OMC Policy Mix Review Report

Country Report
Estonia

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This report is based on input by all reviewers and prepared by Wolfgang Polt, Joanneum Research, Institute for Technology and Regional Policy, Vienna/Austria as part of the IPTS Specific Contract No. C 150176.XII to support the CREST OMC-3% Policy Mix Peer Reviews.

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1 Introduction

This report summarizes the reflections of the experts who have reviewed Estonia in the context of the CREST Open Method of Coordination (OMC) Policy Mix exercise. The expert review was conducted by the following experts:

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Boris Pukl	Slovenian Research Agency
Arjan Wolters	Ministry of Economic Affairs, The Netherlands
Marta Truco	EC observer, DG Research

The review was carried out from 11 to 12 June 2007 in Tallinn, organised by the Ministry of Economic Affairs and Communications. In preparation of this meeting, an OMC Policy Review Background report (see Annex A) on the main features of the Estonian Innovation System was produced, which provided information about the Science Base, Business R&D and Innovation, Economic and Market Developments, Human resources and the RDTI policy system and it governance.

The review was carried out in the form of 3 Focus Groups, bringing together policy makers from different ministries and policy experts, people responsible for the implementation of policy from agencies, and addressees of policy from the business and academic communities. The first Focus Group was held jointly for a project on STI governance in Estonia carried out by Katrin Männik (Technopolis). The participants of the Focus Groups and the Issue Papers prepared in preparation are documented in Annex B and C respectively.

In addition, a number of individual interviews with Estonian experts was carried out either face to face or via phone (see Annex D for a list of interviewees).

This review report tries to provide a view on the achievements and challenges for Estonian RTDI policy against the background of the 3% target and the ways to achieve it by improving the mix and coherence of RTDI policies and its articulation against each other. It provides a synthesis of the observations of the experts and – on the basis of a critical discussion of the current state - puts forward some recommendations for Estonian RTDI policy.

2 The Estonian R&D and Innovation System

Estonia is a small open economy with a population of some 1.3 Mio people. Following independence in 1991, it has trebled GDP per capita by 2005. Growth rates have been consistently higher than the EU25 average (7,5% vs. 2.3% between 1995 and 2006). In most recent years, Estonia experienced the highest growth rates in Europe, exceeding 10% in some years, thus mirroring those of some Asian countries[1].

In this phase of rapid catching-up, differences in income and productivity levels with the EU average have shrunk, but still are considerable to date (39% of EU25 average). State budget accrues a surplus and unemployment levels are currently among the lowest in EU. The main forces behind the rapid catching-up the country has experienced in recent years are the establishment of a liberal market regime, openness to international links and a business-friendly framework conditions (such as corporate tax regime, regulations etc.). These conditions have enabled a rapid re-structuring of the enterprise sector in the transformation period and have attracted considerable amounts of FDI (notably from neighbouring countries like Sweden and Finland, to which there are cultural ties), which are among the highest in the industrialised world.

So far, the catching-up path of the Estonian economy is primarily based on the favourable business environment and low labour costs. Hence, the industrial structure of Estonia is to a large extent dominated by SME-s and sectors with low R&D intensity. Some of these sectors are well inter-twined with their respective cluster-counter parts in Sweden and Finland (e.g. in wood/fostered and electronics clusters). In these clusters, the EE enterprises occupy the lower-end of the value-chain. This pattern is not going to change overnight nor can be said to have reached its limits already. Examples of countries which have pursued a similar strategy for decades in the past (or at present) include Ireland and Austria. The difference between Estonia and these predecessors is probably in the time for which this development path is a viable one. Here, we expect the period in which a further transition to a more knowledge-based (i.e. skill-intensive, R&D intensive, more innovative) economy should happen to be somewhat shorter and sustained efforts in this direction are very timely and appropriate.

