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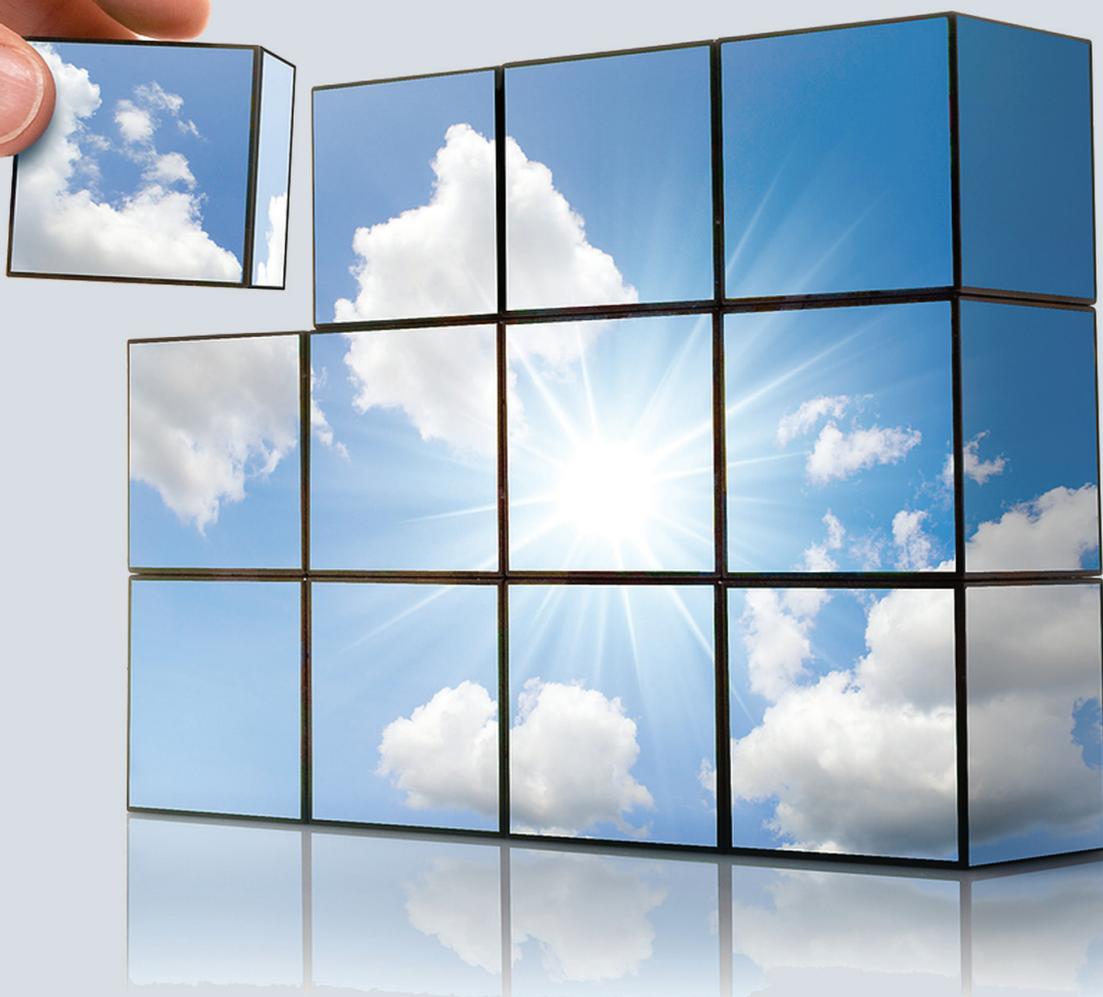
Evaluation framework for innovation and enterprise support policies in Estonia

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Evaluation framework for innovation and enterprise support policies in Estonia

A report to the Ministry of Economic Affairs and Communications, Republic of Estonia

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Introduction

This report provides the Ministry of Economic Affairs and Communications (MKM) of the Republic of Estonia with an overall conceptual framework for the evaluation of the national innovation and enterprise strategies and related policy measures (programmes, major projects, etc.). The main questions posed by the Ministry for the current methodological study were:

- Can the two strategies be evaluated together to appraise the joint impact of innovation and enterprise policy?
- Can the policy impact be assessed through one evaluation study or should selected programmes be evaluated separately as well?
- Should there be a link with other policy initiatives in related areas e.g. launched by the Ministry of Interior, the Ministry of Education and Research?
- How do agencies (EAS, etc.) identify client groups and to what extent are measures focused on specific client groups ?
- Should the evaluation approach adopted be based on distinguishing excepted results and impacts by certain client groups?
- Is it relevant to tackle certain sectors/priority areas in the evaluation? In particular, for which business sectors are the measures and their expected impacts likely to be more or less relevant?
- How in depth should the evaluation of the strategy and measures be (in terms of indicators, activities, etc)?
- What are the key indicators to focus on during the evaluation?
- Is it possible to distinguish the cost-efficiency (e.g. with a view to public budgetary resources), effectiveness and impact when comparing grants and other financial instruments?
- What is the most cost-effective way (for the MKM, its agencies and the firms receiving support) to collect a minimum set of representative data for the impact analysis?
- What data is available for the impact analysis (e.g. collected by EAS when selecting and funding projects) and what data needs to collected additionally before or during the evaluation?

The framework seeks to enable the MKM to assess the effectiveness of implementation and the impact of the current set of innovation and enterprise policy measures. The appraisal framework is to be used, by MKM analysis staff, in 2011 to provide a retrospective analysis of the period from 2007 (and before where relevant for longer running measures). The output of the study provide both advice for analysing the outcome and impact of policy measures and guidance on the feasibility of continuing, merging or stopping certain measures for the next programming period (from 2014–20). Rather than adopting a measure-by-measure approach, the evaluation methods framework aims to enable the MKM to assess the combined impact of innovation and enterprise policy measures. The focus of the evaluation framework is on those measures directly supporting enterprises and thereby expected to contribute to competitiveness and economic growth. Hence, it is necessary to assess the optimality of the whole policy portfolio (coverage of market and system failures, number of programmes, programme management and procedures).

The study was carried out during the first quarter of 2011 by a team comprised of Dr Katrin Männik, Alasdair Reid and Michal Miedzinski.

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1.1 | Policy challenges, evaluation challenges

Policy makers are increasingly aware of the need of synergies or, at least, complementarities in the design of policy measures in order to ensure the most effective interventions with the highest value for money. This challenge has led to policy portfolio approaches in some countries and led to a debate on policy coordination in other countries and at the EU level. This move to limit fragmentation of public policies requires a different approach to policy making from the design, through implementation to policy monitoring and evaluation. This project focuses on policy evaluation, however it will make reference to other phases of policy as policy evaluation alone cannot resolve the inherent problems of policy design and planning.

If the policy-makers aim is to build-in synergies and avoid fragmentation when designing public interventions, then the key evaluation challenge is to provide better understanding of the overall impact of this intervention. Hence, to better understand the impact of public policy on the performance and behaviour of companies, evaluations need to capture all major interventions (or the lack of thereof). This implies going beyond evaluations of individual measures which may offer relevant results for assessing effectiveness and efficiency, but have limited utility for appraising impact. As a response, a systemic approach to evaluating research and innovation has been proposed (Arnold 2004).

1.2 | Key features and implications of systemic evaluation design

A systemic approach to policy evaluation has the following key features:

- scope: focus on the entire policy system or policy portfolios encompassing relevant policy measures
- impact: focus on impacts of public intervention on the entire company system as well as on the different target groups, sectors, regions
- time horizon: focus on the sufficiently long time horizons to capture impacts of public intervention
- comparisons: ability to compare different policy measures / policy portfolios (relevance, effectiveness, efficiency) aiming at the same objectives
- framework conditions: explicit focus on the influence of the framework conditions on the evaluated policy area
- audience and utility: the results of such evaluations are relevant beyond one policy area as interactions with other policies are taken into account

1.2.1 | Scope: finding the right "evaluation portfolio"

When designing an evaluation system and an overall evaluation approach there is a need to keep in mind the "systemic questions" about the relevance (or appropriateness), impacts as well as effectiveness and efficiency of public policy. The more explicit are the policy objectives the easier it is to find consensus on these questions. This "grand evaluation design" should frame the evaluation questions posed within individual evaluation studies and activities focussing on programmes or specific transversal topics.

The evaluation system designed to tackle the systemic questions should focus on different levels of analysis and diagnosis: system-, meso- and micro level. System level evaluation focuses on the "system health" in which the subject of the analysis is the innovation system and systemic impact of the policies on the system (see also Arnold 2004). The systemic evaluation helps to scope and frame the evaluation questions for the thematic evaluations on the meso level.

Meso level evaluations tackle specific themes (e.g. company creation), actors (e.g. small enterprises) or regions having in mind their role in the performance of the overall system and, in this context, identifying the role of relevant policy measures. Micro level evaluations are the most typical evaluation focusing on individual policy measures that is programmes or less often policy portfolios.
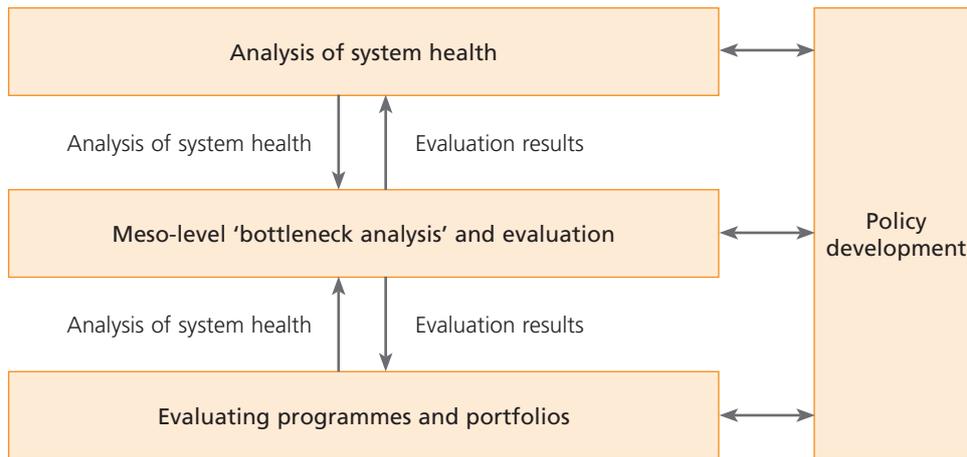
Figure 1. Evaluation in systems world
Source: Arnold (2004)

Building the "evaluation portfolio" means making choices about the overall scope of evaluation and moni-toring in order to best inform both policy design and policy implementation. The choices will depend on the overall rationale of the evaluation as well as on the limits of analytical capacity (including availability of data), budget and time. The composition of the "evaluation portfolio" will determine the capacity to understand various processes and impacts of policy making. To understand better overall policy impacts, for example, the decision may be made to invest more in systemic or meso evaluations and perform policy portfolio evaluations focussing on longer time horizons rather than commissioning evaluations of single policy measures reporting on outputs and short term results.

1.2.2 Attribution puzzles and understanding impacts

A systemic approach to policy evaluation addresses some key problems of evaluation of policy impacts on the innovation process in companies and in the wider economy. One key issue is the question of additionality (or added value) of public intervention, which requires understanding of and the ability to make assumptions about attribution of innovation effects to policy interventions. A systemic approach accommodates not only input and output additionality, but also to the issue of behavioural additionality of public intervention (OECD 2006, Georghiou 2007).

In order to better understand the effects of policy on company behaviour and performance an evaluation study needs to take into account diverse factors influencing innovation process (a single policy measure is but one such factor) as well as allow for a sufficient time-lag for effects to take shape. A systemic evaluation explores the drivers and barriers in a comprehensive way looking at all relevant policy measures, the non-policy related factors as well as at the wider context of innovation process. This enables to avoid the "project fallacy" problem, which leads to a wrong attribution of effects due to a very limited scope of evaluation study. Thus, the systemic approach to evaluation recognises the problems of attribution of policy impacts in programme evaluations and responds to the systemic nature of innovation processes. Needless, to say it also requires a more comprehensive methodological approaches and sufficient data sets in order to undertake a robust analysis.

Table 1. Key features of evaluation levels

Level	Rationale	Scope	Criteria	Time horizon	Frequency
System	Evaluation and assessment directly contributing to a better design of public strategy and policy. Analysis of the innovation system and diagnosis of the relevence, effectiveness and efficiency of the policy as a whole.	Medium and long term impacts of all the innovation and enterprise policy interventions (policy portfolios) on economy, including the role of framework conditions and policy options comparison	▪ Relevance ▪ Policy effectiveness ▪ External coherence	Long term trends capturing structural processes and changes. Focus on the long term impacts of policy interventions on economy.	Every 2-3 years (adapted to policy program-ming cycles)
Meso	Evaluation and assessment directly contributing to a better design of public strategy and policy in relation to specific transversal topics (or "bottle necks"), client groups or regions. Analysis of specific problems or components of innovation system.	Medium and long term impacts of policy intervention on the specific target groups, sectors or technology areas, regions, including the role of framework conditions and policy options comparison Effectiveness of an entire programme portfolio	▪ Relevance ▪ Policy effectiveness ▪ Policy efficiency (incl. compara-tive analysis) ▪ External coherence ▪ Additionality (input, output, behavioural)	Long term trends capturing structural process and changes in sectors or value chains, specific thematic areas, target groups or regions. Focus on the long term impacts of policy as whole.	Selected studies repeated every 2-3 years; additional problem-oriented studies
Micro	Evaluation and assessment of individual programme or programme portfolio.The focus is on effectiveness and efficiency.	Effectiveness of a programme	▪ Effectiveness ▪ Efficiency ▪ Cost-effectiveness ▪ Internal coherence	Focus on the time horizon allowing to assess outputs and results of the programme or programme portfolio. Need to place the analysis in the long term context (use of meso and system analysis).	Ex-ante, mid-term, ex-post for major programmes or programme porfolios, ex-post for selected minor programmes

1.2.3 Comparisons: policy options and benchmarks

A systemic approach to evaluation, notably to assessing effectiveness and efficiency, should allow for comparative analysis of policy alternatives. The comparisons should be made between policy portfolios rather than just between individual measures. The comparative perspective is relevant for both ex ante and ex post evaluations and should encompass both national and international comparisons.

1.2.4 Audiences and utility

The systemic approach to evaluation enlarges the scope of the audience and of the utility of an evaluation study. The process and results of the evaluations are relevant not only to the civil servants responsible for a policy measure, but become relevant to policy makers from various ministries and agencies as well as politicians responsible for overall design of policy interventions. As such, the evaluation starts playing a strong formative role becoming a reference in strategic policy design.

A systemic evaluation is of relevance for other stakeholders in the innovation system. A debate on systemic policy issues can attract interest from business and research, and may be a factor contributing to a more active participation and sharing of experience between stakeholders. Hence, there is a relation between the scope and depth of overall evaluation questions and the involvement of stakeholders in the policy cycle.

1.3 Designing a systemic evaluation approach

A systemic evaluation approach in order to be effective has to be embedded in the overall policy design process. Ideally, the key systemic evaluation questions as well as key indicators should be agreed upon and integrated during the programming stage. Such an integrated approach is feasible if preparatory work is undertaken that reviews the relevance and utility of evaluation practice.

The preparatory work to establish a systemic evaluation approach requires:

- Performing a policy review
  - reviewing strategic policy objectives in the area of focus
  - comparing strategic policy objectives with other related areas
  - mapping and classifying relevant direct and indirect policy measures and policy portfolios

- Performing an evaluation review
  - mapping and classifying evaluation activity (micro, meso, macro)
  - reviewing monitoring and data collection
  - assessing value added of evaluation activity
    - to assess relevance of policy measures
    - to assess effectiveness of policy measures
    - to assess efficiency of policy measures
    - to understand impact of policy (e.g. socio-economic impact, input-output-behavioural additionality etc)
    - to contribute to policy design (including improving internal and external coherence)
  - reviewing major studies and reports in the field relevant for understanding framework conditions / future challenges
  - identifying fields where evaluation did not deliver sufficient results

- Designing an evaluation system and "evaluation portfolio"
  - identifying systemic evaluation questions based on the high level policy objectives (political process)
  - assuring policy relevance of evaluation findings
  - defining micro, meso and system level evaluation needs
  - adapting monitoring and data collection process
  - consulting and testing the evaluation design with stakeholders (utility check).
    - One path for utilising these technologies is to establish spin-off companies, this has already happened with many close to market entry technologies but requires highly determined people with business knowledge, and is more of an anomaly than a practice

This report aims to provide a framework in which the MKM can establish and undertake/pilot such a systemic evaluation of Estonian enterprise and innovation policy implemented over the last decade (since approximately 2002 and in terms of Structural Fund programming periods since 2004).

Table 2 below summarises an overall framework for conducting evaluation at different levels of aggregation (left hand columns) on the one hand across a smaller or larger breadth of possible types of public intervention. The simplest evaluation would be one where the evaluation focuses a single programme and seeks to understand the direct effects of that programme. This is increasingly uncommon as an approach since even in the case of a single programme, there is a need to take account of framework conditions and synergies/overlaps with other programmes (at least in the policy field).

