evaluation culture have caught up and have, in some cases developed "best practices" (e.g., Austria in the area of MAPs). Others have advanced already high standards (e.g., NL, UK, Nordic countries).
 - Provision of various "toolkits" (e.g., EPUB)
- Caveat: National practices and "evaluation cultures" still vary widely, even among OECD or EU countries
- And: New needs and new challenges for evaluations

Gernot Hutschenreiter, OECD: "Evaluation in Science and Innovation – the OECD Context"

OECD  **OCDE**

Major tasks

- Improve methodologies in order to capture impact of various policies, instruments, etc.
- Broaden the scope of evaluations (including the underlying concept of additionality)
- Improve the use of evaluations / role in the policy cycle and diffuse good practice
- Build evaluation firmly into new programmes
- Move towards approaches capturing better the complexities of interactions in innovation systems, towards systems evaluation
- Take up the new challenges ...

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New challenges 1

New challenges derive from recent developments observable in OECD countries, such as

- New objectives (e.g., building capabilities in R&D co-operation, networks, etc.)
- New types of instruments (e.g., multi-actor, multi-measures, multi-objective programmes)
 - Much can be learned from experiences with designing, implementing and evaluating MAPs
 - Examples: MAP Thematic Network; PP/Ps assessed in OECD peer review process in Austria, Australia, France, Netherlands, Spain

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New challenges 2

- Interactions in complex S&T policy systems
- Changing international environment / Globalisation
 - (Geographical) structure of R&D spillovers
 - Access of "non-nationals" to S&T programmes (significant differences in openness, attitudes. E.g., UK R&D tax credit; overly defensive attitude towards outward FDI in R&D in some countries)
 - "Internationalisation" in evaluating national programmes, etc. (Nordic countries pioneering)

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A case for a reciprocal approach

- Need for a reciprocity of perspectives
- Increasing our understanding of individual programmes / instruments or institutions based on state-of-the-art methodology
- Will an aggregation of "micro-level" analyses render a systemic view ?
- Complementary analyses with a macro perspective required
- Relation to current OECD work

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OECD

Behavioural additionality

- Broadening the scope of evaluations by going beyond traditional quantification of impacts in terms of input and output measures
- Lasting impacts on behaviour understood as “learning”, e.g. with respect to strategy, networking, capabilities
- OECD currently supports work on behavioural additionality in the context of government funding of business sector R&D
- At the OECD/PREST Workshop (May 2004)
 - results of studies from Austria, Belgium, Finland as well as the UK and the US (ATP) were presented and
 - future studies planned in a number of countries discussed

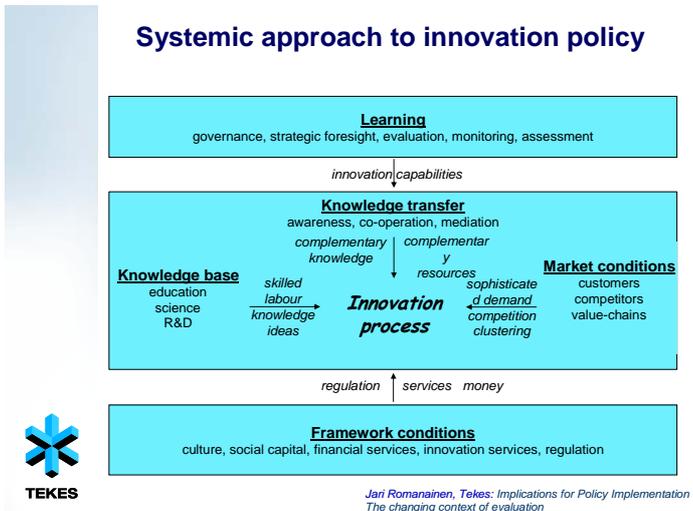
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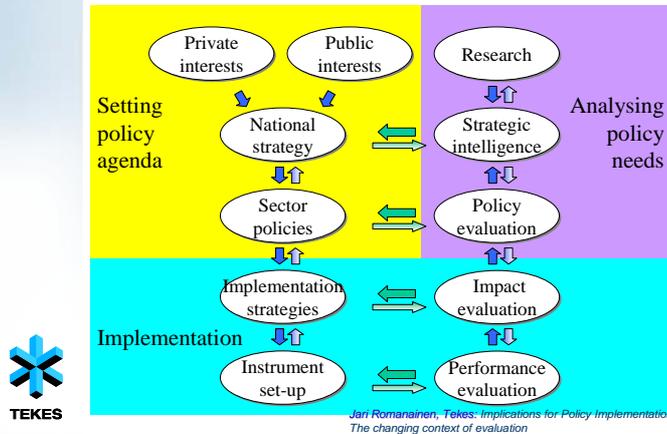
Policy Mixes for promoting innovation