The (small) size of the country was more than once brought up in the discussions as a potential problem and obstacle for development, e.g. in the problems of creating critical masses, reap the benefits of larger markets etc. In our opinion, smaller size can also be an advantage: smaller economies also have smaller inertia and they can faster react to changes, as well as adapt to the changing environments and new framework conditions. On the other hand, size might indeed be a problem, e.g. when it comes to the question of priority setting and design of policy: while one would assume that the smaller the country, the more important it is to set priorities to reach critical masses, such a policy might also be unnecessary exclusive to parts of the innovation system. There might be a rationale for RTDI policy – especially in view of the small size of the country – to be as much generic (and as little selective) as possible in the policy measures to ensure a general lifting of R&D and innovation capacities throughout the innovation system. Especially the new national technology programmes should be reviewed in this light and not be confined to too narrowly defined technology areas. Rather, they should be linked much more with cluster initiatives and have significant non-R&D components.

[1] See the Background Paper in Annex A for a more detailed account of the Estonian development.

As competitiveness of Estonian enterprises today is mainly based on cost advantages and proximity to the neighbours, they occupy only the lower parts in the value-added chain. Industrial structure is very much geared towards sectors with comparatively low R&D intensity and dominated by SME-s.

Through foreign direct investment and trade, Estonia is well linked to highly developed European economies and has come some way in restructuring its trade relations away from the countries of the former Soviet Union. Nevertheless, some of the legacies of this period are to be seen until today and have an impact on the development of the Estonian innovation system, e.g. concerning energy supply.

While the transition process is by and large very successful, there are some imbalances in this growth trajectory which pose challenges for future development. Among these are the current account balance which is highly negative, labour market and skill shortages which lead to rapid increases in wages and erode the current basis for cost competitiveness.

Estonia is classified in the European Innovation Scoreboard in the 'innovation trailing' group and only in the 'followers group' in the Global Innovation Scoreboard and has very low rankings and performance in terms of BERD, patents, life-long learning and other indicators.

In the years since independence, Estonia has successfully developed a number of institutions and instruments of RTDI policy through:

(i) the formulation of strategies for RTDI policy for the periods 2002-2006 and 2007-2013 respectively
(ii) the rapid set-up of an RTDI policy system and related policy instruments which is modelled after European best-practice examples (with Finland and Sweden being role-models in many instances)
(iii) in the substantial increase in R&D expenditures in absolute terms in recent years
(iv) successful implementation of e-government strategy, which has brought EE to the top of the respective rankings of development of the information society.

The developments of Estonian RTDI policy have to be assessed quite favourably: Estonian RTDI policy has definitely tried to establish a system based on international best practice examples. This process was supported by active policy learning from other countries and participation in EU policy discussions. A major role for policy formulation – as in other new member countries – played the Structural Funds, but in Estonia – unlike in other countries - this was accompanied by own strategy formulation.

Budgets for RTDI policy – starting from a low level - have been growing very rapidly in absolute terms. In terms of share of R&D in GDP, growth was less then anticipated because also GDP grew very rapidly. While public expenditures for HERD match the EU average, both GOVERD and BERD are well below this mark. This imbalance between the different R&D performing sectors was – and still is – a major concern for Estonian RTDI policy, which has tried to establish links between academia and industry through various measures in recent years.

These increases in budgets as well as the need to link to EU policy have put the Estonian RTDI policy system under considerable strain in terms of its capacity for policy formulation,

policy coordination and policy implementation. Especially for policy implementation, some new institutions have been created. In these circumstances, it is natural, that policy governance is an issue.

At this moment, most of the institutions and instruments cannot be comprehensively assessed and evaluated because they are too recent. Where there are some evaluations (e.g. for the SPINNO programme) the results were taken into account in this report. Otherwise, assessments given here are based on the experts' judgement on the basis of their individual backgrounds.

This report is organised along the lines of the major topics that came up during the review, the interviews and the discussions among the review team. They reflect in our opinion the major questions and challenges for Estonian RTDI policy in the coming years:

- **Strategic orientation** of Estonian RTDI policy: here, we discuss inter alia, the 3% target against the background of structural characteristics of the Estonian Economy and whether RTDI policy should have an explicit high-tech orientation.
- The role of the **Science System and Industry-Science relations**: considerable attention and effort has been devoted to improve relations between industry and science in Estonia. Here, we give a critical appraisal of these measures.
- Raising the **Innovation capacities in the enterprise sector**. Here, we discuss how different barriers to innovation for Estonian firms (awareness, cooperation with research institutions, human resources, funding of R&D and innovation) can be tackled
- **Governance and Policy learning** in Estonia: In times of rapid change (also institutional change), governance of RTDI policy is a major issue. Here, we discuss how the setting for Estonian RTDI policy could be improved and greater policy coherence could be achieved.
- And finally, we propose some **adjustments and further developments in the policy mix** of Estonian RTDI policy and try to draw some **main conclusions**.