Table 2. A systemic evaluation framework

Level / type of evaluation		Examples	Public intervention											
			Innovation and enterprise policy						Other relevant policy areas		Framework conditions			International comparisons
			Programme 1	Programme 2	Other direct measures	Fiscal scheme 1	Fiscal scheme 2	Other indirect measures	Direct measures	Indirect measures	Infrastructure	Market trends	Financial markets	Benchmarking
Micro level		Individual measures and portfolio evaluations (programmes, financing schemes etc)												
Meso level	Thematic	Supporting start-ups												
		Strengthening export capacity and internationalisation												
		Developing product development and technology capacity												
	Sector / technology area	ICT												
		Textiles												
		Mobility and transport												
		Construction												
		etc												
	Regional	Tallinn												
		Tartu												
		etc												
System level		Evaluation of system effects of the public intervention on SMEs												

Clearly, there is a cost-benefit issue that makes it impossible, and often not cost-effective, to do in-depth evaluations of every single programme or issue. Hence, depending on the breadth and ambitions of the evaluation, a larger or smaller number of the cells in the matrix may be 'filled'. A system level evaluation would cover a broad range of programmes from one or more policy areas and framework conditions, but in terms of 'depth' may not seek to fully investigate all issues or understand the specific impacts of all programmes.

1.3.1 Methodologies: data sources and methods of analysis

Given the framework set out above, the next issue is which types of data collection and analytical methods may be most optimally applied. Table 3 set out the principal data source and collection methods for each of the three broad types of evaluation.

Table 3. Principal data sources by type of evaluation

Level / type of evaluation	Principal sources of data		
	Internal evaluation data and information	External evaluation data and information	External data
Micro level	■ programme monitoring data ■ data from monitoring and impact assessments of indirect measures	■ inteviews ■ focus groups, case studies	■ innovation surveys ■ structural stats
Meso level	■ aggregated monitoring data from direct and indirect measures (allowing for thematic / sectoral / regional disaggregations) ■ monitoring data from related past and on-going programmes	■ surveys (control group approaches), case studies (including interviews) ■ expert panels and other expert opinion seeking methods ■ stakeholder workshops	■ innovation surveys and other relevant surveys ■ established independent databases ■ structural stats ■ international stats
System level	■ aggregated monitoring data from direct and indirect measures monitoring data from related past programmes	■ surveys (control group approaches) ■ expert panels and other expert opinion seeking methods ■ stakeholder workshops and conferences	■ innovation surveys ■ structural stats ■ established independent databases ■ international stats

Table 4 sets out in more detail the principal choices for data (quantitative statistics and qualitative evidence) collection methods, whilst Table 5 similarly summarises the main methods than can be applied for analysis of data and qualitative information.

Table 4. Key data collection methods

Data collection methods and data sources for evaluation	Description
Use of existing monitoring data collected during the programme lifetime	Use of data and other information relating to the programme's administration, activities or performance systematically collected during the lifetime of the of the programme, usually by the programme management or administration
Use of existing surveys or databases	Use of existing data, generally collected for purposes external to the evaluation and the measure (e.g. CIS data, opinion polls, business expenditure surveys, etc.)
Document and literature searches	Search of the documents and literature directly and/or indirectly related to a programme. These may include, for example, administrative manuals, application forms, assessment forms, existing evaluation report and broader policy reports.

Data collection methods and data sources for evaluation	Description
Participant interviews	Interviews (either face-to-face or by telephone) conducted with those who have participated in a measure (i.e. recipients of funding) or who have benefited from the activities or services provided by a measure. May involve a structured interview format but allows scope for investigating issues that arise during the interview itself.
Non-participant interviews	Interviews (either face-to-face or by telephone) conducted with those who have not participated in a measure (e.g. recipients of funding) or who have benefited from the activities or services provided by a measure. May involve a structured interview format but allows scope for investigating issues that arise during the interview itself.
Participant surveys	Surveys conducted with the participants or beneficiaries of a measure. May be conducted via paper or on-line, but usually involve the completion of a structured questionnaire.
Non-participant surveys	Surveys conducted with those who have not directly participated in, or are not the main intended beneficiaries of, a measure. May be conducted via paper or on-line, but usually involve the completion of a structured questionnaire.
Focus groups, workshops, group meetings, etc.	A small panel of people selected for their knowledge or perspective on a topic of interest that is brought together to discuss the topic with the assistance of a facilitator. The discussion is used to identify important themes or to construct descriptive summaries of views and experiences on the focal topic.
Peer reviews	Process of evaluation or assessment of programme activities or programme outcomes/outputs involving qualified individuals within the relevant field. The peers are often sourced from outside of the country or region concerned by the evaluation.
Bibliometric or patent database studies	Searches of scientific publications (and sometimes their citations) and patents from bibliometric and patent databases with a view to understanding if the measure has had a substantive impact on scientific or technological productivity or networking patterns.

Table 5. Key data analysis methods

Data collection methods and data sources for evaluation	Description
Input/output analysis	Method used to represent the interaction between sectors of a national or regional economy in a given time period, and to predict its reaction to stimulation, for example, to increased consumption or changes in government policy.
Cost benefit approach	Procedure for determining the economic efficiency of a programme, expressed as the relationship between costs and outcomes, usually measured in monetary terms.
Econometric analysis	The use of sophisticated econometric models or other similar approaches to study the data.
Counter-factual approaches	Approach that compares the state where no intervention has (or is assumed to have) taken place and the state where there has been an intervention. Can include the use of control groups where data from the participants/beneficiaries of a programme is compared to data from non-participants/beneficiaries, or the use of before/after comparisons.
Case studies	Methods of inquiry that focus on detailed data collection and analysis and which focus on a restricted number of participants/beneficiaries.
Network analysis	Analysis that aims to understand the social and other forms of interaction between the subjects of an evaluation including the beneficiaries.

Each of the specific data collection and analysis methods have a certain number of advantages in terms of their application to different evaluation questions, their cost-effectiveness (direct monetary costs of evaluations but also indirect cost in terms of the time required by beneficiaries to complete surveys, etc.). Table 6 summarises the relative strengths and weaknesses of the various methods.

Table 6. Relative strength and weaknesses of evaluation methods

Tools	Description	Strengths	Weaknesses
Document analysis	▪ Logical framework analysis, to recreate the intervention logic in order to test its appropriateness and to define the key dimensions and metrics to be studied through the evaluation ▪ Analysis of the distribution of assistance and the types of assistance, from financial and other monitoring data	▪ Good, disciplined approach to definition of appropriate performance measures ▪ Permits one to align key tests with changed circumstances and reality on ground ▪ Programme data permit objective analysis of Finances, Activities and Outputs	▪ Not easy to secure buy-in to (newly-defined) key tests amongst beneficiaries and other stakeholders ▪ Dependant upon budget holder having had the foresight to establish baselines and gather the full spectrum of data needed through their standard bureaucratic monitoring systems
Beneficiary surveys	▪ A bespoke set of questions directed to recipients of assistance, mostly closed to permit a degree of quantification. ▪ Some open questions too	▪ Bespoke (One can design questions befitting the intervention, where official surveys / census are unlikely to address ▪ Efficient. One can collect large amounts of highly relevant facts and figures and opinions, cheaply and quickly ▪ Efficient. One can target recipients rather than address questions to very large numbers of people and organisations with no knowledge of a scheme	▪ Works with predominantly subjective data, with response biases ▪ Quality of questionnaire design, tough to get right in a single iteration even with piloting ▪ Single snapshot survey deals poorly with before and after ▪ Can become burdensome to administer if one has to commit to maintaining periodical surveys ▪ Response rates collapse with repeat surveys beyond life of support ▪ Response bias ▪ Deals very poorly with the counterfactual
Impact analysis	▪ Most often addressed through a combination of methods, typically beneficiary surveys run in parallel with surveys of a control group, asking the same questions in order to be able to estimate additionality	▪ Cost-effective means by which to arrive at a reasonably good estimate of direct benefits attributable to a programme ▪ For individual programme evaluations, macroeconomic modelling is almost certain to be too aggregate but might be applicable for collected investments across a programming period	▪ Does less well with indirect benefits, such a knowledge spillovers, so might understate ▪ Does less well with issues like displacement ▪ Does less well with more intangible gains
Network analyses	▪ Use of contractual or survey-derived data to describe the density, connectedness of networks of actors	▪ An evolving technique that is increasingly able to describe the evolution in the nature and extent of regional networks, and points of influence	▪ Cannot explain the changed relationships, either causality or significance (difficult to control for the impact of external factors on any observed changes)
Methods / tools used to evaluate behavioural change	▪ Depending upon the centrality of this as an objective, the tools can range from modules within beneficiary questionnaires to focus groups with self-selecting actors all the way through to more bespoke surveys delivered face-to-face to a sample of the population one is trying to change the behaviour of (borrowed from health-psychology research)	▪ Beneficiary surveys are an efficient means by which to gather large amounts of subjective data on behaviour change	▪ Surveys tend to be completed by the recipients of support on behalf of others, introducing possible biases and information gaps ▪ They necessarily treat behaviour change in a rather aggregate fashion, and do less well at gauging stickiness / sustainability ▪ They need to include similar questions in control group surveys

2 | Innovation and enterprise policy in Estonia: an overview

2.1 | Strategic policy framework

The two main 'sectoral' strategies concerned by this study are: Estonian Research and Development and Innovation Strategy "Knowledge-based Estonia" 2007–2013 (and its predecessor from 2004–2006) and Estonian Enterprise Policy 2007–2013 (and its predecessor from 2004–2006).

The two strategies were important elements of input for the preparation of the national development plan which, in the context of the EU's Structural Funds is, de facto, the National Strategic Reference Framework (NSRF) 2007–13. In addition, the Action Plan for Growth and Jobs, prepared in the framework of the EU's Lisbon Strategy, can be considered as the 'highest level' strategic document of the Estonian Government. Hence, all other strategies, including the NSRF, should contribute to achieving the objectives set out in the AP.

In the framework of the NSRF, two operational programmes (OP), out of three, can be considered as relevant when reviewing and evaluation the strategic framework for innovation and entrepreneurship policies. The specific implementing measures identified in the OP are then developed either internally, by the competent ministry, or with external assistance (e.g. a feasibility study). Finally, at the level of State agencies, the action plan of the Enterprise Estonia agency (EAS) can be considered as a key document since it puts into operation the measures developed at ministry level.

All evaluations, at programme or 'system' level need to take account of the objectives and indicators set out in these main strategic documents when considering the optimal methodological approach. Table 7 lists the objectives of each of the strategy documents identified in Figure 2.
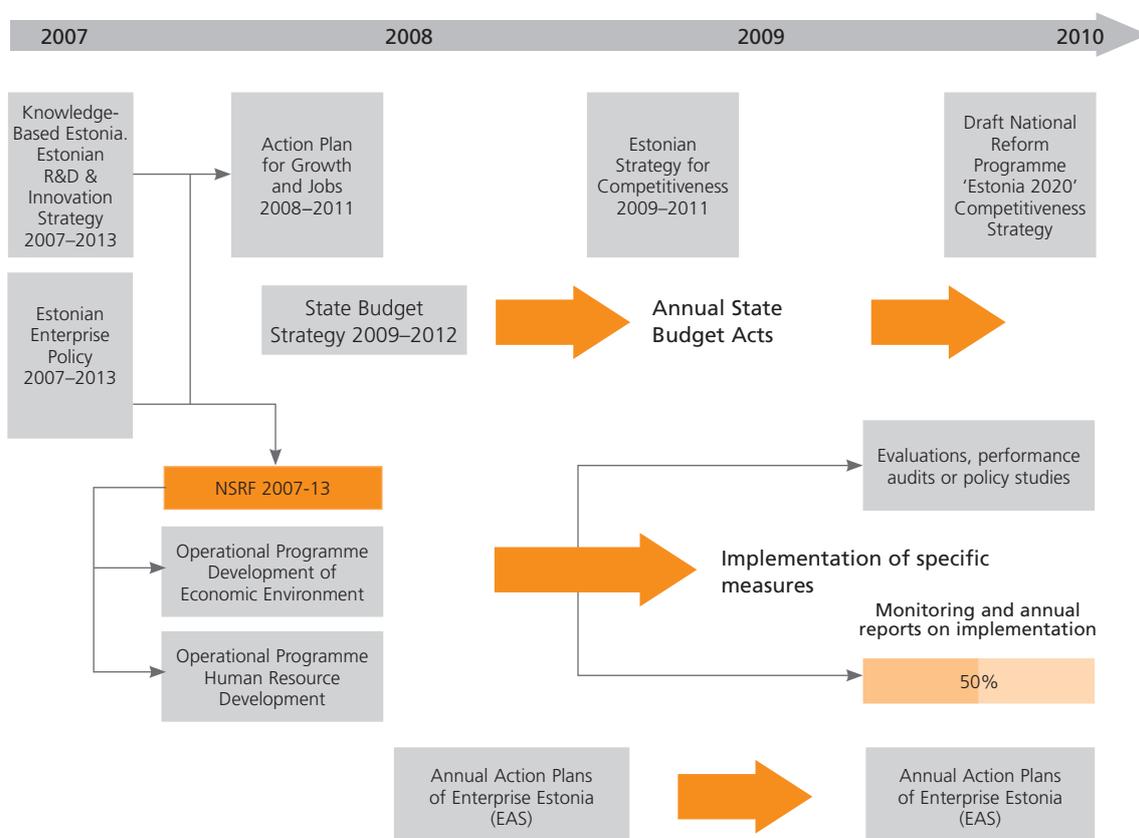

Figure 2. Timeline of main strategies relevant for innovation and enterprise policy

Table 7. Main strategies and policy documents relevant for innovation and enterprise policy (2007–13)

| Name of document	Date	Overall objectives (relevant for innovation and enterprise policy)

Draft National Reform Programme 'Estonia 2020' Competitiveness Strategy	8/11/10	■ Two primary and central challenges in the context of Estonia's prospects for continued growth:
		  ■ to achieve rapid **growth in productivity** through greater capital intensity and products and services with higher value added;
		  ■ to return to the **high level of employment** prior to the economic crisis.
		
		■ Under the field **'Competitive Business Environment'**, six specific challenges are identified:
		  ■ Challenge 6. Creating the preconditions necessary for raising private spending on R&D and increase in the number and quality of innovation outputs.
		  ■ Challenge 7. Developing human resources engaged in research and ensuring a supply of engineers and top specialists.
		  ■ Challenge 8. Using the potential of creative industries to increase the value added in other sectors.
		  ■ Challenge 9. Creating an environment for attracting larger volumes of foreign direct investments in industries with export potential and higher value added.
		  ■ Challenge 10. Developing a support policy for promoting the international competitiveness of businesses
		  ■ Challenge 11. Bring transportation, ICT and other public infrastructure and institutions supporting business to international level.

Estonian Strategy for Competitiveness 2009–2011 Overview and Updates to the Estonian Action Plan for Growth And Jobs 2008–2011	5/11/09	■ **conservative macroeconomic policy** with the aim of keeping the public deficit within the limit of 3% of GDP, joining the Euro area in 2011 and maintaining low public debt levels in order to be able to sustain high investment levels and a favourable level of taxes in the medium and long-term perspective; ■ **raising the export potential of enterprises** primarily by improving the general business environment in order to increase investment and productivity. The aim is to maintain the share of export compared to GDP at its 2008 level. To achieve this, a number of measures are being taken to support export companies. The previous high levels in foreign investment can only be achieved through systematic and sector-based work with potential investors; ■ **skills development** by increasing the financing of life-long learning, ensuring more resources for continuing education and retraining activities and using the period of lower employment to raise the skills of 50 000 people by at least one level; ■ **maintaining employment levels by improving the business environment** and stimulating job creation, increasing public investments and providing additional subsidies with the aim of preventing long-term unemployment.
Action Plan for Growth and Jobs 2008–2011	Oct. 2008	■ to develop education based on the needs of companies, and modernise work relations in order to increase the safe **flexibility of the labour market**; ■ to **increase the ability of R&D activities**, and direct these to be more commercial; ■ to develop an **economic and investment environment that supports innovation** and the international competitiveness of enterprises operating in Estonia; ■ to **increase the use of environmentally friendly energy**, and at the same time ensure the security of the energy supply and the competitiveness of the energy sector.

Name of document	Date	Overall objectives (relevant for innovation and enterprise policy)
The Operational Programme for the Development of Economic Environment 2007–2013	21/6/07	■ Seven priority 'axis' of which first two (directly) relevant for innovation and enterprise policy ■ 2.1. Innovation and growth capacity of enterprises 　■ Objective 1.1: Providing Estonian enterprises access to capital required for productivity increasing investments 　■ Objective 1.2: Successful internationalisation of Estonian enterprises 　■ Objective 1.3: Technological modernisation of businesses, increase in development capability and productivity 　■ Objective 1.4: Inflow and commercialisation of new innovative business ideas 　■ Objective 1.5: Successful knowledge and technology transfer 　■ Objective 1.6: Supporting the development of creative industries 　■ Objective 1.7: Ensuring the competitive and sustainable development of Estonia's tourism sector ■ 2.2. Improving the competitiveness of Estonian R&D through research programmes and modernisation of HE and R&D institutions 　■ Objective 2.2.2.1: Estonia's R&D is focused at highly prospective thematic areas of research quality and business potential 　■ Objective 2.2.2.2: Improved research environment and higher education study environment 　■ Objective 2.2.2.3: Estonian R&D has become internationally more competitive
The National Strategic Reference Framework 2007–2013	21/6/07	■ Headline objective for the NSRF: **fast and sustainable development**. This objective entails in itself three sub-objectives: 　■ **raised competitiveness of the economy**; 　■ increased social cohesion; 　■ more sustainable use of environment. ■ To which contribute six priorities (or 'action areas'): 　■ Educated and active people 　■ **Increase in the research and development capacity and in the innovativeness and productivity of enterprises** 　■ Better connection opportunities (accessibility) 　■ Sustainable use of environment 　■ Integral and balanced development of regions 　■ Higher administrative capacity
Knowledge-Based Estonia. Estonian Research and Development and Innovation Strategy 2007–2013	7/2/07	■ The strategy set three main objectives: 　■ the competitive quality and increased intensity of research and development; 　■ innovative entrepreneurship creating new value in the global economy; 　■ an innovation friendly society aimed at long-term development.
Estonian Enterprise Policy 2007–2013	2007	■ Estonian entrepreneurs and employees are competent and professional and the people are enterprising and innovative; ■ Estonian companies have the means to make investments that are future-oriented and increase productivity; ■ Export capacity of Estonian companies has improved and their growth results from taking advantage of the opportunities of international operations; ■ Estonian legal environment favours entrepreneurship and the entrepreneurial mindset.