- Increasing recognition of the importance of the policy mix. Even some scarce econometric evidence
- Marked differences across OECD countries, e.g.
 - The Netherlands combines (mandatory) evaluations of instruments (e.g. the R&D tax incentive scheme) with scrutinizing the policy mix (systems / interdepartmental evaluation)
 - Austria went half way (joint evaluation of FFF and FWF, but no evaluation of tax incentives for R&D)
- Planned Peer reviews (TIP Working Party)
 - aiming at providing guidance to policy makers for improving the mix of policies
 - developing a better understanding of the inter-relationships among policy instruments

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Innovation Policy Cycle



From 2nd to 3rd Generation Innovation Policy

- **Non-technological innovation**
 - New business models and value chains
 - Service innovation, social innovation
- **Maintaining the balance**
 - Science - industry
 - Economic - social
 - Existing - new
- **Innovation policy governance**
 - The role of innovation and innovation policy in other sectors
 - Increasing number of stakeholders
 - Regional development, employment, social divide, etc.
- **Framework conditions, creating the demand**
 - Regulatory framework, e.g. IPR, taxation of private VC investments
 - Public procurement, lead markets, etc.



*Jari Romanainen, Tekes: Implications for Policy Implementation
The changing context of evaluation*

Levels of evaluation

- **Performance**
 - Focus on monitoring
 - User oriented, emphasis on learning
 - Integrated in programme implementation (or organisation strategy)
 - Project, programme and/or organisation approach
- **Impact**
 - Focus on ex-post (and ex-ante)
 - Emphasis on outcomes and impact
 - External
 - Programme and/or organisation approach (or target group approach)
- **Policy**
 - Focus on ex-ante, monitoring, ex-post
 - Emphasis on policy learning across schemes
 - Integrated in policy design (feedback)
 - Policy and/or target group approach



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Programme evaluation at Tekes

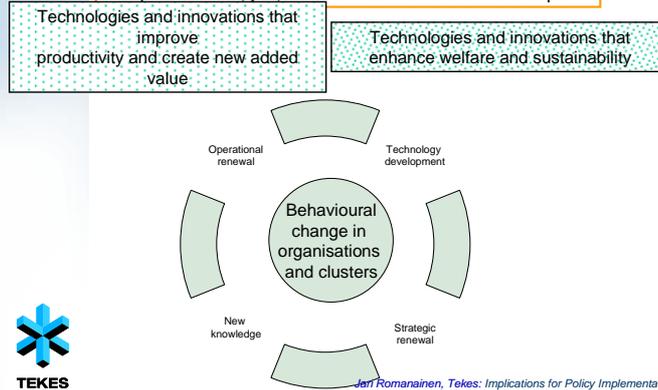
- **First generation**
 - Performance evaluation
 - Feedback for participants
 - Peer reviews
- **Second generation**
 - Separation of performance and impact evaluation
 - Internal performance evaluation supporting monitoring
 - External impact evaluation supporting programme design
- **Third generation**
 - Impact modelling and thematic evaluations
 - Supporting renewal of technology programme concept
 - Better support for policy design



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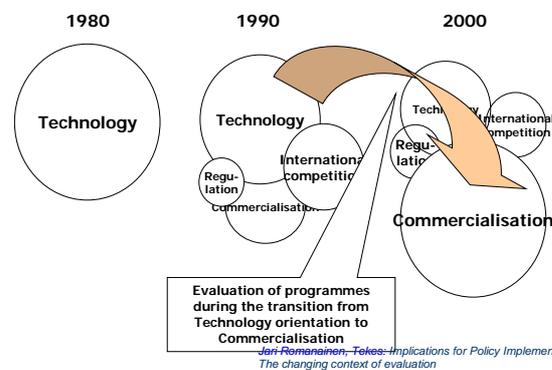
Impact model of technology programmes

The activities of the programme and the projects creates competitiveness, job, well-fare and environmental impacts