3 Commentary by the review team

3.1 Strategic Orientation of Estonian RTDI Policy

The 3% target

In its strive to achieve the Lisbon and Barcelona targets, the Estonian government has set itself ambitious targets. E.g. the R&D strategy document '*Knowledge-based Estonia'* asserts that the "target of 3% of GDP expenditures on research and development, as agreed in the Lisbon strategy, is planned to be achieved by 2014. (p. 15)" However, the strategy is less clear on why a 3 percent objective makes sense in an Estonian context, or how Estonia is supposed to reach such a goal.

Given

(i) the experience of the previous period of the KBE strategy (2002-06) where the target could not be met despite a rather well-articulated STI policy,
(ii) the current phase of rapid economic growth which renders any target of a quota/ratio doubtful and
(iii) and the given structures of industry with its dominance of less R&D intensive sectors, which are not likely to change overnight,

reaching the 3% target would imply a rather drastic structural change in manufacturing industry, which, given today's situation, is not very likely to take place. Hence, the targets put forward in the strategy seem somewhat overambitious and should not be pursued at all costs. While it is certainly necessary to further raise R&D and knowledge intensity in the years to come, it has to be remembered that this is an input (or cost) target. If not accompanied by sensible policy measures, there is also the risk of spending monies not wisely, that is not to the needs of the EE innovation system.

In our view, EE would seem well on track towards a Knowledge-Based Economy (KBE) if the increases in R&D expenditure in absolute terms are sustained in the coming years. Moreover, we think that further increases in R&D funding, though a necessary ingredient in a comprehensive overall KBE strategy, are not the main obstacle for the current growth trajectory of Estonia nor the further development of the innovation system. More pressing and pertinent challenges of the near future seem to be in raising the innovation capabilities of enterprises in a broader way: to encourage SME-s to engage in innovation, to raise the level of innovation in enterprises from predominantly incremental towards more strategic innovation and on a broad basis, that is throughout all branches of the economy.

High-tech orientation of RTDI policy

There is no optimal R&D investment rate that covers all countries and all industries. The R&D investment needed in an industry is dependent on the competence needs of the companies found in that industry.

Skill-intensive, innovative companies in traditional sectors can be just as good contributors to a country's economic growth as a high-tech company, and they will probably contribute also more to the overall employment (both can be seen in the recent development of Estonia but also in other countries like Austria, Slovenia, Slovakia etc). Given that Estonian industry is dominated by small and medium sized companies (which invest little in R&D in any country) and mainly in so-called "low tech" branches, one cannot benchmark Estonia up against countries like Sweden or Finland. Sweden and Finland have several more huge, high tech, companies (Nokia, Ericsson etc.), which Estonia is lacking. These companies provide a significant part of the national R&D investments of these countries.

As far as we can see, there is a need for a coherent discussion on the relationship between the future development of Estonian industry and the needs for R&D within industry and in the knowledge institutions. This discussion should not be misled by the dichotomy between high tech and low tech industries. The term "high tech" means a company that invests more than 4 percent of its turn-over on R&D. It is – in essence -- an R&D indicator. Given that companies can be knowledge-based, innovative and profitable without these levels of R&D investments, the development of high tech industries cannot be put up as a political goal in its own right.

Relevant Estonian business areas that could benefit from such incremental, but knowledge-intensive, innovation could for instance be food production, the textile industry, building materials, pulp and paper, furniture, manufacturing and electronics. The strong growth of the Estonian service sector indicates a need for a more systematic approach towards this heterogeneous part of the economy, including tourism (which is the only sector where there is an explicit sectoral policy), health and social work and financial services.

If Estonia decides (like Finland before it) to focus on the development of high tech companies, that decision should be based on a thorough analysis of the competences available in today's companies and the challenges Estonian industry will face in the future. If there is reason to believe that some of the present industries have no viable future due to comparative advantages of other countries, then it would make sense to see if the competences found in those industries can be used for new activities, including high tech industries.