Source: compilation by Technopolis Group based on cited policy documents

*Figure 3. Schematic analysis of main indicators from Estonian strategic policy documents
(numbers in diagram are targets set)*

Intermediate objectives (results)	Overall objectives (impacts)	Main indicators	Timeline of targets			
		2007	**2011**	**2013**	**2020**
High position in e-State ranking lists	Raised competitiveness of the economy	Productivity % EU		80%	80%	80%
Higher position in EIS		Employment rate % EU			72%	76%
Higher position in World Bank Doing Business	Structural change	Share of exports as % of GDP		75%	Share Estonian exports World Trade	0,11%
Early-stage VC invest-ments % GDP		FDI as % GDP (more knowledge intensive)		73%		
Satisfaction (%) with business environment		Employment in hi-medium tech sectors		11%		
Enterprise start-up rate	Entrepreneurial activity & environment	Enterprise survival rate			70%	
Innovation expenditure as % turnover		Enterprises per 1000 inhabitants		39		
BERD as % GDP		% of innovative enterprises		>45%		
GOVERD as % GDP	Increased R&D capacity in enteprises	% of turnover from sales of new products and services		12,9%	15%	
New and updated R&D infrastructure		% of enterprises involved in innovation co-operation		46%		
Life-long learning rate		GERD as % GDP (of which foreign funded)		2%	3%	3%
% of foreign (doctoral) students	Improved human resources for R&D and innovation	Revenue of R&D institutes from commercialisation IP		10% growth p.a.		
N° of doctoral students		N° researchers & engineers per 1000 employees		7	8	
		Number of ISI/WoS publications		1250	1200	

Source: compilation by Technopolis Group based on main policy documents

From an overall policy perspective, an evaluation framework for a specific policy field should be able to answer the question "how has this specific policy contributed to the overall national development goals"? In this respect, the strategic objectives and related indicators set out in the plans constitute a set of targets that specific measures (programmes, major projects, legislative or regulatory action, etc.) may be expected to contribute to attaining.

However, in a context, where there is a multiplicity of 'plans', and where a major unexpected 'externality' has occurred (the 2008–9 financial crisis due to partly external, partly internal factors) leading to the adaptation of the plans, the initial expected and actual likely impact of innovation and enterprise policies may have evolved over the period since 2007. The first evaluation criterion, the relevance of the strategy, risks to be a moving target for those seeking to assess the policy impact.

In fact, the evidence from Figure 3 suggests that in Estonia most 'headline objectives' and the corresponding indicators are relatively stable over time. Perhaps more remarkably, the targets hardly evolve even when they are pushed back by 9 years from 2011 to 2020 (e.g. the target for Estonian productivity as a share of the EU average remains constant at 80%).

The headline objective for the NSRF, fast and sustainable development, included as a first of three sub-objectives: raising the competitiveness of the economy and as a 2nd of six priorities (or action areas): increase in the R&D capacity and in the innovativeness and productivity of enterprises. The NSRF considered that the speed and continuity of economic growth and the competitiveness of the economy, depend currently and will depend even more in the future, on the R&D and innovation capacity and the productivity of enterprises. The focus of overall policy is thus very much on increased productivity and added-value creation. At the same time, from a social cohesion perspective, the objective of increasing the employment rate figures prominently in all national strategy documents.

The objectives, and indicators/targets, set out in the Action Plan for Growth and Jobs 2008–2011 are clearly derived in large part from the preceding two 'sectoral strategies' and from the NSRF. However, they are more operationally linked to specific measures and in that sense integrate elements of more 'result' type objectives and indicators.

Given the evaluation framework proposed in Figure 3, the strategic policy framework in Estonia includes aspects requiring analysis vis-à-vis the following dimensions:

- **Sectoral**: a core element of the national 'competitiveness agenda' over the last decade in Estonia has been the need to induce a structural change in the economy. While this is not explicitly mentioned as a 'headline objective' in the NSRF, the need to shift economic activity and hence employment towards 'higher-value added' or high-tech and medium-high tech sectors are clear objectives. The aim to induce 'structural change' is not necessarily limited to 'high-tech' manufacturing, for instance, there is an increasing prominence given to supporting the development of 'creative industries'. The extent to which innovation and enterprise policies have in practice focused on specific sectors (e.g. via clusters policies or implicitly via the focusing of general innovation and enterprise support measures) and to what extent this has contributed to a 'structural change' needs to be evaluated.
- **Thematic**: since the first Knowledge-Based Estonia strategy (2002–2006), there has been an expressed intention to focus research and innovation policy on a number of key technology fields considered as critical for the development of the Estonian economy and society. The extent to which this is a) relevant b) has been actually pursued c) led to observable strengthening of Estonian performance in these fields needs to be evaluated. In particular, the 'OP Economy' foresaw that under the priority axis 'innovation and growth capacity of enterprises' "*at least 50% of the budget for co-operation between businesses and R&D/HE institutions and raising the innovation capacity and demand of enterprises will be allocated in line with thematic R&D programmes*".
- **Regional**: while there is no explicit 'regional innovation policy' in Estonia, the regional dimension is not absent from strategy documents and indeed specific regional focusing of policy is outlined in the NSRF for both the OP Economic Development and the OP Human Resource Development.
  - For the OP Economic Development "entrepreneurship must be fostered in all regions of Estonia, irrespective of their entrepreneurial environment". The regional dimension of innovation support (pg.75 OP economy) was highlighted as an explicit issue as "most of the R&D and innovation capable businesses are located in the 'capital area', South-Estonia (around Tartu) and North-East Estonia. Accordingly, one of the priorities of the SF support for innovation is 'increasing awareness, skills and capacities of the both business and research sectors **across different regions in Estonia'**. The OP foresaw to place a 'focus on regional knowledge hubs' such as science and technology parks, 'which are already regional key players in bringing business and research together. However, the OP foresaw an explicit strategy of concentrating "SF RTDI interventions at regions with high RTDI and business concentration" while keeping in focus the need for more collaboration between knowledge institutions in those regions and business in the other regions". The cluster development measure was highlighted as means by which public support will be given to make less capable enterprises to collaborate with more advanced ones across all sectors and regions.
  - For the OP Human Resources, the priority is mainly to improve the international competitiveness of R&D activities in Tallinn and Tartu, however, it is noted that strengthening Tartu as a R&D centre should have "a positive impact on the development of Southern Estonia, especially in terms of developing regional knowledge, innovation and business networks and systems".

2.1.1 Innovation policy objectives

Estonian innovation policy started more or less from scratch in 2000. In the decade before this, the prevailing attitude in Estonia was that the markets mechanisms would produce the outcomes desired. In connection with the economic downturn in 1999, there was a growing awareness that market mechanisms alone would not be sufficient and, relying on Finnish experiences in particular, an innovation policy was formulated. The first innovation policy strategy was Knowledge-Based Estonia 2002–2006. Estonia was broadly recognised as one of the leading countries in innovation policy among the then candidate countries for EU membership. This was, in part, due to an explicit policy learning process and openness to adapting policy approaches from Nordic (notably Finland) and other advanced North-West European countries.

The current core document, with respect to policy in support of the Estonian innovation system is the "Knowledge-Based Estonia: Research and Development and Innovation Strategy 2007–2013" (hereafter KBE2). At the core of Estonian innovation policy is the need to increase value-added in manufacturing and services, which in turn can be expected to enhance export capability (and subsequent revenues). The crucial role of exports is a consequence of the very limited size of the domestic market. In order to achieve this, a number of bottlenecks have to be addressed:

- To ensure a sufficient number of people and competitive infrastructure
- To focus more on Estonia's needs and opportunities and to ensure the stable growth of financing at agreed level
- To increase productivity and high added value export
- To support the development of cooperation networks encouraging the growth of innovation
- Creation and dissemination of knowledge necessary for better policy-making
- Increasing the role of the public sector in valuing the knowledge-based approach

The KBE2 sets out three overall objectives and defined a number of indicators and targets to be met by 2013.

- The competitive quality and increased intensity of research and development
- Innovative entrepreneurship creating new value in the global economy
- Innovation friendly society aimed at long-term development

The indicators proposed are listed in Appendix A2.

2.1.2 Enterprise policy objectives

The NSRF underlines that there is a need for "a proactive, well-targeted and versatile support to enterprises in Estonia…implementation of the actions must bring about structural changes in the economy – the aim is to reduce the share of the "traditional" actions and sectors by increasing the share of knowledge- and skills-intensive actions and sectors". This focus on 'structural change' set out in the NSRF is less apparent in the Estonian Enterprise Policy (EEP) 2007–13, which set out four main objectives:

- Estonian entrepreneurs and employees are competent and professional and the people are enterprising and innovative;
- Estonian companies have the means to make investments that are future-oriented and increase productivity;
- Export capacity of Estonian companies has improved and their growth results from taking advantage of the opportunities of international operations;
- Estonian legal environment favours entrepreneurship and the entrepreneurial mindset.

A key indicator for the EEP's implementation was 'number of enterprises per 1000 residents' (linked to first objective). Yet, paradoxically, the overview of Estonian entrepreneurship development in the EEP underlines that over the period 1995–2005, the number of micro-enterprises (up to nine employees) has grown faster than any other size class so that by 2005, they accounted for 81% of all companies. Over the same period, large and medium-sized enterprises had declined in absolute numbers to only 167 and 1255 respectively. This aim to 'boost' relative numbers of enterprises seems at odds with the second objective to raise productivity which is often higher in more automated medium to larger scale companies. However, this relationship is not necessarily linear since research by the MKM for manufacturing sectors found that enterprises with 250 or more employees often have lower productivity than enterprises with less than 250 employees. This is the case, for instance, in textiles sector. In any event, there is not a clear focus on 'growth of companies' in the EEP.

A second stylised fact from the EEP was the dominant role of Tallinn as a hub for the creation of new enterprises, yet the EEP argues that there is no specific need for a 'regional preferences or quotas in support programmes' (pg 11).

A key obstacle identified to company development and productivity improvements was the 'lack of qualified labour', followed by the small scale of the national market. At the time, financial constraints appeared to be greater for potential entrepreneurs and newer companies, than established SMEs. Finally, the overall entrepreneurial environment (tax burden, bureaucracy, etc.) was still considered insufficient.

The EEP foresaw the policy being implemented through four main fields of activity with a total budget of 3.7 billion EEK (approx. €237m) was foreseen (of which 85% from EU Structural Funds).

- Developing know-how and skills (30.2% of budget)
- Supporting investments (38.4% of budget)
- Supporting internationalisation (30.2% of budget)
- Development of the legal environment (1.2% of budget)

2.1.3 Related policy objectives

The strategic plans relevant for innovation and enterprise policy all make explicit reference to 'human resources' as a key 'bottleneck' in the Estonian innovation system, in general, and for knowledge-based business development in particular. In this context, it is necessary to take account of the main strategic documents developed in the field of higher education, namely: the Higher Education Strategy for 2007–13 and the implementation plans of the Ministry of Education and Research (Educated and Active People 2009–2014) and the Operational Programme for Human Resource Development 2007–2013 (OP HR).

Clearly, the scope of interactions with other policies could be widened beyond the 'human resource development' programmes, other policy fields with direct relevance include: mobility (intra-country and international linkages), environment and energy policies (in relation to adjusting the Estonian economy to meet 'grand challenges' related to resource efficiency, energy efficiency and security of energy supply through renewables, etc.), etc.

The Estonian Energy Technology Programme would be an example of an effort to integrate innovation and enterprise policy with a 'sectoral' policy.

2.2 Overview of innovation and entrepreneurship policy measures

Having considered the strategic policy objectives, and as noted above in section 1.3, in order to set up an evaluation framework the next step is to map and classify the relevant direct and indirect policy measures. Table 9 provides a list of the relevant innovation and enterprise policy measures implemented since 2004 structured into four main groups with respect to the specific objectives of the measures:

- support to start-ups
- company development
- strengthening export capacity and internationalisation, and
- developing product developing and technology capacity.

A number of 'stylised facts' are evident immediately.

Firstly, approximately half the measures (11 out of 15 grant or financial engineering measures) have been operational since 2004 (or earlier) as can be seen from Table 8.

Table 8. Financial support measures by launch year and main objective

Launch date/ Main focus of measure	Prior to 2007 (11 measures)	Since 2007 (15 measures)
Business development & exports	■ EAS Start-up grant ■ EAS Business incubation programme ■ EAS Development of knowledge and skills ■ EAS Export development support ■ *KREDEX business loan guarantees* ■ *KREDEX long-term large export guarantees, short-term export guarantees.*	■ EAS Start-up and development grant ■ EAS Cluster development programme ■ EAS Development of creative industry ■ EAS Recruitment of development personnel ■ *KREDEX start-up loan guarantee* ■ *KREDEX capital loan* ■ *Kredex subordinated loan* ■ *Kredex long-term loan in partnership with commercial banks* ■ *KREDEX credit line for the banks*
Innovation and technology development	■ EAS Entrepreneurship and Innovation Awareness Programme ■ EAS SPINNO/SPINNO+ ■ EAS R&D project support programme ■ EAS Competence Centre Programme ■ EAS funding for science & technology parks	■ EAS Technology investment programme for industrial enterprises ■ State Energy Technology Programme 2007 ■ State Biotechnology Programme 2009 ■ EAS Innovation vouchers ■ EAS semi-industrial and testing laboratories ■ *Estonian Development Fund*

Source: Technopolis Group from literature review and interviews. Financial engineering measures are in italics (equity, guarantees, loans, etc.); all other measures provide grants.

Simply 'counting' measures, there appears to have been a shift towards 'financial engineering' measures in from 2007 onwards and to some extent from 'start-up phase' towards development/growth of companies (including through recruitment) under the business development objective. Export promotion and 'internationalisation' in general, are also the subject of non-financial actions through the EAS Internationalisation programme (foreign investment advice, marketing of Estonia, EXPO2010, network of foreign EAS representatives, etc.). The innovation and technology development measures are relatively stable over the entire period, in reality, since the two state programmes do not add any specific funding and the main novelty is the innovation vouchers scheme. Although 'technically' supporting innovation as well, both the clusters and technology investment programme are more focused on business development than product (service) development.

Secondly, a number of the programmes have been placed under several headings, such as the entrepreneurship and awareness programme (initially launched during the 2004–2006 as an innovation awareness programme) or the development of knowledge and skills programme. These programmes can be considered to provide solutions to various elements of a company innovation and growth strategy. This suggests that from an evaluation perspective it is necessary to trace the combined impact of different projects funded under the programmes to understand the impact of the public sector intervention.

Table 9. List of identified innovation and enterprise policy measures since 2004

Name of programme	Start date	End date
Support to start-ups		
EAS Entrepreneurship and Innovation Awareness Programme (2007–2013: portal aktiva.ee, entrepreneurship awareness)	2004	2013
EAS Development of knowledge and skills (2007–2013: basic training for start-ups, business mentoring programme)	2005	2013
EAS Business incubation programme	2004	2013
EAS Start-up grant	2004	2007
EAS Start-up and development grant	2008	2013
KREDEX start-up loan guarantee	2008	2015

Name of programme	Start date	End date
Company development		
EAS Entrepreneurship and Innovation Awareness Programme (2007–2013: management awareness)	2004	2013
EAS Development of knowledge and skills (2007–2013: employees, managers)	2004	2013
EAS Cluster development programme	2008	2013
EAS Technology investment programme for industrial enterprises	2008	2010
EAS Recruitment of development personnel: international marketing, product development, product design and processes	2009	2013
EAS Development of creative industry (supporting support structures, awareness, development of knowledge and skills)	2008	2013
KREDEX business loan guarantees	2004	2015
KREDEX capital loan	2007	2011
Strengthening export capacity and internationalisation		
EAS Entrepreneurship and Innovation Awareness Programme (2007–2013: export awareness)	2004	2013
EAS Development of knowledge and skills (2007–2013: export trainings)	2004	2013
EAS Export development support (until 7/11/2010: three separate activities – export marketing support, foreign fairs support, joint marketing support; formerly known as export marketing grant, export plan programme; presently)	2002–2004, 2004–2007, 2007–2013	2013
EAS Recruitment of development personnel (international marketing);	2009	2013
EAS Internationalisation programme (foreign investments, marketing conception of Estonia, EXPO2010, foreign representatives, others)	2000	no end date
KREDEX credit line for the banks	2010	1st Q 2011
Kredex subordinated loan	2009	1st Q 2011
Kredex long-term loan in partnership with commercial banks	2009	2010
KREDEX long-term large export guarantees, short-term export guarantees	2004	no end date
Developing product development and technology capacity		
EAS Entrepreneurship and Innovation Awareness Programme (2007–2013: innovation awareness activities)	2004	2013
EAS Development of knowledge and skills	2004	2013
State Energy Technology Programme (no direct support, EAS own activities) – management	2007	no end date
State Biotechnology Programme (no direct support, EAS own activities – management)	2009	no end date
EAS International cooperation network (EAS own activities: EUREKA, Framework programmes, Space programme, etc)	2002	no end date
EAS Innovation vouchers	2008	2013
EAS SPINNO+	2008	2013
EAS R&D project support programme	2001	2013
EAS Competence Centre Programme	2003	2013
EAS Recruitment of development personnel (R&D)	2009	2013
EAS Innovation support structures (science, technology parks, supported until 2006), semi-industrial and testing laboratories (since 2010)	2010	2013
EAS regional competence centres (co-financed by the Ministry of Interior)	2010	2013

Thirdly, there is a need to make a distinction between direct funding programmes (essentially the EAS grant financing measures), indirect funding (the KREDEX guarantee schemes implemented through commercial banks) and indirect support measures (funding for the provision of services by innovation 'intermediaries', networking and promotion actions run 'in-house' by the agencies themselves (essentially EAS). The impact of indirect support measures may hypothetically be as important as direct funding, however, it tends to be even more difficult from an evaluation perspective to judge the actual effects of, say, the development of professional capacities within a support network on enterprises, as the final beneficiaries.