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Thematic evaluation: Programmes targeting behavioural change and clustering



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The changing context of evaluation*

Benefits of Thematic Evaluations

- Provide a much better insight into technology programmes as a concept
- Allows stronger conclusions and recommendations
- Provides understanding of sector specificity and generality of different impact mechanisms
- Create a learning platform for exchanging good practices
- Improves the design of new programmes



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The changing context of evaluation*

The use of Scientific Information in Policy Design

- **Information overload**
 - The amount of information is increasing
 - There is an increasing need to make sense of large amounts of information from varying sources of varying reliability
 - Policymakers increasingly have to rely on expert advice
- **Increasing use of scientific information for political purposes**
 - Understanding of the complexity of various phenomena is increasing
 - This opens up the possibility for different interpretations
 - When experts have differing opinions, this allows policymakers and politicians decide which experts they want to believe
 - This can lead into politicisation of expert knowledge (scientific information)



- **Implications for policy evaluation**
 - Limited approaches in evaluation of complex phenomena leads into recommendations based on limited understanding
 - The credibility towards evaluation is eroding
- Jari Romanainen, Tekes: Implications for Policy Implementation
The changing context of evaluation*

Conclusions

- **UNDERSTANDING THE CONTEXT:** Innovation policy consists of a mix of schemes targeted at several systemic failures – evaluation should recognise the role single schemes play in the policy mix targeting these failures. [complexity]
- **UNDERSTANDING THE NEED FOR CONTINUITY:** Evaluation should be recognised as a continuous learning process. [change]
- **UNDERSTANDING THE IMPACT MECHANISMS:** Impact modelling and thematic approach can be useful in better understanding the role different schemes play in policy implementation, impact of mix of schemes and identifying good practices across schemes. Impact modelling and thematic approach require combination of evaluation methodologies and demand methodological development. [rationale]
- **UNDERSTANDING THE FUNCTION:** Evaluations can be used for various purposes – it is important to understand the role different evaluations have, especially in designing and analysing policies. [role]



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The changing context of evaluation*



Three historical regimes

- Macroeconomic stability
- Microeconomic efficiency
- Innovative capacity

All factors are currently important, but the main growth factor now is innovation.

The basis for this state have developed historically...

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First regime: Macroeconomic stability

- Low and stable inflation
- Hard currency policy
- Targetting monetary aggregates

... Policy consequence: Central bank independence

Measurable market conditions and shared standards are necessary conditions for the later focus on efficiency ...

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Second regime: Microeconomic efficiency

- Nondistorted saving and investment balances
- Uniform and transparent tax policy

... Consequence: Lower marginal taxes and simpler tax structures

leading to our current regime ...

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Third regime: Innovative capacity

Which policy elements are supporting this regime?

- Acces to finance of innovation
- Independent financing vehicle
- Clear contract with financing vehicle to kick start the new market

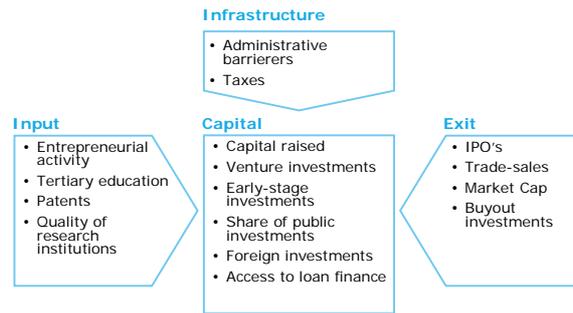
Need for market benchmark measuring new parameters ...

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Helpers and hurdles for the innovation market: Model used by Vaekstfonden

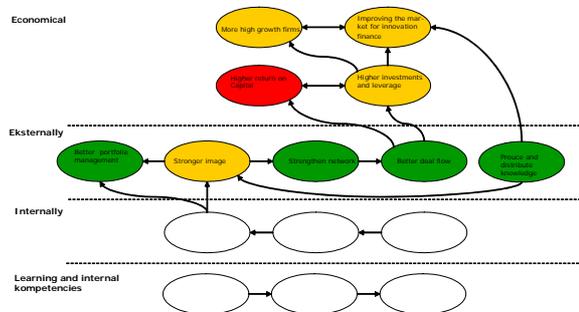


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Vaekstfonden: strategy tree as of august 2004



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