Estonian policy makers do, for obvious reasons, like to compare their country to their Nordic neighbours. If they find that the present industrial structure is not sustainable, it would make sense to take a closer look at the paths followed by Ireland and Singapore and try to attract or develop more high tech companies. These companies can, under the right circumstances, become economic and technological "locomotives", pulling the rest of the economy behind them –just like the US has done for Canada, Germany has done for Austria and UK has done for Ireland for quite some time in post-war history. In such a context a 3 percent objective makes sense.

Societal goals and RTDI policy

Though the necessity to link R&D policy to industrial policy cannot be overemphasised in the Estonian case, RTDI policy is not tantamount to these policy areas. Societal goals are expressed in other policy arenas and need to be articulated with RTDI policy. From our review we gathered the impression that such an articulation is still very weak in Estonia and policy coordination between the relevant ministries is little developed.

Several examples of societal needs have been given that require specific R&D approaches[2]:

- Research and education on the field of health care and social needs can lead to improved well-being of Estonian citizens and increase the ability of the population to remain in productive employment longer as one solution to mitigate demographic processes.

- Energy resources are another area where research is required to safeguard future interests of society. In Estonia, the resources of oil-shale energy production are being gradually exhausted. (…)

- Finally, in an uncertain global environment, Estonia has to maintain a capacity to protect its citizens and interests within the common security policy of the EU. (p. 30)

None of these priorities are industrial priorities only, but all of them can be integrated with policies for developing specific clusters.

3.2 The role of the science system and industry-science relations

With respect to its public science system, Estonia faces problems that many small transition economies have faced or still are facing: a relatively large university system that (also as a part of the legacy of the former system) is quite decoupled from the enterprise sector.

Thus, it should not come as a surprise that it has been stated quite often that one of the main challenges if not THE main challenge of the EE innovation system is to bridge the gap between academia and business or the science system and the innovation system. Currently, cooperation between universities and business sector in innovation is at a low level as is the share of academic science in industry. Partly, this might be reflection of the heritage of the old academic system and the prevailing attitudes (the old Academy of Science Institutes have been incorporated into the universities in the 1990ies) and the speed of change has been much slower in the university and educational system than in other parts of the innovation system.

In our discussions we found greatly varying views and opinions and certainly not a common picture among Estonian RTDI policy makers about the role the science system can play. While some are advocating an orientation of the science system towards international links of science and the pure orientation towards excellence, others are seeking possibilities to more strongly link the science system to innovation. Apparently the specialisation patterns of EE science and enterprises don't match easily. Size is a problem here, as the mere fact that there can only be a limited number of competent research groups on the one hand (out of a total of some 4000 researchers in EE) and the specialisations of EE industry.

[2] *Evaluation of the design and implementation of Estonian RTDI policy: implications for policy planning*: Ministry of Economic Affairs and Communications of the Republic of Estiona/Technopolis Consulting Group Belgium, Tallinn 2006.

We heard some Estonian policy makers argue that given the lack of R&D absorptive capacity in firms and the missing correspondence between industrial structure and university and college orientation, universities should focus on the needs of the global society instead. Such an argument must be based on the idea that R&D is an objective in and for itself and not a tool for a means.

Although we do understand the need for all countries to contribute to the solution of global problems, we would argue that Estonia has not reached a stage where it can afford to fund much public research that does not focus on Estonia's own needs, being those social, cultural, environmental, industrial or economical. Such a typology of objectives is provided in the new R&DI strategy. We consider it of paramount importance to make sure that the university sector works in tandem with the rest of society in these areas.

Initiatives in this vein could be:

- An increased focus on the development of competences needed in industry in existing university units. This should be done by increasing the numbers of new students and graduates, but should not limit the scope of the number of major competence areas which universities follow and develop.
- The establishment of independent, non-profit, research institutes targeting the relevant section of industry might be an option for the future, depending and based on the current competence centre programme out of which such institutions might emerge. The advantage of such institutions is that they tend to be more market oriented and more sensitive to the practical, short term, needs of industry.
- A stronger orientation of public R&D programs towards industry needs. A preference should be given to re-orient and bolster existing programmes over establishing new ones. At the moment there are not many companies that can take part in (or contribute funding to) such R&D projects, but that will improve over time as the competition in the market and mergers and acquisition probably will bring in larger companies with more "R&D clout."