A variant on the first and third categories is the "State Technology Programmes" which provide no additional funding but are intended to act as "structuring elements" in the public funding system, ensuring a focusing of the various direct funding instruments on certain technologies

A key additional measure missing from the list is the Estonian Development Fund (www.arengufond.ee), created, by an act of Parliament, in 2007 in order to both develop an environment for early-stage funding of 'high-tech/value added' start-ups and support a broad participatory debate through foresight on key sectors, technologies and issues (e.g. higher education) and related studies and events. The KREDEX subordinated loan instrument is another form of equity capital that potentially could act in synergy with the EDF's direct co-investment with private investors in the equity capital of enterprises.

The terms of reference for the study raised the issue of how the agencies (notably EAS) identify client groups and to what extent are measures focused on specific client groups. Based on available documentation, there is no explicit sectoral targeting approach firms within the strategy of Enterprise Estonia (EAS) (see Action Plan 2009, Annual Report 2009). The main distinction made by EAS is between three types of companies:

- Start-up firms
- Established firms (development, export or innovation type support measures)
- Foreign direct investors

For each type of client, EAS adopts a 'value chain' approach whereby companies can be offered a range of services related to the 'value chain' they fall under. However, the value chain concept appears to be related more to a segmentation from a 'service provider' perspective than from a true value chain from a business perspective. Indeed, there is no explicit sectoral (NACE digit approach, etc.) or thematic (technological) targeting of EAS support with the following exceptions:

- Following the signature in 2009 of the contract under which Estonian firm can participate to the European Space Agency (ESA), EAS has undertaken a number of promotional and awareness raising measures towards firms working in fields relevant to the space sector.
- The creative industry programme under which EAS is providing focused support to the service sector firms, notably through funding for creative industry incubators and awareness raising actions.
- Through the management of State R&D programme for energy technology and biotechnology, EAS can in principle adopt a more targeted approach to client management for enterprises interested by these technology fields (which can also be considered sectors or sub-sectors).
- The cluster development programme after two rounds was funding 8 projects by 2010: wood construction cluster, ICT Cluster, Estonian ICT Centre export cluster Estonian Wind Energy Association: Wind Cluster, Wooden Houses Association, logistics and transit project development, Living Centre of Excellence and Innovative Building Project: Estonian ECO Cluster; Waste re-use cluster.

If there, is by and large, no explicit sectoral strategy, there may, however, be a sectoral focusing of funding through the various measures. Indeed,

- For the technology investment grants: 24% of grants have been awarded to manufacture of basic metals and fabricated metal products, 12% to manufacture of wood and wood products and a further 8% to paper and paper products.
- A similar pattern emerges from KREDEX loans for the period 2008–2010 with 20% allocated to wood products manufacturers, 17% to basic metals manufacture and fabricated metal products and 7% to the paper and paper products sector.

The chemical sector is also generally well placed in the grant and loan funding just after the three main beneficiary sectors.

Based on available data (2004–10, data from EAS), the situation is even more skewed when it comes to the main R&D financing programme with 'professional scientific and technical activities' (i.e. organisations performing scientific R&D services, computer design etc.) receiving over half of the funding and the education sector another fifth. However, it should be noted that the 'R&D sector' includes biotech firms, which receive the bulk of R&D support, followed by ICT, environment/energy firms, notably through funding allocated to the competence centres (grouping of firms and associated university labs)[1]. Hence, R&D support is clearly focused on a number of key R&D intensive firms in the economy.

In terms of 'traditional' business sectors, these receive 15% of the total subsidies granted. The main beneficiaries from the 15% granted to 'traditional business sector' are: computer programming, consultancy and related activities, specialised construction activities, manufacture of coke and refined petroleum products, rubber and plastic products.

From the evaluation viewpoint, these patterns of funding could be examined given the CIS 2006–2008 survey data, to identify differentiated patterns of activity by sector. However, it is difficult to chart causality directly from CIS statistics on innovation activity to public sector intervention. Similarly, the BERD statistics published by Statistics Estonia for 2009 show that levels of expenditure in the business sector remain in absolute terms similar to 2008. However, 75% of the R&D expenditure is attributable to only 58 enterprises from high-tech manufacturing or knowledge intensive services less affected by economic crisis. In this case, it should be possible to examine to what extent the public sector intervention received (or not) by these key R&D investors was a critical element in the maintenance of their R&D budgets (or whether the decision to invest was driven more by business strategy or differentiated market opportunities).

2.3 | Conclusions of the policy review and recommendations arising

The policy review carried out in this section leads to a number of specific conclusions for the development of an evaluation framework for innovation and enterprise policy. These conclusions include:

- Estonian strategic objectives for innovation and enterprise policy have been relatively stable over the last decade (at least since 2004). The analysis of objectives, indicators and targets underlines that there are a number of well-established headline and secondary objectives with broadly consistent targets against baselines from the 2004–2006 period (depending on the indicator).
- Similarly, while there has been an evolution towards a number of new measures and funding patterns have evolved (greater funding for infrastructure, new forms of financial instruments, etc.), the core set of measures has been in place for a period of between 6 to 10 years. It should, therefore, be possible to trace the impact of this set of measures on innovation activity, entrepreneurial behaviour and ultimately economic outcomes (productivity, employment, structural change in the economy, exports).
  - **Recommendation 1:** if an evaluation is to be conducted in 2011–12 period, it should adopt a longer-term perspective with a key research question being "the extent to which innovation and enterprise policy has fostered structural change in the Estonian economy over the decade to end 2010".

- It is difficult to separate out from an evaluation perspective, the overall impact attributable to specific innovation policy measures from those supported under an enterprise policy 'hat'. Equally, all national strategic documents underline that the broader set of measures supporting 'RTDI' cannot be considered in a vacuum from those aimed at improving (higher) education and training systems. Indeed, a necessary, and even sufficient, condition for improving Estonian business innovation and competitiveness is an improved access to skilled personnel. Hence, the 'knowledge triangle' linkages need to be at the heart of the evaluation.
  - **Recommendation 2:** it will be more costly and less effective from a policy learning viewpoint to undertake individual evaluations of all specific innovation and enterprise policy measures. We recommend that the evaluation should adopt a broad-based approach where the inter-linkages between the specific measures are a specific focus of attention.

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1   http://www.eas.ee/index.php/for-the-entrepreneur/innovation/competence-centre-programme?setlang=en-GB

3 | The current monitoring and evaluation framework for innovation and enterprise policy

The section reviews briefly the current practices and capacity for the evaluation and monitoring of innovation and enterprise policy in Estonia based on available literature and interviews carried out with officials in MKM and EAS. It is divided in two sections, the first examines the key types of evaluations carried out to date and main issues arising from them; the second reviews the monitoring framework and operational indicators used by EAS.

3.1 | Evaluation record of Estonian innovation and enterprise policy

Table 10 below summarises the main studies and evaluations commissioned by the Estonian public authorities or agencies over the last decade analysing either the Estonian innovation system more broadly, assessments of portfolios of measures or 'strategic plans' (Structural Fund programming documents) as well as at the micro (measure) level (feasibility studies and interim evaluations). Aside from feasibility studies (e.g. the latest on introducing an R&D tax credit) and SF programme wide evaluations, a number of measure specific evaluations have taken place (SPINNO, Competence Centres, highlighted in bold in the table) as well as an 'early' impact evaluation of State Enterprise Support Measures (Kuusk, K., Jürgenson, A., 2007).

A country review of innovation policy and evaluation practice commissioned by the European Commission (Kalvet, 2010) argued that while a relatively high number of evaluations have been carried out in Estonia, in several cases, the details of the methodology are unclear (e.g. the number of interviews carried out) and that mostly evaluations have been carried out based on interviews without the introduction of more quantitative evidence. He noted that this is quite common in studies relating to R&D and innovation, but that they might have been complemented with company-level indicators (impact on employment, value-added, etc.) where appropriate.

Subsequent to the review by Kalvet (2010), three main studies have been commissioned by the Estonian authorities of relevance for enterprise and innovation policy:

- An analysis of the Community Innovation Survey Results 2006–2008 is on-going (spring 2011, PRAXIS, Tartu University and Technopolis Group)
- An evaluation of the Structural Fund (ERDF, ESF) measures supported under the operational programme for human resource development falling under the responsibility of the Ministry of Education and Research (MER), on-going (spring 2011, PRAXIS, IBS, Technopolis Group)
- State Audit on the Impact of the State Enterprise Policy on Estonian Competitiveness, State Audit Office, 2010.

The analysis of the CIS 2006–2008 provides the most up to date insight into business innovation activity and co-operation patterns. However, given that at least two phases of economic trends have occurred since the survey (the 2008–9 recession and the gradual recovery since 2010), the results of the survey can at best give an idea of the evolution of the innovation system compared to previous periods. Hence,

The on-going evaluation of the MER Structural Fund measures in favour of research and higher education can be expected to provide some insights into the relevance of certain investments (infrastructure, equipment, centres of excellence) or support programmes (HEIs-business collaboration development, doctoral schools, mobility programmes, technology programmes) for the business sector.

Table 10. Studies & evaluations of Estonian innovation & enterprise policy since 2000

Evaluation type	Title	Author, year
System studies	Analysis of the Community Innovation Survey Results 2006–2008	Ongoing 2011, PRAXIS, Tartu University, Technopolis Group
	Eesti ettevõtete uued võimalused – ärimudelid, avatud innovatsiooni ja riigi valikud (New opportunities of Estonian companies – business models, open innovation and state decisions)	Kalvet, T., Karo, E., Kattel, R., 2010
	The Estonian Economy Current Status of Competitiveness and Future Outlooks. Arengufond.	Varblane U. et al, 2008
	Assessment of the Estonian Research, Development, Technology and Innovation Funding System (for the MER)	Nedeva, M., Georghiou, L., 2003
	Evaluation of Estonian Innovation System	Hernesniemi, H. 2000
Meso level (multi-measure/ programme level)	Evaluation of the Higher Education and R&D measures funded by the Structural Funds (for the MER)	PRAXIS, IBS, Technopolis Group, on-going 2011
	State Audit on the Impact of the State Enterprise Policy on Estonian Competitiveness	State Audit Office, 2010
	Struktuurivahendite rakenduskava hindamine. Uuringuaruanne. (Evaluation of EU SF operational programmes)	Ernst & Young Baltic, PRAXIS, Säästva Eesti Instituut, Balti Uuringute Instituut, 2010
	EST_IT@2018 (ICT foresight)	Estonian Development Fund, 2009
	Ex-ante evaluation of the National Strategic Reference Framework 2007–2013 and Operational Programmes (to the MoFinance)	Tallinn University of Technology, 2007
	Impact Evaluation of State Enterprise Support Measures	Kuusk, K., Jürgenson, A., 2007
	Evaluation of the Design and Implementation of Estonian RTDI Policy: Implications for Policy Planning	Reid, A., Walendowski, J., 2005 (Technopolis Group)
	Optimising the Design and Delivery of Innovation Policy in Estonia: an Evaluation of Policy Instruments for Intensifying Business Innovation	Reid, A., 2003
Micro (measure level)	Feasibility Study for an Estonian Materials Technology Programme.	Spinverse Oy, 2011
	An analysis of tax incentives to promote research and development in Estonia.	KPMG Baltics AS, PRAXIS Centre for Policy Studies, Staehr, K. 2010
	Estonian Biotechnology Programme. Feasibility study for an Estonian biotechnology programme	Ernst & Young, 2010
	Mid-Term Evaluation of the Competence Centre Programme.	Arnold, E. et al 2008
	Feasibility Study for Technology Investment Programme	Technopolis Group, 2008
	Feasibility study for Inno Awareness Programme	Ernst & Young, 2008
	Estonian Development Strategy of Energy Related Technologies. Feasibility Study	Huuhka, P. et al 2007
	Innovation Staff Recruitment Programme Feasibility Study	Gabrielsson, N. et al 2007
	Impact Assessment of R&D Financing Programme	Jürgenson, A., 2007
	Impact Evaluation of Spinno Programme in 2001–2006. Implications for the EU Structural Funds Programming Period 2007–2013	Brighton, R., Kells, 2007
	Access of Enterprises to Venture Financing in Estonia: Feasibility Study of Government Support Scheme	De Lange, L. et al 2004

Evaluation of the SPINNO programme (mid-term)	SQW, 2003
Business incubation: review of current situation and guidelines for government intervention in Estonia	Rouwmaat, V., Reid, A., Kurik, S. 2003
Feasibility for SPINNO programme "High tech venturing in Estonia: background report for the ESTPIN programme"	Technopolis Group, KU Leuven, 2001
Feasibility Study for Competence Centre Programme	Technopolis Group, 2001

Equally, the MER SF measures are, on paper, either 'upstream' measures likely to generate spillover effects for enterprise and innovation policy (e.g. increase in number of S&T graduates,) or complementary ('open access' for businesses to R&D infrastructure, greater potential for academic staff to provide contract research, linkages between competence centres and academic research institutes, etc.). Any future evaluation of innovation and enterprise policy needs to carefully chart out the expected 'linkages' or synergies between the MER measures and those of the MKM (implemented by EAS and KredEx).

In this context, the 2010 State Audit Office (SAO) report is a key document since it provided a first in-depth analysis of the results of the enterprise (and innovation) policy. It was based on:

- An analysis of 57 different measures implemented by EAS and KredEx during the period 2004–9 and which disbursed 7.4 billion crowns (approximately €474m), divided into seven groups for the purpose of analysis. For each group, the SAO agreed with the MKM and two agencies the expected impact the support should have had on the behaviour and the economic trends of the enterprise (for example, export growth).
- a questionnaire was sent to a sample of 4,262 enterprises, out of which 1,881 enterprises responded: 954 enterprises had received support, 180 enterprises had applied for but did not receive support, 747 enterprises had never applied for the support (and were used as a control group).
- In the questionnaire, supported enterprises were asked to assess the impact of the support received on their economic activity. The SAO compared the survey responses with the real economic indices of the enterprises who had received support, and of the control group, the indices in the fields of activities and the economy of Estonia as a whole.

Based on the questionnaire and the additional desk research and interviews, the SAO came to the, somewhat brutal, conclusion that the support measures "*have not improved the competitiveness of the audited fields of activity*". In particular, it argued that the low productivity and the limited export capacity of Estonian enterprises have not significantly increased as a result of enterprise policy measures. The main reason put forward by the SAO for this limited impact "*was a rigid, untargeted and dispersed system of supports which tries to deal at the same time with many problems of entrepreneurship and very often does not consider the actual needs of enterprises*".

Without exploring in details the counter-arguments of the MKM, EAS and KredEx to the finding of the SAO (these are detailed in an annex to the SAO report), a number of potential issues arise with the approach adopted by the SAO from a standpoint, in particular, of innovation policy:

- Selection of sectors: the SAO analysis excluded certain sectors and focused on those with the highest growth potential. The sector choice may reflect 'a view' on future growth potential but it also include a disparate set of sectors partly 'labour intensive' (with lower productivity at outset, such as timber or metal sectors) and partly 'knowledge intensive sectors accounting for relatively little employment but with high productivity at outset). Equally, Varblane (2008) underlined that labour productivity growth was fastest in the period up to 2008 in sectors oriented towards the domestic market irrespective of their innovativeness. The logic of the SAO to analyse impact of growth sectors may have been correct but it seems to have been done in a way that ignores the different dynamics of different sectors (notably whether they are driven by 'world demand' or 'domestic demand').
- Time: this is a key weakness in the SAO analysis from a number of perspectives. First, although the report argues that the period covers 'highs and lows' in economic cycles, the evidence on programme implementation suggests that many grants and support delivered, notably in the early period (see Kuusk and Jürgenson, 2007, Reid 2005, Arnold et al, 2008) suffered from delays and gaps in implementation due to switch overs between Structural Fund periods. Hence, expecting "verifiable impact on economic indices" is somewhat optimistic. Secondly, time is a key element for not only product innovation but also productivity (through process innovation) or export growth.

- Coverage of measures: the SAO analysis analyses measures that concern direct funding to enterprises (grants or loans/guarantees). This ignores a number of the interventions aimed at developing a better environment for entrepreneurship or innovation and the overall effect this is likely to have on overall performance of a wider group of companies, but in a marginal and difficult to verify way.