- The role of research as a learning tool for students is probably just as important as its ability to generate new ideas and inventions to be used by industry today. Given that Estonian industry demonstrates only a limited ability to make use of university research at the moment, it is probably wiser to use the university system to develop human resources needed in the future.

- However, there is also room for improvement of the quality of the Estonian university and college education should be research-based, as a good supply of R&D trained candidates will increase the R&D absorbing capacities of Estonian firms in the future. There is a need for specific measures to support small R&D groups, the development of human resources and to stimulate and attract prominent Estonian scientists from abroad to return in the country. First measures have been taken (mobility programme is about to be implemented), but don't seem sufficient and in general it might be said that there is still a lack of synergy between science and industry policy.

On the basis of our discussions it is safe to conclude that there is still a huge gap between science and business sector which is likely to continue for a number of years. If there are new policy measures to be introduced to further close this gap, they should primarily address the entry barrier of most enterprises to engage in such collaborations and target especially the capacities of SME-s to engage in R&D.

3.3 Raising innovative capacity of Estonian firms

Estonian enterprises, mostly SME-s, are in traditional sectors and industries. There is a low number of R&D performing enterprises in Estonia correspondingly, there is also a low share of high tech companies in value added and exports in traditional sector. On the other hand, the share of innovative SME-s, especially in the service sector is quite high, also in international comparison. The export of innovative companies grows by the rate of 20-25%. In general, high-tech exports are also growing rapidly (albeit from a very low level). Only small number of companies has R&D activities, but, it seems, that there is a rapid increase. Number of patents in industry is small. Availability of skilled labour is certainly a barrier. There is a lack of qualified labour at all levels. Currently this labour shortage is caused by the very rapid growth of the Estonian economy, but this shortage might not disappear even with lower growth rates given the 'demographics' of higher education with low enrolment in Science and Engineering studies.

Generally, there is wide-spread agreement that raising the innovative capacity of enterprises should be a prime policy concern of Estonian RTDI policy. Yet from what we see in the figures (e.g. from the most recent CIS), there seems to be very little public support to private innovation. Public funding seems to be still very much geared towards R&D (and the science system). In our view, there is definitely a need to better tailor policy measures to this end. In the following, we propose a few measures which we consider especially pertinent to the EE situation:

Given the present challenges for Estonian industry and services we think that government should focus on the following dimensions in the coming years:

Human capital and entrepreneurial qualities

Human capital is an important bottleneck for creating a knowledge based economy in EE. The problem seems to be twofold: 1) the number of science and engineering graduates is low and the age pyramid of researchers is strongly skewed towards the older cohorts, and 2) the quality level of graduates is threatened by the fact that students quite often start working in business before finishing their study and 3) by the fact that life long learning is at a very low level, that is there are not many measures of vocational training in place.

We doubt whether there are sufficient policy measures in place as of yet. The mobility programme recently launched is a step in the right direction, but it will only cover a smallish number of people and again is confined to researchers. In our view, these measures have to be accompanied by measures that make it financially attractive to both employers and employees to invest in education. Certainly in these years of fast economic growth and labour shortage firms will not be very willing to let people spend time on education. Fiscal measures to promote life long learning might be a way to address the issue. We would strongly encourage a discussion in this vein to be initiated also in EE, knowing about the obstacles and difficulties of such a measure given the current (simple and low) overall tax regime in EE.

Creating innovation awareness and stakeholder involvement

Well educated staff is a necessary but not sufficient condition of firms to be aware of the need to innovate. Here, certainly, more needs to be done. The Dutch Syntens may be an example on how to create awareness, although this organisation is increasingly concentrating its efforts

on SME-s already willing to innovate (that is, are already aware of the need to innovate). Syntens operates from a number of regional offices, offering technological services (problem identification, partner search) to SME-s to a maximum of two days a year per SME. Its focus is mainly technological and Syntens mostly employs engineers. For Estonia it might be worth considering such a measure with a specific emphasis on SME-s in the service sector.

Currently, business companies and business associations are much more concerned with other questions, e.g with labour markets and environmental regulation etc. The Ministry of Economic Affairs and Communications is well aware of the problem and prepares various initiatives to support and stimulate the dialogue between different stakeholders, including good practice and guidelines for stakeholder involvement. But for the time being, there seems to be little responsiveness from the side of the business and branch level associations. We consider this to be probably a transitory problem: once there are more R&D intensive and innovative enterprises, this will be reflected in the stance of the business association. But especially in cluster related policies sectoral trade associations should be ascribed an important role.

Increasing accessibility of research institutes and universities

Two programmes currently exist in EE to increase interactions between the public research system and the enterprise sector: 1) the Competence Centres and 2) the SPINNO programme. Total funding has been about 13 million Euros over the past three years, which are considerable sums in the EE context. SPINNO has been evaluated quite favourably, for the competence centre programme it is too early to judge on its success.

However, both measures might not reach SME-s which have not already built up critical mass of R&D capacities or engage regularly in innovation. To reach out towards the majority of SME-s, additional measures might be needed to create a real demand for research among firms and to stimulate research institutes to address these demands. One way to create such a demand is a voucher system as is operated in the Netherlands over the past three years and is either in implementation or in discussion in a number of other countries (e.g. Austria, Ireland). The voucher addresses both sides: it stimulates SME-s to go to research institutes and it gives research institutes a financial interest in performing R&D on behalf of SME-s.

The Dutch voucher system was introduced in three stages. First there were three pilots before the system was introduced on a large scale in 2006. Over the years changes have been made in the design of the voucher system.

The pilots were extensively – and favourably - evaluated. Additionality with regard to collaboration with universities and research organisations could be demonstrated. However, there were no signs that this collaboration went on afterwards (without voucher) once the original research question was addressed. The number of voucher issued but not capitalized grew as the numbers of vouchers available increased. Whether the voucher system changed the attitude of universities and research institutes towards SME-s is not yet clear. A new evaluation is planned for the end of this year.

We strongly recommend establishing such a system taking into account the experiences of other countries (notable the Netherland, but also other countries which are implementing variations of the system) in EE as a means to address SME-s hitherto not being reached by the policy measures to foster interactions between industry and science.

Stimulating private R&D on a broad basis

Currently, the public funding for private R&D (18.4 million Euros in five years) is channelled by via direct support. No tax credit scheme to stimulate R&D by firms exists in EE. Although seemingly at odds with the simple and transparent Estonian tax system such a scheme might be considered as an option for the future. The Dutch WBSO might serve as a successful example, but other countries have such a scheme in place as well (France, Norway). The Promotion of Research and Development Act in the Netherlands (WBSO) took effect in 1994. The WBSO provides for a fiscal facility that reduces wage costs for R&D employees by reducing wage tax and social insurance contributions[3]. The condition is that these employees should work on technological R&D activities aimed at the development of products, processes and software that are new to the company. The WBSO also provides for extra incentives for high-tech start-ups to conduct R&D. One of the main advantages WBSO over a R&D subsidy is its simplicity. Implementation costs of WBSO are about half of those for subsidy schemes, while at the same time a tax reduction targeted towards R&D is more efficient in promoting R&D as a general tax cut for firms. The WBSO is thoroughly evaluated. It is proven to be effective while every Euro of tax reduction results in an increase of expenditures of more than 1 Euro.

Another example in this vein is the Norwegian Scheme 'SkatteFunn', which is a measure that gives tax allowances for investments in R&D. 20% of expenses for R&D projects in SME-s, and 18% in large companies, may be deducted. The basis for deduction is R&D expenses of up to NOK 4 mill (approximately EUR 530 000) for internal projects, and another NOK 4 mill for co-operative projects (or NOK 8 mill for co-operative projects alone). The R&D projects should aim at generating new knowledge, information or experience which is of value to the development of new products, services or production processes. This measure has become a successful one among Norwegian companies. The results from an evaluation are expected by the end of the year.

Given that the R&D strategy KBE suggests the introduction of such a measure, we encourage policy makers in EE to open a discussion on the issue to explore the feasibility – based on the growing experiences of other countries. One of the advantages of this kind of public support to private R&D would be that there is no administrative effort involved and would put no further strain on the EE RTDI policy system.

[3] The scheme also applies for the self-employed involved in R&D-activities, in which case the settlement takes place via income tax. The analyses presented in this study relate only to companies, and not to the self-employed.