- Project fallacy: to some extent, despite the existence of a control group, the SAO approach falls into the trap of project fallacy, that is assuming that a funded project is a singular event leading to a singular output (e.g. export grant will lead to increased exports). This is naïve since from a company perspective the public policy impact is more likely to arise from a series of interventions, both direct financial and indirect advisory services, along the 'life-cycle' of a product or the implementation of a plan to improve process innovations.

- Behavioural additionality: the SAO analysis ignores a key element of modern evaluations namely that quantitative techniques have limited analytical power to explain the full effects of public support. Recent work (OECD 2006) has underlined the importance of taking into account behavioural additionality: 'the differences in firm behaviour resulting from an intervention'. The idea is that an evaluation should explore the effects beyond the direct impact (e.g. increased sales from a new product commercialised thanks to funding for an industrial R&D project). This implies examining ways in which the funding has generated permanent changes in the process and practice and capabilities of a firm to undertake innovation (e.g. has the firm developed new methods or tools for identifying innovation projects, have they improved methods for managing the innovation process, etc.). Kalvet and Jürgenson (2007) already applied such techniques (based on the work of Kuutse and Jürgenson) to the R&D financing programme subsidies of the 2004–6 period and found positive effects; while finding a mixed result in terms of immediate 'economic effects'.

3.2 | The monitoring system for innovation and enterprise policy in Estonia

In line with the key questions, the study team appraised the data available for carrying out an impact analysis (e.g. collected by EAS when selecting and funding projects) and considered what data needs to collected additionally before or during the evaluation?

The data for each of the measures has been compiled in appendix A.3 based on information gathered from the MKM, Kredex and EAS and the table gives an overview of the current state of play in terms of what sort of data it is possible to collect (or not) and a basic overview of indicators per measure. Based on our desk research and interviews, it appears that relatively detailed sectoral data is available at the level of programme managers. The sectoral data available concerns direct financial measures support to companies. In order to understand the sectors targeted by indirect support measures such as, for instance, SPINNO, competence centres or InnoAwareness would require further investigation with programme managers.

In terms of indicators, appendix A.3 gives an overview of the basic information most readily available from EAS or Kredex. Additional, more specific programme based information is available from EAS and Kredex activity plans and reports[2]. In appendix A.4 an overview table compiled by the MKM shows the indicators available for each measure. As could be assumed intuitively, the grey cells show indicators for which there is no specific problem to collect data and the orange those for it is more difficult.

In addition, for the period 2007–2009 data on financial allocations and other indicators are available for measures but also by sectors, counties, etc. The data available covers the following indicators:

- Number of applications
- The number of companies including the request rate
- The amount of support requested
- Number of projects
- The amount of support
- Project volume
- The average cost of the project
- Average amount of aid
- The average value added per employee
- The number of completed projects
- The amount of subsidy paid
- The volume of aid projects supported by the
- Contribution rate of use over the project (%)

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2   Annual plans and reports for EAS are available at: http://www.eas.ee/index.php/sihtasutusest/eelarved-ja-aruanded/eelarved/2010 and for Kredex at: http://www.kredex.ee/1545

- Number of jobs created
- The average value added per employee
- Estimate of the value added per employee
- Average export turnover forecast

Moreover, it is possible to access data for single companies per years, in terms of type of support given and from which programmes. MKM confirmed that the data for indicators in is also available from EAS for 2004–2006.

In addition, a database was constructed for the SAO audit of enterprise policy measures. As noted above, this database gives answers only for direct financial support measures of companies but not for the rest of programmes or does not cover the whole range of activities supported by certain programmes.

3.3 | Conclusions and recommendations

Given the past evaluation experience, we would recommend the following:

- based on the data available from EAS and KredEx, it appears that it is possible to undertake an analysis of the allocation of funding by business sector for the period 2004–2010. A sectoral approach is relevant since the evaluation can take into account the specific market drivers (domestic, external, etc.), structures (knowledge intensive, labour intensive, foreign owned, etc.) and trends such as the life-cycle stage of the sector (new emerging products or services, declining sector).
- Secondly, it appears possible to trace in a longitudinal manner the support receive by specific enterprises enabling an analysis (e.g. for a select number of case study companies) of the real effects of a stream of support over a relatively long time period (from 2004 onwards). This approach would focus on the combined impact of a 'portfolio' of aid received per company. The control group approach (non-aid recipients) adopted by the SAO is appropriate but only at a more fine level of analysis where similar companies can be tracked.

4 | An evaluation plan for Estonian innovation and enterprise policy

Based on the review of the current strategic policy objectives and the overall evaluation framework proposed above, this section sets out an evaluation framework including proposals for the types of evaluation, main evaluation indicators and relevant methods (for certain client groups or priorities) and a timetable.

4.1 | Conclusions and recommendations

In addition to the original study questions already addressed in previous sections, the key research questions that the Ministry of Economic Affairs and Communications asked that this study should provide a response to were as follows:

- Can the two strategies be evaluated together to appraise the joint impact of innovation and enterprise policy? (Q1)
- Can the policy impact be assessed through one evaluation study or should selected programmes be evaluated separately as well? (Q2)
- Should there be a link with other policy initiatives in related areas e.g. launched by the Ministry of Interior, the Ministry of Education and Research? (Q3)
- How do agencies (EAS, etc.) identify client groups and to what extent are measures focused on specific client groups ? (Q4)
- Should the evaluation approach adopted be based on distinguishing excepted results and impacts by certain client groups? (Q5)
- Is it relevant to tackle certain sectors/priority areas in the evaluation? In particular, for which business sectors are the measures and their expected impacts likely to be more or less relevant? (Q6)
- What are the key indicators to focus on during the evaluation? (Q7)
- How in depth should the evaluation of the strategy and measures be (in terms of indicators, activities, etc)? (Q8)
- Is it possible to distinguish the cost-efficiency (e.g. with a view to public budgetary resources), effectiveness and impact when comparing grants and other financial instruments? (Q9)
- What is the most cost-effective way (for the Ministry, its agencies and the firms receiving support) to collect a minimum set of representative data for the impact analysis? (Q10)
- Which data are presently available for the impact analysis (e.g. collected by EAS via the process of selecting and funding projects) and which need to prepared additionally before the start or during the evaluation? (Q11)

For the purposes of this concluding section, the research questions have been grouped into x main conclusions and recommendations

An integrated set of policy objectives call for a systemic evaluation of inter-linked policies (response to Q1 & Q3)

Given the close inter-linkages of the strategic objectives (the R&DI and enterprise policy strategies being component elements of the overall NSRF) and of the operational delivery (e.g. the value chain approach adopted by EAS), the evaluation approach should consider the combined impact of innovation and enterprise policy. Moreover, the public intervention aimed at increasing the availability of skilled people (higher education) and public/academic research can be considered as 'necessary conditions' for the full attainment of the objectives related to innovation and enterprise policy. Hence, the evaluation framework must examine the extent to which the implementation of the education and research policies has fostered or hindered the attainment of policy objectives related to business competitiveness.

There is a need to assess the (cost-)effectiveness of policy and impact on specific target groups, including functionally connected networks (e.g. value chains) (response to Q4 & Q6)

As noted in previous sections, Estonian innovation and enterprise policy is explicitly targeted at strategic and operational levels to specific technologies (see KBEII strategy), regions (e.g. focus on Tallinn and Tartu for innovation policy; excluding Harju county for enterprise policy measures) and types of companies (start-ups, exporting companies, foreign direct investors).

The evaluation needs to consider at a systems level whether this focusing was

- relevant and coherent (e.g. between increasing the number of companies per capita versus increasing innovation or export rates)
- whether the policy measures implemented actually effectively targeted the technologies, regions or types of companies.

Secondly the MKM asked whether it is relevant to tackle certain sectors/priority areas in the evaluation and, in particular, for which business sectors are the measures and their expected impacts likely to be more or less relevant? (**Q6**)

The sectoral dimension is less explicit in strategic policy, however it is implicitly present given the need for structural change and hence a shift to high-technology manufacturing or knowledge intensive services. It is also implicit, 'ex-post', in the actual distribution of funding by EAS and KREDEX to specific sectors where three main 'low- or medium-low technology' sectors (basic metals and fabricated metal products, wood and wood products, paper and paper products) absorbed 50% of finance for business development and technology upgrading in recent years. On paper this appears coherent, since these sectors are major employers and to remain competitive on export markets need to improve productivity. A specific analysis of the effects of this funding for 'technological upgrading' could shed light on whether there has been indeed an improvement in cost-competitiveness or value added (productivity) in the key firms supported.

The key question here is whether, indeed, without a specific sectoral focus – or a focus on the specific functional value chain – of grant or loan/equity financing schemes, it can be expected that the actual outcome will do anything than reflect the current (manufacturing and service) sectoral structure of the economy. Or in other words, at a systems level, is the current funding, de facto, reinforcing the current structure of the economy rather than fostering structural change?

Although EAS adopts a value chain approach (**Q4**), this is focused on types of services on three broad types of companies and the related support measures available to them: start-ups, developing companies (export and innovation support) and foreign investors. Hence, the approach is not explicitly sectoral or thematic (aside from a recent focus on creative industries sector and space, but the latter at a strategic rather than funding measure level).

Indeed, two questions need to be assessed by the evaluation:

- whether even if the measures were more sectorally focused, EAS has sufficient in-house competence to conduct a thematically/sectorally focused policy, and
- whether the currently implemented 'value chain' approach is optimal since it appears to be an EAS' 'chain of support measures' rather than an integrated 'client management' type approach to enable an enterprise to improve its internal value chain (for instance applying Michael Porter's 1985 model) to enhance 'margins'; and, perhaps, more importantly to understand and then help position strategically Estonian firms in international value chains. This implies that EAS would have client managers dedicated to specific firms with sectoral or industrial value chain expertise.

The evaluation approach should be focused on the contribution of enterprise and innovation policy to the overall objective of structural economic change (Q.2, Q.7, Q.8)

The evaluation approach should consider the overall contribution of enterprise and innovation policy to the structural change of the Estonian economy. The current 'evidence base' from studies, surveys (CIS), statistics and evaluations provide individually pieces to the 'puzzle' but so far do not give a comprehensive insight into the overall structuring effects of policy interventions since 2004. The broad statistical trends for three key indicators suggest that there has been little improvement in the structural performance of the Estonian economy since 2000.

Employment in high- and medium-high-technology manufacturing sectors
Share of total employment (%)
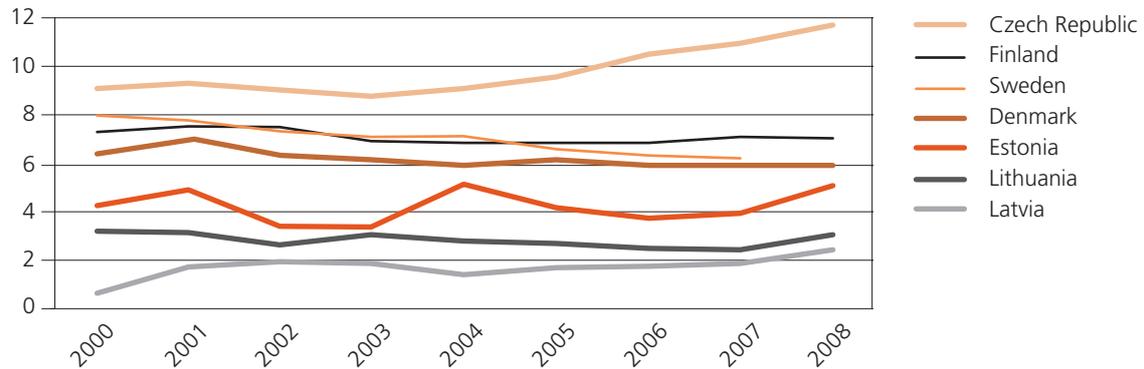
Employment in knowledge-intensive services sectors
Share of total employment (%)
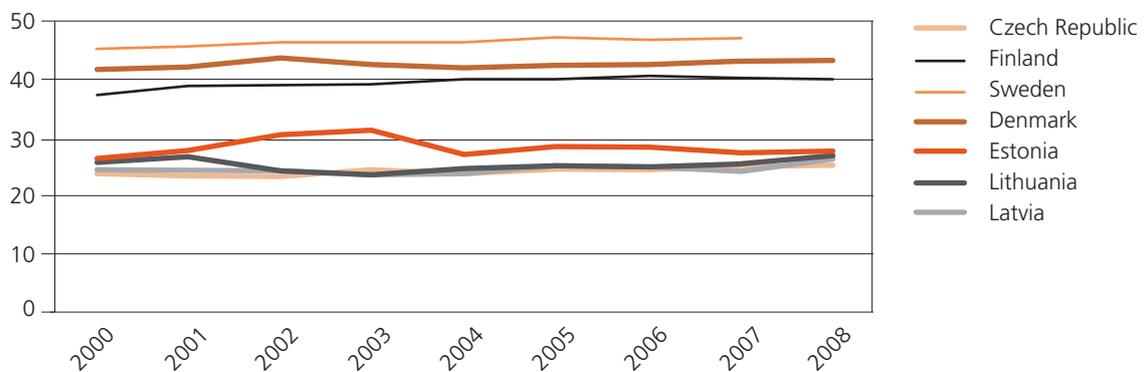
High-tech exports
Exports of high technology products as a share of total exports
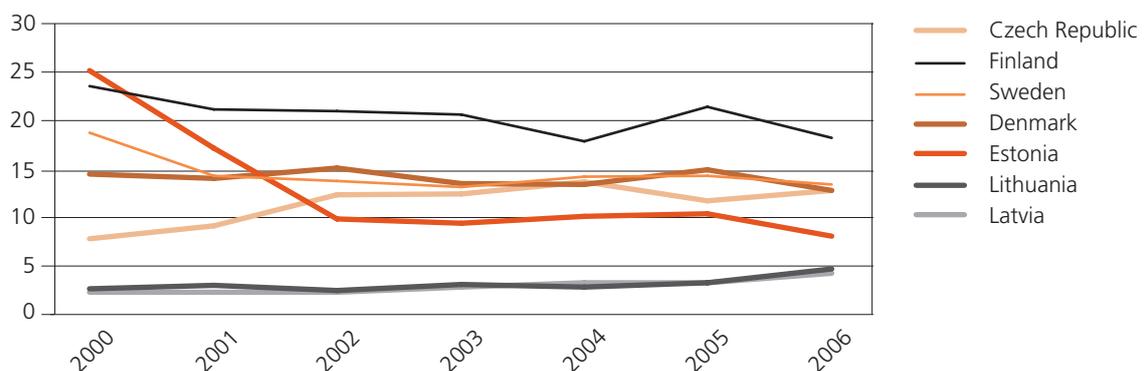
Figure 4. Trends in key indicators of economic structure
Source: Eurostat

The most comprehensive evaluation to date, by the State Audit office, adopted a multi-measure 'portfolio' evaluation approach but sought to prove direct 'short-term' effects on individual indicators. This approach, while adopting good practice in terms of control groups, etc., is undermined by the limited time frame (particularly for innovation related effects), by excluding certain sectors and by a 'mechanical' focus on direct effects on 'key performance indicators' of specific firms (ignoring behavioural additionality, spillover effects, etc.).

The evaluation approach proposed does not rule out the need for specific evaluations of selected programmes (Q.2), however, at the present time, a broad evaluation that addresses the key issue of the extent to which the entire set of innovation and enterprise measures have contributed to structural economic change seems more appropriate. The MKM has a track record of commissioning individual programme evaluations and selected programme level evaluations could contribute to the overall evaluation, if time and budget allows (see below).

In terms of key indicators (Q7), these should be selected at each level of the evaluation framework, however, the emphasis on structural change suggests the need to focus on indicators enabling a conclusion to be reached on:

- the extent to which product (or service) development (supported by innovation policy measures) is feeding through into exporting firms (supported by enterprise policy) shifting up their value chains (from 2nd tier to 1st tier suppliers to own products labels);
- the extent to which new company creation (and / or knowledge intensive FDI) is leading to a change in the structure of the economy (shifting towards knowledge intensive services, medium-to-high-tech manufacturing, transforming "traditional" sectors into a knowledge-based sectors by developing their own knowledge base or by connecting them to other sectors).

Finally, in terms of the depth to which the evaluation should analyse the strategy and measures (Q8), the suggested evaluation framework with a system approach but 'meso-level' elements allows for conducting analysis on specific topics through case studies, focus group or statistical methods.

The current monitoring system provides a basis for evaluation at micro and meso (sectoral, etc.) levels but requires further refinement to appraise systemic impact (Q. 9, 10 & 11)

The study has established that the data sets (Q.11) available at EAS and Kredex do allow for the clear identification of companies that have benefited from innovation and enterprise measures over a relatively long time period. The work of the State Audit office has resulted in the development of a database bringing together key statistics from various State agencies on enterprises. Hence, the availability of data on public funding to enterprises and on the main business performance indicators has been shown to be readily available. However, it is has been argued that attempting to draw a direct causal relationship between specific grants for an enterprises and overall business performance over a 2–3 period is over ambitious.

The aspects on which additional data need to be collected are notably on the extent to which public funding has led to a 'step change' in innovation activity in the business sector, in the sense, that there is an appreciably higher rate of innovation expenditure (not just technological), and notably product innovation (leading to an improved position on export markets or value chains) of enterprises.

In terms of broader macro trends in innovation performance the CIS provides an insight into specific aspects of innovation activity including on a sectoral basis. However, the CIS data is always received with a time lag and needs to be used an indicator of longer-term trends. Hence, there is a need to collect more evidence on a cohort of enterprises, across sectors, engaged in, or building the capacity to undertake, product development with a view to export markets.

Considering the issue of cost-effectiveness (Q.10), rather than a wide ranging survey (such as that already conducted by the State Audit office) there is a rational to focus additional data collection on a relatively small number of firms in the range of 500 (given that Statistics Estonia found that in 2009, 75% of the R&D expenditure was attributed to only 58 enterprises and that the total number of enterprises declaring such expenditures was limited to a few hundreds). This would cover a large enough number of companies to capture the main firms driving specific national supply chains or clusters, leading technological innovators as well as firms, not capture in official BERD statistics, but undertaking non-technological innovation (notably the service sector).

Finally, the question (Q.9) concern the issue of whether it is possible to compare grants and other financial instruments in terms of cost-efficiency, effectiveness and impact when comparing grants and other financial instruments. This can only be reasonably done by first assessing the intervention rationale in the overall policy context and the logic of each instrument and then comparing like with like. It is difficult to compare a loan (or loan guarantee) instrument aimed at supporting an industrial company to purchase new production line technologies with a grant aimed at support work on the proof of concept of a research result within an industrial firm. Hence, such comparisons need to be made in a logical order of outcomes and with an explicit recognition of methodological caveats (e.g. attribution problems etc).

Concerning this question, however, a comparative review of the Estonian policy mix with that of other 'peer countries' would enable a view as to whether all options open to support business innovation and entrepreneurship are being used (e.g. the study on R&D tax credits has been done already).

4.2 | Evaluation approach

4.2.1 | Proposed evaluation activities

An evaluation of the impact of innovation and enterprise policy needs to take into account a number of **contextual issues** if it is to succeed:

- Increasing entrepreneurship and innovation activity per se is not the aim of public policy, rather these policies should contribute to the overall goal of the NSRF, namely increased social well-being (improved business competitiveness and a sustainable use of the environment being contributory factors to this goal).
- Evaluating individual measures will not by themselves reveal the full impact

The proposed evaluation approach aims to ensure that the evaluation process feeds into the development of future strategic plans that will be developed in the coming year for the 2014–20 period. The plan is based on a number of **core principles**:

- The need to develop an improved 'in-house' policy monitoring framework and capacities enabling regular reviews and adjustments to specific measures and, where required, strategic objectives.
- A focus on how the measures are continuing in the short to medium term to improving the capabilities of enterprises ('behavioural additionality') and in the medium to long-term to addressing 'system failures' and not only of the direct effect of each euro of public spending on individual company performance.

The evaluation process proposed involves 3 **key phases**:

- Phase 1: ***developing further an evidence base*** for the evaluation notably focusing on the types and levels (funding) of support by size class, age, sector, thematic (technology) and region. This phase would be carried out largely in-house by a task force composed of officials from MKM, EAS, KREDEX and eventually other public services. An external 'process consultant' or/and 'expert panel' could be used to support the work of the group in terms of methodological advice and analytical techniques.
- Phase 2: **a longitudinal evaluation on a group of enterprises** assisted by innovation and enterprise policy measures since 2004. The evaluation should be carried out by triangulating the findings of the statistical data, collected by EAS and Kredex, on support given and performance indicators of specific firms with survey data and complemented by in-depth interviews with selected companies. The aim of this specific evaluation would be to assess the overall impact of the public policy intervention on the companies, including on behavioural aspects such as co-operation with other companies or academic researchers, rather than only assess the direct effects of individual grants. A counterfactual approach could be used in this phase. Table 11 provides an indicative set of criteria for selecting the sample of firms for the evaluation. A key issue is the weighting given to the criteria. While the sample should be representative of the weight of different types of firms, sectors, etc. in the general economy, the aim is not to replicate with such a small survey the current structure of the economy. Rather, the aim should be to focus on firms with a **potential** for export-led growth and with higher knowledge intensity than average.

Table 11. Indicative criteria for selecting companies for in-depth analysis

Criteria	Explanatory note
Share of firms by sector in terms of employment	■ Recommend to include a share of firms from 'low- to medium low sectors but which are important employers. ■ Include firms from knowledge intensive service sectors
Innovation intensity	■ This should include a sample of firms which are amongst the main contributors to BERD as well as firms that are more 'adopters' of existing technology but which may be innovating through marketing or design.
Share of exports in turnover (or growth in share of experts over last three years)	■ Focusing on firms that have experienced a high growth rate in exports would allow to examine the extent to which policy measures have supported this trend.
Recipient of grant aid from two or more enterprise or innovation support measures	■ This should be a key criteria in that the firms selected for analysis should be amongst those which have benefited from a number of EAS or Kredex supports over time, in order to allow testing the validity of the 'value chain' concept.
Partner in a competence centre or cluster	■ To enable an analysis of firms which have begun to co-operate for innovation or export development in order to examine how such measures have led to behavioural change.

- Phase 3: **system level analysis**. This phase could involve two main steps:
  - Two specific evaluation studies that would investigate specific 'bottlenecks' in the innovation system using notably a focus group approach with key stakeholders. Two specific issues would benefit from further study:
    - skills needs of enterprises for innovation and export and inter-linkages with human development;
    - the effects of innovation and enterprise measures on improving organisational and non-technological capabilities in enterprises.

Outline terms of reference for a study on skills needs of enterprises for innovation-led export growth and policy support

1. Empirical studies in a number of European countries have shown that product innovation is associated with increased employment while process innovation has no effect (at best)[3]. Equally, high technology sectors tend to be associated with higher rates of employment growth (notably ICT sector). At the same time, the application (embodied innovation) of new technologies (notably ICT) tends to be an important element in driving productivity. Both types of process can lead to significant changes in demand for different type of qualified staff (e.g. leading to job losses amongst lower skilled people) as well as in a redefinition of skills and qualifications required even amongst more highly skilled people. Given the overall objectives of the Estonia 2020 strategy to promote higher employment levels but also higher productivity, the study should seek to develop recommendations on how innovation and enterprise policy can best foster employment rich innovation.

2. The objective of the study will be to examine the way in which innovation activity in Estonian enterprises is leading to a change in the composition of skills and on employment levels. The aim will be to examine on the one hand what kind of jobs have been created by innovative Estonian firms over the period 2004–2010 and on the other hand, to examine the changing skills requirements of knowledge intensive manufacturing or service firms. The study will seek to explore the role which public funding measures in favour of entrepreneurship or innovation have played in fostering the development of 'employment-rich growth' and supported a realignment of skills composition in line with business innovation strategies.

3. The study should undertake a review of relevant international and national studies, survey data and academic research in order to develop a framework of analysis for examining the effects of innovation activity in Estonian firms on employment and on skills composition of the workforce. The range of skills considered should cover both technical and managerial functions.

4. Based on an analysis of relevant data on innovation, employment trends and exporting intensity of the main sectors of the Estonian economy, the study should propose a sample of enterprises to be surveyed on the effects of the innovation activity on employment and on current versus future skills needs for innovation.

5. The survey of enterprises should consult both enterprises that have received one or more grants from EAS or EU R&D and innovation programmes (FP6, FP7); as well as 'innovative' enterprises which have not received assistance.

6. Based on the literature review, data analysis and survey results, a number of in-depth cases could be examined at either company or sub-sector or regional level to understand the effects of product and/or process innovations on employment and skills needs.

7. The role of education and in particular, the interaction between enterprises studied and (notably higher) education and vocational and life-long learning training institutes to redefine curricula be examined based on the results of the survey

8. The study should make a number of recommendations concerning the adjustment of innovation and enterprise policy measures to better respond to skills challenges and where relevant propose realignment of educational curricula or methods.

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3   For a good summary, see Tether et al, A literature review on Skills and Innovation (2005). A CRIC report for the UK Department of Trade and Industry

Outline terms of reference for a study on impact of enterprise and innovation policy measures on organisational and non-technological innovation in Estonian high-tech manufacturing and knowledge intensive service firms

1. Recent evidence (e.g. CIS 2006–2008 results) tends to suggest that Estonian firms are under-performing compared to more advanced EU economies in terms of rates of organisational and non-technological innovation. Estonian innovation policy has largely focused on product innovation and technological innovation in manufacturing sector firms. Although there has been a recent emphasis on creative industries, service sector firms that tend to innovate through organisational and procedural change (even if such innovation often involves the application of technologies, notably ICT) have been less targeted by policy. Various studies have pointed out the need for a greater focus on design and marketing and organisational change in manufacturing firms enabling them to export higher value added products. At the same time, innovation in knowledge intensive service sector firms is increasingly an area of intervention of public policy in other more advanced EU countries (e.g. Finland).

2. The study will seek to examine the extent to which the current set of policy measures in Estonia responds to the needs of firms in terms of enhancing and fostering organisational and non-technological innovation. The study should seek to distinguish between forms of organisational and non-technological innovation in manufacturing (e.g. in a selection of higher-tech companies) and in knowledge intensive service sectors. It should propose an operational categorisation of different forms of organisational and non-technological innovation and identify and use this framework when examining the needs of Estonian firms and in terms of the rationale for public policy intervention, if any.

9. At a minimum, the study should address the following questions:
   - To what extent do form of and the intensity of organisational and non-technological innovation differ between firms (by size, ownerships, geographic location, industrial or service sector, export intensity, etc.) (analysis of available data, survey of firms, etc.)
   - Do the current innovation and enterprise policy measures respond to the needs of enterprises and support increased the rate of non-technological and organisational innovation. This question could be addressed through focus groups or interviews with selected enterprises
   - What examples of good practice from other European countries exist in terms of supporting non-technological and organisational innovation. How applicable are they to the Estonian case ?
   - Recommendations for future adjustments to existing policy measures.

These studies would feed into an international peer review that could focus on how the 'knowledge triangle' (innovation, research and higher education) policies supported by the Structural Funds have led to a greater specialisation of the Estonian innovation system (in line with the themes proposed in the KBEII strategy. An option here would be to use the 'self-assessment' tool annexed to the Innovation Union Communication as a framework. This review could include focus groups with leading Estonian businesses involved in innovation and export led development.

Table 12. Innovation Union self-assessment tool as a framework for a peer review

IU Self assessment tool – main sections	Elements of the evaluation framework contributing to peer review
Promoting research and innovation as a key policy instrument (competitiveness, job creation, societal challenges, etc)	- Evidence from policy review that could be organised by MKM and interviews carried out by peer reviewers
Design and implementation of research and innovation policies targeted at exploiting current or emerging national/regional strengths (smart specialisation)	- Evidence from monitoring data and national technology programmes on concentration of funding on key technologies/sectors - Evidence from longitudinal study on effects on innovation in leading enterprises
Innovation policy is pursued in a broad sense going beyond technological research and its applications	- Evidence from longitudinal or specific study on non-technological innovation - Focus group with enterprises
Adequate and predictable public investment in research and innovation focused in particular on stimulating private investment	- Findings of on-going evaluation being conducted for the MER on Higher Education and Research measures

IU Self assessment tool – main sections	Elements of the evaluation framework contributing to peer review
Education and training systems provide the right mix of skills	■ Findings of on-going evaluation being conducted for the MER on Higher Education and Research measures
Framework conditions promote business investments in R&D, entrepreneurship and innovation and partnership between higher education institutes, research centres and business, at regional, national and international level, are actively promoted	■ Evidence from past evaluations aimed at ■ Findings of on-going evaluation being conducted for the MER on Higher Education and Research measures ■ Focus group with 'triple helix partners'.
The public sector itself is a driver of innovation	■ Focus group of public sector partners to consider role of public procurement, etc.

4.2.2 Recommendations on the monitoring system and indicators

The terms of reference asked two specific questions concerning indicators:

- What are the key indicators to focus on during the evaluation?
- What is the most cost-effective way (for the MKM, its agencies and the firms receiving support) to collect a minimum set of representative data for the impact analysis?

The current set of indicators at strategic and operational levels have been reviewed in the study. The issue at present is not so much the choice of indicators as the need to focus on a few 'key performance indicators' with respect to the main focus of the evaluation exercise. These KPI can be considered at the three main levels of the evaluation framework proposed

- At strategic level, the overall KPI should be the shift of employment and value added in the Estonian economy originating from medium-high tech manufacturing or knowledge intensive services.
- At meso-level, the overall effect can be measured by 4 main KPI from the group of enterprises studied as part of the longitudinal survey:
  - Growth in export turnover and employment of assisted enterprises (as an indicator of the effect on creating companies able to compete on external markets);
  - Share of turnover/sales from new products
  - 'additional (net) recruitment of qualified staff' as a proxy for 'in-house' capability improvements
  - increased innovation co-operation, given the small scale of most Estonian companies external co-operation is a necessary condition for innovation.
- At micro-level, there is a need to monitor more closely the extent to which companies are receiving support in a consecutive and logical way to support development (e.g. innovation voucher, technological acquisition loans, R&D grant for product development, export support, etc.). Additionally, a KPI that should be monitored more closely is the sectoral or thematic (technological) focus of support provided.

In operational terms, it would appear most cost-effective for the MKM to make use of the database developed as part of the State Audit Office study that allows linking survey responses of enterprises to the EAS support database for enterprise and innovation measures and statistical data from Statistics Estonia. The main effort required would be to extend the coverage of the database (currently 2004–8) to include data for 2009 and, if possible, 2010. Data from the business register could potentially be added. Equally, the CIS updated database (2004–2008) could be potentially exploited further to support the sectoral approach of the evaluation study (the results of the study of the CIS results will be published shortly). The updated database would allow the testing of new control groups (more coherent with the evaluation aim focused on structural change). This analysis could be done by running a factor analysis for the EAS/Kredex support measures to identify sectoral/value chain groupings in order to select control groups neutrally.

4.2.3 | Evaluation plan

The table below summarises the various steps of the evaluation plan and indicates approximate resource/budget requirements.

Table 13. Indicative costing of evaluation approach

Phase	Activity	In-house vs external and estimated cost
Developing further an evidence base	▪ Assemble all measure level data for selected indicators	▪ Task force of in-house staff of MKM, EAS, Kredex. ▪ A contract of 20–30 person days could be tendered for an external process consultant to coach and advise task force
Longitudinal evaluation of policy impacts	▪ Statistical analysis of enterprises based on database ▪ Interviews with between 40–75 enterprises ▪ Focus groups by sector/theme	▪ Main element that could be tendered out. Cost range between 45–100k euro depending on level of ambition and involvement of Estonian and/or international experts
System evaluation	▪ Studies using a mix of quantitative and qualitative methods to explore in more depth specific innovation system bottlenecks and effects of innovation and enterprise policy measures. ▪ Peer review by 3–5 experts/senior officials from other EU Member States supported by a process consultant/reporter.	▪ Two to three studies could be commissioned to exam identified bottlenecks in innovation system. Approximate costing would be in the range of 50–75k euro per study. ▪ Background report for peer review exercise could be compiled in-house by MKM staff based on ERAWATCH, etc. type reporting, eventually with assistance of external consultant. ▪ Peers normally only paid limited fees/costs if done within cycle of EU 'OMC' type reviews. An external consultant could be appointed as reporter for the peer review group (10–20 days work).