Cluster oriented policy

We would recommend the development of a plan for the development of the knowledge bases for industries of special importance for the Estonian economy. We are not advocating subsidizing individual companies here, but developing strategies for strengthening the development of industrial clusters (networks of companies, suppliers, customers, service providers and knowledge institutions involved in the same value chain of production). Here we are in line with the EU Trend Chart Report on Estonia of 2006, where Erik Terk and Andres Viia list "Lack of focus of innovation policy in terms of clusters and high-potential (key) areas on the implementation level" as a major weakness in their innovation governance SWOT review.[4]

Such a set of priorities would not necessarily conflict with Estonia's current prioritization of ICT, biotechnology and materials, as these are generic knowledge areas that might be of use to many of the existing industries. There might be conflicts though, if technology areas for the technology programmes would be defined too narrowly and only with a view to technology.

One way of identifying such clusters and their competence needs would be to arrange a national foresight study, involving policy makers, researchers and experts and industry representatives, but with a broader remit than just the look into the future avenues of scientific and technological development with the aim of defining R&D priorities. Rather, such strategies must be able to take all different types of knowledge into consideration. Alternatively, one could think of industry roadmaps under the planned cluster programme.

3.4 Governance and Policy Learning

The RTDI policy system in Estonia has done a remarkably good job in recent years (compared to problems and challenges faced in other countries) and has deservedly been assessed quite favourably in international comparison. Having read relevant background documents and discussed innovation policy concepts with Estonian civil servants and policy makers, it is clear to this group that Estonian policy competences in this area are among the advanced ones in Europe. Estonian policy makers have made the 'systemic approach' to RTDI policy as the main frame of reference in a much more concise way than is found in many old member states.

On the other hand, we think that – though the strategy documents for 2002-06 and 2007-13 had/have a broad view of innovation – still many measures start from the R&D end of the policy spectrum. We have the suspicion that this was partly guided by the fact that policy learning was based on examples from the most advanced concepts of RTDI policy systems.

As evaluations have demonstrated and was stated also by many people concerned with RTDI policy in Estonia, it seems that institutional setting is (still) not ready for the new strategy. This implies that the Estonian Government will have to rethink and re-examine the role of individual institutions, in particular the ministries and governmental agencies, as well as various bodies and committees in the performance of national innovation system.

[4] European Trend Chart *Innovation Annual Innovation Policy Trends and Appraisal Report Estonia 2006*, p. 22, www.trendchart.org.

On the other hand, 'third generation', broad-based, and holistic innovation policy initiatives have not been implemented elsewhere in Europe. Thus, the situation in EE is not better or worse than in most other countries. Though policy coordination definitely is an issue, it might more important that Estonia further develops and improves its "second generation" policies than venturing into extremely time consuming policy processes attempting to coordinate the activities of a large number of ministries.

Having said that, we still see room for improvement of the EE RTDI policy system in

- A better articulation between (higher) education, science, technology and enterprise policies.
- The policy system is under strain in terms of implementation capacity: one of the main reasons for the establishment of technology and/or cluster programmes

With regards to the issue of governance, the coordination between individual stakeholders, in particular between ministries, seems to be the main problem. This problem was partly tackled with the introduction and implementation of the Structural Funds. In the opinion of some of the participants in the panel, it seems that there are improvements with regard to the communication between ministries. It appears that cooperation between the two most important ministries with regard to the implementation of the activities, the Ministry of Education and Research and the Ministry of Economic Affairs and Communications is improving, however, the problem remains, how to engage other ministries and their more active involvement in the governance of the national innovation system in Estonia.

In this vein, the governance vehicle of the S&T council does not seem to fulfil the expectations. One reason for this could be that the main policy formulation is still carried out in the two separate sub-committees for R&D policy and innovation policy respectively. Another reason is definitely to be found in the under-staffing of the Council. Similar institutions in other countries enjoy greater capacity and hence are more capable of pro-active formulation of policies.

- An attempt to re-invigorate the council as a true instrument of policy co-ordination and governance might include both a significant increase in the capacities of the secretariat as well as a dissolution / merger of the two sub-committees.

An important question is also, how other ministries can be included in the process of design and implementation of an R&D and innovation strategy. Creating demand for research and innovation support services and creating favourable environments is certainly very important. Defining public demand for R&D (mission, societal objectives) and increase capacities of ministries to do so can be ways in this direction.