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Appendix A │ Indicators

Appendix A.1. Indicators for the NSRF sub-objective: raised competitiveness of economy

Indicator	Explanation	Baseline	Target level
Employment rate (%) among people aged 15–64	Measures the number of employed people in the working age population. Higher employment increases the production potential of economy, but the increase of employment is also a consequence of economic development (increasing demand for labour). Rise of employment helps to increase the consumption ability of population and there-by gives further impulse to economic development. The source is Estonian Statistical Office; data are published also at Eurostat web page. The determined target level is fixed in the Action Plan for Growth and Jobs 2005–2007.	64.4% (2005)	72% (2014)
Productivity of companies per employee from EU25 average	Measured in relation to EU25 average, taking into account the GDP in Purchasing Power Standards. Company's productivity per employee shows how efficiently the people's abilities are in the economy. Increase of productivity allows to increase the economic production also in conditions where the number of working age people or employed is not rising (this is called intensive growth). Data are published at Eurostat webpage under structural indicators. This indicator and the target levels are used in Action Plan for Growth and Jobs 2005–2007 as well as in **R&D and Innovation Strategy 2007–2013**.	58.6 (2005)	80% (2013)
Survival rate of enterprises	The survival rate number of share of enterprises (with reported turnover) still operating 3 years after they were registered. The rise in the value of the indicator reflects the improvement of the entrepreneurial environment and the viability of enterprises. The basis for measurement is data from Estonian Tax and Customs Board. The indicator is used in **the Estonian Enterprise Policy 2007–2013**.	63% (2005)	70% (2013)
R&D investment of companies as percentage of GDP	The indicator reflects the orientation of companies to development activities and innovations s the core activities of raising competitiveness. The Statistical Office yearly collects data, which is published also in the Eurostat database under Structural Indicators. This indicator is used in Action Plan for Growth and Jobs 2005–2007 as well as in **R&D and Innovation strategy 2007–2013**.	0.42% (2004)	1.6% (2013)
Employment in high-tech and medium-high-tech industry and service (% from total employment)	Companies belonging to NACE code 24, 29–35, 64, 72 and 73 sectors are considered as high- and medium-high-technology industrial and service companies. Increase of employment in high-technology sectors shows that the phase of jobless growth has passed and companies have reached a higher level of development (their activities are more knowledge- and technology-intensive) and they expanding their activities. Data published by Eurostat. The target level is fixed in the Action Plan for Growth and Jobs 2005–2007 and the indicator is also used in **R&D and innovation strategy 2007–2013**.	7.57% (2004)	11% (2013)
Satisfaction of entrepreneurs with transport infrastructure	Satisfaction of entrepreneurs directly expresses whether the investments made into transport infrastructure contribute to the growth of companies and of the whole economy. The indicator is based on the results of an opinion poll of Estonian enterprise managers. Estonian Institute of Economic Research conducts the poll on a yearly basis for the periodical Estonian International Competitiveness. Average indicator of different means of transport is used (6=very good, 1=very poor). The indicator is used in the Transport Development Plan 2007–2013.	4,23 (2005)	4,65 (2013)

Indicator	Explanation	Baseline	Target level
Average life expectancy (M/F)	Average life expectancy shows the number of years to be lived on average at some age according to the life table in case no change in mortality. Here the average expected lifetime is measured at the age of 0 – average life expectancy at the moment of birth. The indicator is used for international comparison as a general indicator of the state of health of population. Long-term development potential depends on the life expectancy and the state of the health of population. Based on data of Statistical Office	M – 67,27 (2005) N – 78,14 (2005)	M – 73 (2015) N – 80 (2015)
Number of full time scientists and engineers per 1,000 employees	Directly characterises the size of labour force dealing with research and development, there-by also the size of the human capital necessary for the development of knowledge-based society. The latter influences speed of economic development as well as the long-term sustainability of economy and development of society. Statistical Office yearly collects data by the common method of EU and OECD. The indicator is included in R&D and innovation strategy 2007–13.	5,1 (2004)	8,0 (2013)
Rate of participation in lifelong learning	Measured as the percentage of adults participating in adult training among the residents aged 25–64. The indicator shows the readiness and opportunities of people to participate in further training and retraining. It is a key reflector of the flexibility of education and labour market and of the continuous updating of knowledge and skills Eurostat labour market survey data are used for monitoring. The indicator is included in the Life-Long Learning Strategy 2005–2008. Target level after 2008 will be determined in the future.	6,5% (2006)	11,5% (2013)
Number of graduates in technical fields	Measured as the percentage of graduates in natural sciences and sciences and technology, production and construction fields from all graduates. The development of science and technology and existence of relevant human resource is the foundation of knowledge-based economy, which in turn is essential for the sustainability of development. Data from Estonian Education Information System (EHIS).	20,2% (2004)	25% (2013)

Appendix A.2. Summary of main indicators from strategic documents

Name of document	Main indicators	Source	Baseline	Target (year of achievement)
Draft National Reform Programme 'Estonia 2020' Competitiveness Strategy	Headline objectives:			
	■ Employment rate in the 20–64 age group % EU27	■ Not specified	■ Not specified	■ 76% (2020)
	■ Productivity per employed person % EU average	■ Assume Eurostat		■ 80% (2020)
	Competitive business environment field:			
	■ GERD as a % of GDP			■ 3%
	■ Share of Estonian exports in world trade			■ 0.11%
Estonian Strategy for Competitiveness 2009–2011 Overview and Updates to the Estonian Action Plan for Growth And Jobs 2008–2011	■ Maintain share of exports as % of GDP	■ Not specified	■ 2008	■ n.a. (2011)
	■ Raise skills by one level	■ Assume Eurostat		■ 50000 people (2011)
	■ Maintain the employment rate			■ 63.5% (aged 15–64) (2011)
	■ Recover growth of productivity			■ 63.5% of EU level (2011)
	■ Government R&D spending as % of GDP			■ 1.3% (2011).
	■ Gross expenditure on R&D as % of GDP			■ 2% (2011)
Action Plan for Growth and Jobs 2008–2011	Objective 4: increase international competitiveness of R&D activities			
	■ Estonia's ranking and SII indicator value in the European Innovation Scoreboard	■ Source: European Commission, EIS	■ 18th, 0.37 (2007)	■ 15th place, 0.45 (2011)
	■ Gross expenditure on research and development as a percentage of GDP.	■ Source: Statistics Estonia	■ 1.15% (2006)	■ 2.0% (2011)
	Sub-objective 1: develop human capital for R&D			
	■ N° of full time researchers and engineers per 1000 workforce	■ Statistics Estonia	■ 5.4 (2006)	■ 7% (2011)
	■ N° of doctoral students admitted to doctoral studies (per year)	■ HTM	■ 541 (07/08)	■ 550 (2011)
	■ N° of graduates per doctoral studies (per year)	■ HTM	■ 153 (06/07)	■ 250 (2011)
	■ Percentage of foreign doctoral students	■ HTM	■ 3.3% (07/08)	■ 10% (2011)
	Sub-objective 2: develop an internationally competitive R&D environment			
	■ Volume of updated and new R&D infrastructure	■ HTM	■ 957m² (2008)	■ 6000 m² (2011)
	■ R&D expenditures as a % of GDP financed from foreign sources	■ Statistics Estonia	■ 0.19% (2006)	■ 0.19% (2011)
	Sub-objective 3: ensure better focusing of funding for R&D activities			
	■ Number of high quality publication	■ HTM	■ 967 (2007	■ 1250 (2011)

Name of document	Main indicators	Source	Baseline	Target (year of achievement)
	Objective 5: increase the productivity and international competitiveness of enterprises			
	Labour productivity per person employed as a percentage of the EU27 average	Eurostat.	64.7% (2007)	80% (2011)
	Sub-objective 1: develop strategic competencies in enterprises			
	Percentage of innovative enterprises	CIS	48.1% (2006)	>45% (2011)
	N° of full-time researchers and engineers in the business sector per 1000 employees	Statistics Estonia	1.8 (2006)	3.3
	Percentage of enterprises having trained at least half of their staff in the last 12 months	MKM	39% (2005)	45%
	Sub-objective 2: support the internationalisation of enterprises			
	Export of goods and services as a percentage of GDP	Estonian Tax & Customs Board	72.8% (2007)	75% (2011)
	Sub-objectives 3: promote foreign investments			
	Foreign direct investments as a percentage of GDP	Eurostat	72.7% (2006)	Status quo (2011)
	Sub-objective 4: support investments in the development of technologies, products and services			
	Innovation expenditures in enterprises (% turnover)	CIS	4.6% (2006)	2.2%
	Business expenditure on R&D as % of GDP	Statistics Estonia	0.53% (2006)	1.05%
	Sales revenue from new products as a % of turnover	CIS	9.3% (2006)	12.8%
	Sub-objective 5: promote innovation-related co-operation and joint activity among enterprises			
	Revenue of R&D institutions acquired from commercialisation of intellectual property	MKM	130.4m kroons (05/06)	10% growth per year
	Percentage of enterprises engaged in innovation related co-operation	CIS	39.5% (2006)	42% (2011)
	Sub-objective 6: support enterprises with high growth potential		0.031% (2006)	
	Early-stage venture capital investments as a percentage of GDP	EVCA	89% (2005)	0.06% (2011)
	Annual Growth in the turnover of the tenant companies in science and technology parks and incubators	MKM		40% average
	Objective 6: develop a business environment favourable to enterprise and entrepreneurship			
	Placement in the rankings of the World Bank's survey doing business	World Bank	22nd (2006)	14th (2011)
	Number of operating enterprises per 1000 inhabitants	Estonian Tax & Customs Board	36.6 (2006)	39 (2011)
	Sub-objective 1: increase entrepreneurship and support small enterprises			
	Number of enterprises established in a year	Estonian Tax & Customs Board	6687 (2006)	6700 (2011)
	Entrepreneurial activeness among Estonian inhabitants	Eurobarometer	40% (2006)	45% (2011)

Name of document	Main indicators	Source	Baseline	Target (year of achievement)
	Sub-objective 2: develop the business-related regulatory environment			
	■ The maximum number of days it takes to establish an enterprise	■ World Bank Survey Doing Business	■ 7 (2008)	■ 1 (2011)
	■ Proportion of business operators who think that the regulatory environment does not hinder business activity	■ IMD	■ 7.47 (2007)	■ 7.6 (2011)
The National Strategic Reference Framework 2007–2013	■ Employment rate (%) among people aged 15–64	■ Eurostat	■ 64.4% (2005)	■ 72% (2014)
	■ Productivity per employee as % EU25 average	■ Eurostat	■ 58.6 (2005)	■ 80% (2013)
	■ Survival rate of enterprises	■ Estonian Tax & Customs	■ 63% (2005)	■ 70% (2013)
	■ R&D investment of companies as percentage of GDP	■ Eurostat	■ 0.42% (2004)	■ 1.6%(2013)
	■ Employment in high-tech and medium-high-tech industry and service (% from total employment)	■ Eurostat	■ 7.57% (2004)	■ 11% (2013)
	■ Satisfaction of entrepreneurs with transport infrastructure	■ Estonian Institute of Economic Research	■ 4.23 (2005)	■ 4.65 (2013)
	■ Average life expectancy (M/F)	■ Statistics Estonia	■ M – 67,27 (2005) F – 78,14 (2005)	■ M – 73 (2015) F – 80 (2015)
	■ Number of full time scientists and engineers per 1,000 employees	■ Statistical office	■ 5.1 (2004)	■ 8.0 (2013)
	■ Rate of participation in lifelong learning	■ Eurostat LFS	■ 6.5% (2006)	■ 11.5% (2013)
	■ Number of graduates in technical fields	■ Estonian Education Information System	■ 20.2% (2004)	■ 25% (2013)
The Operational Programme for the Development of Economic Environment 2007–2013	2.1 Innovation and growth capacity of enterprises			
	■ (1.1) Added value per employee of enterprises receiving support (result)	■ EAS, KREDEX	■ 225k EEK (2005), 199k EEK small firms	■ 500k EEK (2015), 400k small firms
	■ (1.1) Induced private sector investments into new technologies and machinery (output)	■ EAS	■ 0	■ 2.1bln EEK (2007–15)
	■ (1.2) Number of exporting enterprises (impact)	■ Tax & Customs Board	■ 6797 (2005)	■ 8700 (2015)
	■ (1.2) Foreign Direct Investment as % of GDP (impact)	■ Eurostat	■ 97% (2005) (2nd in EU)	■ Top 3 in EU (2015)
	■ (1.2) Growth of export turnover in enterprises receiving support (result)	■ EAS	■ not available	■ 20% nominal growth (2015)
	■ (1.2) Number of supported companies export plans (output)	■ EAS	■ 0	■ 346 (2015)
	■ (1.3) Innovation investment % turnover (impact)	■ CIS	■ 1.6% (2004)	■ 2.6% (2016)
	■ (1.3) Enterprises protecting IP (impact)	■ CIS	■ 13.4% (2004)	■ 22.5% (2016)
	■ (1.3) Sales from new products or services % turnover (result)	■ EAS	■ n.a.	■ 25% (2015)
	■ (1.3) N° new technologies, products or services developed by supported firms (output)	■ EAS	■ 21 (2006)	■ 60 per annum (2015)
	■ (1.3) Private sector R&D investments induced by supported projects (output)	■ MKM ?	■ 0 (2006)	■ 600m EEK (2015)

Name of document	Main indicators	Source	Baseline	Target (year of achievement)
	(1.4) Turnover growth of enterprises located in S&T parks and incubators (result)	MKM	89% (2005)	40% per year (2007–15)
	(1.4) N° of enterprises in S&T parks including incubators (result)	MKM	175 (2006)	315 (2015)
	(1.5) N° of spin-off companies from HEI (result)	MKM/EAS	5 per year (2005)	16 per year (2015)
	(1.5) Revenue of universities and R&D institutions from commercialisation and contract services (result)	MKM/EAS	"130 372 thousand kroons" (05/06)	Nominal growth 10% per annum (2007–15)
	(1.5) N° of graduate students involved in co-operation between enterprises and research institutes in supported projects (result)	EAS	26 per annum (2006)	65 per annum (2015)
	(1.5) N° of cooperation projects between enterprises and research institutes (output)	MKM/EAS	30 per annum (2006)	60 per annum (2015)
	(1.6) Employment in the creative industries sector (impact)	Statistics Estonia	3% (2003)	4.2% (2015)
	(1.6) N° of projects promoting creative industries (output)	N.a.	0 (2006)	10 (2015)
	(1.7) Increase in export of tourism services (impact)	???	???	???
	2.2. Improving the competitiveness of Estonian R&D through the research programmes and modernisation of higher education and R&D institutions			
	(2.1) Share of intramural R&D expenditure in NABS 04, 05 and 07 as share of total expenditure (Result)	Eurostat	36.6% (2004)	50% (2015)
	(2.1) N° of thematic R&D programmes launched (output)	HTM	0 (2006)	6 (2015)
	(2.2) R&D working places created in new or upgraded facilities of R&D institutions (Result)	Programme monitoring	0 (2006)	800 (2015)
	(2.2) Students using new or upgraded facilities (Result)	As above	0 (2006)	1500 (2015)
	(2.2) New or upgraded facilities of R&D institutions	As above	0 (2006)	25000 m² (2015)
	(2.2) New or upgraded facilities of HEI	As above	0 (2006)	12000 m² (2015)
	(2.3) N° of ISI/Web of Science publications of scientists working in centres of excellence (Result)	ISI Web of Science	0 (2006	300 (2015)
	(2.3) n° of centres of excellence co-financed by ERDF (output)	Programme monitoring	0 (2006)	7 (2015)
Knowledge-Based Estonia. Estonian Research and Development and Innovation Strategy 2007–2013	**1. The competitive quality and increased intensity of research and development**			
	Proportion of researchers and engineers per 1000 employees	Eurostat	5.0 (2004)	8 (2013)
	the proportion of upgraded and new RD&I infrastructures	? MKM/HTM ?	<20% (2004)	80% (2013)
	gross expenditure on research and development as a % of GDP (GOVERD)	Eurostat	0.88% (2004)	3% (2014)
	– of which public sector share (GOVERD)		0.54% (2004)	1.4% (2014)
	the number of high quality publications, according to internationally recognised bibliometric database	ISI Web of Science	796 (2004)	1200 (2013)

Name of document	Main indicators	Source	Baseline	Target (year of achievement)
	the number of European Patent Office patents per million inhabitants will grow five times (	EPO	8.9 (2002)	five-fold increase (2013)
	an efficient eLibrary (a common system of integrated electronic collections and services) and a digital research information system.	Not specified	Not specified	Not specified
	2. Innovative entrepreneurship creating new value in the global economy			
	Business expenditure on R&D as % of GDP	Eurostat	0.34% (2004)	1.6% (2014)
	Business innovation investment	CIS	1.6% (2004)	2.5% (2013)
	Share of gross turnover from sales of new products and services	Eurostat	7.6% (2004);	15% (2013)
	employment in high-tech and medium-high-tech industry and services as a share of total employment	Eurostat	7.53% (2004)	11%
	Business productivity per employee, % the EU25 average		57% (2005)	80%
	3. Innovation friendly society aimed at long-term development	Not specified	Not specified	Not specified
	a growing number and increasing importance of foreign investors who consider Estonia to be a good location for innovative activities;			
	an increasing inflow of knowledge and technology intensive foreign investments;			
	a growing number of internationally known Estonian brands and trademarks;			
	a growing number of foreign researchers and students coming to Estonia;			
	a growing number of enterprises participating in international RD&I cooperation programmes and networks;			
	a continuously high position in e-State ranking lists;	European Commission (EIS)	13th (2006)	5th–10th (2013).
	a significantly higher position of Estonia in the European Union "Innovation Scoreboard"			
Estonian Enterprise Policy 2007–2013	**1. Entrepreneurship activity: number of businesses per 1000 residents**	Tax & Customs Board	30 (2004)	40 (2013)
	Enterprise survival rate: number of businesses active three years after registration	Tax & Customs Board	57% (2003)	70% (2013)
	Productivity per worked compared to EU25	Eurostat	50.6% (2004)	72% (2013)
	Business environment (position in World Bank Doing Business survey)	World Bank	16th (2005)	Top 15 (2013)

Source: compilation by Technopolis Group based on cited policy documents

Appendix A.3. Overview of available data per measure

Supporting start-ups

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2) Start date	End date	BUDGET (EEK) 2004–2006 Planned	2004–2006 Actual incl. state budget (only state budget: No 14, 21)	2007–2009 Planned incl. state budget	2007–2009 Actual (state budget not used; exceptions: No: 1, 14, 19, 20, 21, 24)	2010 Planned	2010 Actual (state budget incl. No 14, 21)	Beneficiary All eligible beneficiaries	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year) Internal (see also annual activity reports of Kredex and EAS)	External
1	)EAS Entrepreneurship and Innovation Awareness Programme (2007–2013: portal aktiva.ee, entrepreneurship awareness)	2004	2013	22 000 000	30 600 550	59 877 675	38 165 617	39 484 396	35 562 177	All stakeholders of the NIS (mainly support through EAS own activities)	(2009) www.aktiva.ee – number of unique visitors 125 268; Awareness of at least 200 000 entrepreneurs grown	Share of companies, who find easy access to business-related information (incl. public support), number of portal visitors, trainees, participants in seminars		Ernst & Young, 2008. Feasibility study for Inno Awareness Programme (http://www.eas.ee)
2	EAS Development of knowledge and skills (2007–2013: basic training for start-ups, business mentoring programme)	2005	2013		198 618 567	93 500 000	53 378 446	96 515 604	98 709 416	Companies, county development centres (direct support, support through EAS own activities)	(2009) basic training for start up entrepreneurs – number of participants 1200; mentor programme – 40 collaboration partnerships, 6 mentor clubs	Participants in trainings and seminars, mentorships		
3	EAS Business incubation programme	2004	2013	13 000 000	14 519 918	27 000 000	2 543 475	11 600 000	3 253 133	Incubators, companies	(2009) supporting 105 companies through 4 incubators	Growth in incubants revenues from offered incubation services, financed full applications, number and growth or incubants in incubators, growth in incubants' sales.		Rouwmaat, V., Reid, A., Kurik, S. 2003. Business incubation: review of current situation and guidelines for government intervention in Estonia (http://www.mkm.ee/innovatsiooni-uuringud/)