In this respect, it might be worthwhile to consider to formulate the topics of the national technology programmes not with respect to technological areas only, but rather to seek for topics with a broader societal remit and then address these challenges with mission oriented programmes that encompass R&D, but go well beyond R&D and include diffusion-, innovation-oriented measures etc

Equally important problems are (insufficient) institutional capacities in responsible ministries and implementation agencies. While the budget for key activities has increased in recent years manifold and the number of policy measures and instruments has risen considerably, the

number of civil servants to administrate and mange these increased funds and policy initiatives remained rather unchanged.

4 Major lessons for Estonian RTDI policy

Strategic orientation of RTDI policy

Estonia has rapidly increased its R&D spending in recent years and has set very high targets for the mid-term future. On the other hand, R&D intensity has only been slowly increasing and Estonia still trails in many innovation-related indicators. While we think that Estonian RTDI policy makers should carefully watch the developments of these indicators, we don't consider this as a major cause for concern for Estonia given the flaws of the synthetic indicator SII which is especially bad in reflecting the developments of catching-up economies and the overall development of the EE innovation system. Generally, we think that some of the problems Estonia is currently facing are quite typical for a country in rapid catching-up.

Thus we think, that the main pre-occupation of Estonian RTDI policy should not be to reach the 3%-target at any cost, but to raise the innovation capacity of enterprises in a broad sense (spanning beyond R&D) and also to address a number of important societal problems.

This might be a problem if the 'demand' side for R&D is not well developed, as is the case in Estonia. Also, we think that a broader innovation strategy has to include the more 'traditional' sectors which (in all countries) have a lower R&D intensity. Here, policy measures like cluster-oriented policies of the type that are implemented mostly on the regional level (e.g. in Austria) would probably be more appropriate than pure R&D support measures.

In general, there should be more emphasis on raising the innovation capacities of SME-s by means like a voucher system. The goal would be to trigger innovation in a broad sense, including non-technological innovation.

Science System and Industry Science relations

While this was - and is - a question receiving much attention in Estonian RTDI policy, we would argue that there should be stronger emphasis on measures to raise the innovation and research capabilities of enterprises. For the science system, we still see improvement for a greater orientation towards the need of the Estonian economy and society. The role of the science and education system for the supply of skilled labour should be strengthened.

In our view, there are some imbalances in the system – some of which are a cause for policy actions, some are not (but are likely to be transitory in nature). The most debated one is the imbalance between the science and the enterprise sector in the innovation system. Partly, we consider this a transitory problem on which RTDI policy has only a limited handle: it needs some years of development before the enterprise sector can grow into a significant funder and user of R&D performed in public research institutions (it has to be noted that there are hardly any public research capacities outside the universities. In other countries like Norway (Sintef), Finland (VTT), the Netherlands (TNO), Germany (FhG) and Austria (ARC, JR), such RTO-s are an important part of the innovation system and can serve as a link from research to the

business sector. We suggest having a closer look into the possibilities of PPP research institutes in EE as well.

Raising innovation capacities of firms

We think that this is the area where the focus of RTDI policy for the next years should predominantly be. We especially think that any strategy in this vein should include the traditional sectors, should address SME-s and should have a broad view of innovation and not be confined to R&D solely. There we propose a number of policy actions ranging from voucher systems to cluster oriented policies and also encourage a discussion about tax related support measures, specifically targeted to different types of innovation expenditures (R&D, training, personnel etc.). In our view, it is time to strengthen the 'demand side' of R&D.

Governance and Policy Learning

We think that the conceptual basis for RTDI policy in Estonia is very well developed, but we further think that there is an 'implementation gap', resulting from the limited capacity on the side of policy making (Ministries, council, agencies) and the considerable amount of policy measures and initiatives. Without significant increase in this capacity, we see a danger of 'policy failure'. Unless the design of new policy measures is not matched by an increased implementation capacity, we would even advocate NOT installing such measures – including the ones we propose in this report.

We specifically urge to think about new arrangements for the Research Council as a tool for policy coordination and see a strong need to strengthen the capacities both at the ministries as well as in the implementation agencies. Otherwise, there is the danger that many of the good concepts and policy initiatives might not be well implemented.