NO	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used; exceptions: No.: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
4	EAS Start-up grant	2004	2007	150 407 151 (incl. NO 4,13)	94 636 609	40 139 500	21 323 488	20 200 000	34 366 546	Companies registered less than one year ago	(2004–2009) 825 companies			Evaluation of Business Support Measures in Estonia PRAXIS Policy Analysis 10/2008
5	EAS Start-up and development grant	2008	2013						21 053 182	Companies registered less than three years ago (start 0–1, growth 0–3)	(2004–2009) 393 companies	Value added in supported companies (1 year after support), sales (1 year after support), export sales (1 year after support), employment in supported companies (1 year after support), supported start-ups per year, survival rate among supported start-ups after 3 years, number of supported start-ups, who has export sales after 3 years, share of export sales in net sales among support companies		

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state: No 14, 21)	Planned incl. state budget	Actual (state budget not used, exceptions: No: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
6	KREDEX start-up loan guarantee	2008	2015			By 31.12.2009: ■ volume of guarantees €1,04m ■ volume of loans €1,39m			By 31.12.2010: ■ volume of guarantees €2.28m ■ volume of loans €3.04m	Companies registered less than three years ago	By 31.12.2009 – 58 contracts By 31.12.2010 – 125 contracts	Number of start-up companies, volume of loans, value added per employee, survival rate of start-up companies, growth in sales and export sales in companies, share of fast growing companies among companies received uarantee(s)	Questionnaire surveys among companies organised by MKM, Kredex (2009, 2010), available in Estonian	

Development of the company

No	Programmes	Start date	End date	2004–2006 Planned	2004–2006 Actual	2007–2009 Planned	2007–2009 Actual	2010 Planned	2010 Actual	All eligible beneficiaries	Number of companies received support	Periodically monitored indicators	Internal	External
	EAS Entrepreneurship and Innovation Awareness Programme (2007–2013: management awareness)	2004	2013	22 000 000	30 600 550	59 877 675	38 165 617	39 484 396	35 562 177	All stakeholders of the NIS (mainly support through EAS own activities)	(2009) 30 training days, 380 trained people, prepared 16 TV shows, by average 40 000 viewers, juhtimine.ee total 85 000 visits	Number of participants in trainings and seminars, number of portal visitors		
	EAS Development of knowledge and skills (2007–2013: employees, managers)	2004	2013		198 618 567	93 500 000	53 378 446	96 515 604	98 709 416	Companies, county development centres (direct support, support through EAS own activities)	(2004–09) 478 employees/managers trained	Number of supported projects, trainees, growth in value added per employee in supported companies (since 2008)		Koolitustoetuse mõjude hindamine Praxis 2007, Nõustamistoetuse mõjude hindamine Praxis 2007 (Evaluation of Business Support Measures in Estonia PRAXIS Policy Analysis 10/2008)

No	Programmes	Duration Start date	Duration End date	BUDGET (EEK) 2004–2006 Planned	BUDGET (EEK) 2004–2006 Actual incl. state budget (only state budget: No 14, 21)	2007–2009 Planned incl. state budget	2007–2009 Actual (state budget not used; exceptions: No.: 1, 14, 19, 20, 21, 24)	2010 Planned	2010 Actual (state budget incl. No 14, 21)	Beneficiary All eligible beneficiaries	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year) Internal (see also annual activity reports of Kredex and EAS)	Previous evaluations External
7	EAS Cluster development programme	2008	2013			8 000 000	4 687 871	10 000 000	9 211 862	Foundation or non-profit organisation, companies	(2009) 26 pre-cluster projects, 5 cluster projects	export growth, average value added per employee, growth of value added, % of export from total sales, jobs created	–	
8	EAS Technology investment programme for industrial enterprises	2008	2010			219 000 000	117 646 665	250 000 000	218 877 320	Manufactoring companies	(2004–09) 113 companies	Value added in supported companies (1 year after project finished), sales (1 year after project finished), export sales (1 year after project finished), private co-funds		Technopolis Group, 2008 . Feasibility Study for Technology Investment Programme (http://www.mkm.ee/innovatsiooni-uuringud/)
9	EAS Recruitment of development personnel: international marketing, product development, product design and processes	2009	2013			45 000 000	623 407	50 000 000	5 059 382	Companies	(2004–09) 4 companies	A number of different indicators. Details available in EAS yearly reports.		Gabrielsson, N. et al 2007. Innovation Stuff Recruitment Programme Feasibility Study (http://www.mkm.ee/innovatsiooni-uuringud/)

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary		Periodically (monthly/quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries	Number of companies received direct/indirect support (if available, data from EAS)		Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used; exceptions: No: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
10	EAS Developmenf of creative industry (supporting support structures, awareness, development of knowledge and skills)	2008	2013			15 000 000	0	10 000 000	8 140 378	Foundations or non-profit organisations	(2009) published 289 articles; publication (5000 exemplars) about success stories and best practices of the people in creative industry; portal visitors 9 373; 7 seminars arranged in counties (number of participants 435); event „Plahvatus" arranged (number of participants 259 people; trained: 11 top specialists in design area; pre-consulting and applications – 42 participants, full applications – 21 projects	Number of supported incubants and competence centres, number of supported companies in creative industry incubators and competence centres, number of companies participating in trainings, number of events increasing awareness in creative industry		
11	KREDEX business loan guarantees	2004	2015			By 31.12.2009: ■ volume of guarantees €146.27m ■ volume of loans €270.51m		By 31.12.2010: ■ volume of guarantees €212.41m ■ volume of loans €392.84m		Companies	By: 31.12.2009 – 1671 contracts By: 31.12.2010 – 2121 contracts	Number of companies receiving a guarantee, volume of loans, value added per employee in companies, growth in sales and export sales in companies, private co-invest-ments to new machinery and equipment	Questionnaire surveys among companies organised by MKM, Kredex (2009, 2010), available in Estonian	KredExi investeerimis-laenu- ja liisingu-käenduste (2002–2004) mõjude hindamine, Praxis 2007 (Evaluation of Business Support Measures in Estonia PRAXIS Policy Analysis 10/2008)

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
				2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
		Start date	End date	Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used; exceptions: No: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
12	KREDEX capital loan	2007	2011				99 510 000	33 950 000	1 250 007	Companies	By 31.12.2009 – 14 contracts; 31.12.2010 – 15 contracts	Number of target companies which have made investments, volume of loans, value added per employees in companies, growth in sales and export sales, private co-investments to machinery and equipment	Questionnaire surveys among companies organised by MKM, Kredex (2009, 2010), available in Estonian	

Strengthening export capacity and internationalisation

No	Programmes	Start date	End date	2004–2006 Planned	2004–2006 Actual	2007–2009 Planned	2007–2009 Actual	2010 Planned	2010 Actual	All eligible beneficiaries	Number of companies received direct/indirect support	Periodically monitored indicators	Internal	External
	EAS Entrepreneurship and Innovation Awareness Programme (2007–2013: export awareness)	2004	2013	22 000 000	30 600 550	59 877 675	38 165 617	39 484 396	35 562 177	All stakeholders of the NIS (mainly support through EAS own activities)	(2009) 1 infoseminar (over 30 companies); information mess „Ettevõtja Eesti 2009"	Number of participants in export oriented trainings and seminar, number of companies participated in export awareness seminars and other events		
	EAS Development of knowledge and skills (2007–2013: export trainings)	2004	2013		198 618 567	93 500 000	53 378 446	96 515 604	98 709 416	Companies, county development centres (direct support, support through EAS own activities)	(2009) 57 trainings, number of participants ca 1 100 people	Number of supported projects, number of trainees in projects, growth in value added among supported companies (since 2008)		Koolitustoetuse mõjude hindamine Praxis 2007, Nõustamistoetuse mõjude hindamine Praxis 2007

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used; exceptions: No: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
13	EAS Export development support (until 7/11/2010: three separate activities – export marketing support, foreign fairs support, joint marketing support; formerly known as export marketing grant, export plan programe; presently)	2002–2004, 2004–2007, 2007–2013	2013	150 407 151 (incl. NO 4, 13)	57 429 992	121 592 605	57 107 478	108 000 000	75 336 066	Companies, business repr. organisations	(2004–09) 309	Export turnover of supported companies, number of supported companies		Ekspordiplaani toetuse mõjude hindamine. PRAXISe Toimetised 40/2007 (in Estonian); Evaluation of Business Support Measures in Estonia PRAXIS Policy Analysis 10/2008
	EAS Recruitment of development personnel (international marketing)	2009	2013			45 000 000	623 407	50 000 000	5 059 382	Companies	(2004–09) 7 companies	A number of different indicators. Details available on EAS yearly reports.		
14	EAS Internationalisation programme (foreign investments, marketing conception of Estonia, EXPO2010, foreign representatives, others)	2000	no end date		11 000 000 (2005–2006)		170 530 000		72 668 599	Companies	(2009) 64 events for foreign investors, export targeted people/companies; implemented or initiated 20 new foreign investments to Estonia; personal support service provided to 50 potential foreign investors; follow-up/cont. service support provided to over 40 foreign owned companies in Estonia; support service provided to over 50 companies entering new foreign markets			

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used; exceptions: No.: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
15	KREDEX credit line for the banks	2010	2011 I quarter					1 200 000	875 430 000 (transferred to banks)	Exporting companies	By 31.12.2009 – 0 contracts By 3.112.2010 – 88 contracts (estimation)	Number of target companies which have made investments, volume of loans, value added per employees in companies, growth in sales and export sales, private co-investments to machinery and equipment	Questionnaire surveys among companies organised by MKM, Kredex (2009, 2010), available in Estonian; Riigi tugipakett ettevõtete finantseerimisel, MKM, KredEx 2009	
16	Kredex subordinated loan	2009	2011 I quarter			200 000 000	125 480 000	200 000 000	50 530 000	Exporting companies	By 31.12.2009 – 15 contracts By 31.12.2010 – 23 contracts	Number of target companies who have made investments, volume of loans, value added per employees in companies, growth in sales and export sales, private co-investments to machinery and equipment	Questionnaire surveys among companies organised by MKM, Kredex (2009, 2010), available in Estonian; Riigi tugipakett ettevõtete finantseerimisel, MKM, KredEx 2009	

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget No 14, 21)	Planned incl. state budget	Actual (state budget not used; exceptions: No.: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
17	Kredex long-term loan in partnership with commercial banks	2009	2010			300 000 000	266 200 000	0	28 410 000	Exporting companies	By 31.12.2009 – 14 contracts; By 31.12.2010 – 16 contracts	Number of target companies which have made investments, volume of loans, value added per employees in companies, growth in sales and export sales, private co-investments to machinery and equipment	Questionnaire surveys among companies organised by MKM, Kredex (2009, 2010), available in Estonian; Riigi tugipakett ettevõtete finantseerimisel, MKM, KredEx 2009	
18	KREDEX long-term large export guarantees, short-term export guarantees	2004	no end date	1,240,000,000 credit limit		credit limit		150 000 000	138 290 000 credit limit (Kredex)	Companies	By 31.12.2009 – 199 exporters; By 30.06.2010 – 214 exporters	Guaranteed export turnover, number of supported companies		KredEx'i lühiajaliste ekspordigarantiide mõjude hindamine. PRAXISe Toimetised 33/2007 (in Estonian); Evaluation of Business Support Measures in Estonia PRAXIS Policy Analysis 10/2008

Developing product development and technology capacity

| No | Programmes | Start date | End date | Planned | Actual | Planned | Actual | Planned | Actual | All eligible beneficiaries | Number of companies received direct/indirect support | Periodically monitored indicators | Internal | External |
| | EAS Entrepreneurship and Innovation Awareness Programme (2007–2013: innovation awareness activities) | 2004 | 2013 | 22 000 000 | 30 600 550 | 59 877 675 | 38 165 617 | 39 484 396 | 35 562 177 | All stakeholders of the NIS (mainly support through EAS own activities) | (2009) Innovation Year – media publication for over million people | Number of people, companies participating in trainings and seminars | | |

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary		Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries	Number of companies received direct/indirect support (if available, data from EAS)		Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned budget incl. state budget	Actual (state budget not used; exceptions: No: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
	EAS Development of knowledge and skills	2004	2013		198 618 567	93 500 000	53 378 446	96 515 604	98 709 416	Companies, county development centres (direct support, support through EAS own activities)	(2009) 457 supported projects, in addition 572 training vouchers; 969 participants in 17 trainings	Number of supported projects, number of trainees in projects, growth in value added among supported companies (since 2008)		Koolitustoetuse mõjude hindamine Praxis 2007, Nõustamistoetuse mõjude hindamine Praxis 2007 (Evaluation of Business Support Measures in Estonia PRAXIS Policy Analysis 10/2008)
19	State Energy Technology Programme (no direct support, EAS own activities) – management	2007	no end date							All stakeholders of the NIS – energy sector				Huuhka, P. et al 2007. Estonian Development Strategy of Energy Related Technologies. Feasibility Study (http://www.mkm.ee)
20	State Biotechnology Programme (no direct support, EAS own activities – management)	2009	no end date						2 000 000	All stakeholders of the NIS – biotechnology sector	NA			Ernst & Young, 2010. Estonian Biotechnology Programme. Feasibility study for an Estonian bio-technology programme (http://www.mkm.ee/innovatsiooni-uuringud/)

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used; exceptions: No.: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
21	EAS International cooperation network (EAS own activities: EUREKA, Framework programmes, Space programme, etc)	2002	no end date		1 000 000 (2005–2006)		8 000 000		3 000 000	Companies	The number of companies supported through different international programmes is only available indirectly	Number of technology transfer contracts, number of companies participating in consortias		
22	EAS Innovation vouchers	2008	2013			9 000 000	1 950 582	6 000 000	10 358 477	Companies	(2004–09) 119 companies	Number of submitted applications, number of supported companies, annual growth of R&D and innovation investments in supported companies (%), volume of R&D and innovation investments in supported companies (MEEK), number of new jobs in result of support (supported project)	–	–

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)							Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
				2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
		Start date	End date	Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used; excep-tions: No: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
23	EAS SPINNO+	2008	2013	60 300 000	55 934 194	37 000 000	11 352 994	23 000 000	19 352 924	R&D institutions, applied higher education institutions	See programme documentation	Number of submitted applications, number of supported companies and R&D institutions, private co-investments in supported projects (MEEK), annual growth in revenue from the commercialisation of intellectual property and contract-based cooperation with companies among supported universities and R&D institutions (%, MEEK), number of spin-offs of supported institutions		Technopolis Group, KU Leuven, 2001. Feasibility for SPINNO programme "High tech venturing in Estonia: background report for the ESTPIN programme"; SQW, 2003. Evaluation of the SPINNO programme (mid-term); Brighton, R., Kells, 2007. Impact Evaluation of Spinno Programme in 2001–2006. Implications for the EU Structural Funds Programming Period 2007–2013 (http://www.mkm.ee/innovatsiooni-uuringud/)

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary – All eligible beneficiaries	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year) – Internal (see also annual activity reports of Kredex and EAS)	External
		Start date	End date	2004–2006 Planned	2004–2006 Actual incl. state budget (only state budget: No 14, 21)	2007–2009 Planned incl. state budget	2007–2009 Actual (state budget not used; exceptions: No: 1, 14, 19, 20, 21, 24)	2010 Planned	2010 Actual (state budget incl. No 14, 21)					
24	EAS R&D project support programme	2001	2013	250 000 000	241 128 088	219 400 000	107 522 434	120 000 000	170 638 675	Companies, R&D institutions	(2004–09) 145 companies	Number of submitted applications, number of supported companies and R&D institutions, private and public co-investments in supported projects (MEEK), annual growth in revenue from the commercialisation of intellectual property among supported universities and R&D institutions, annual growth and volume of R&D and innovation investments in supported companies (%, MEEK), share of revenue from new products and services in net sales among supported companies (%), number of new developed technologies, products and services in supported companies, number of new jobs in result of supported projects		Reid, A., Walendowski, J., 2005 (Technopolis Group) Evaluation of the Design and Implementation of Estonian RTDI Policy (http://www.mkm.ee/innovatsiooni-uuringud/); Implications for Policy Planning; Evaluation of Business Support Measures in Estonia PRAXIS Policy Analysis 10/2008; Jürgenson, A., 2007. Impact Assessment of R&D Financing Programme

NO	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used, except-tions: No: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
25	EAS Competence Centre Programme	2003	2013	100 000 000	99 430 700	162 500 000	133 979 024	140 000 000	126 606 126	CCs as companies/ non-profit organisations (based on consortia of companies, R&D institutions, other)	8 CCs operating (see programme documentation for further indicators – related companies, R&D institutions, etc)	Number of submitted applications, number of supported companies and R&D institutions, private and public co-investments in supported projects (MEEK), annual growth and volume of R&D and innovation investments in supported companies (%, MEEK), share of revenue from new products and services in net sales among supported companies (%), number of new developed technologies, products and services in supported companies, number of new jobs in result of supported projects, value added per employee (MEEK), number of students participated in private-public projects.		Technopolis Group, 2001. Feasibility Study for Competence Centre Programme (http://www.mkm.ee/ innovatsiooni- uuringud/); Arnold, E. et al 2008. Mid-Term Evaluation of the Competence Centre Programme (http://www.mkm.ee/ innovatsiooni- uuringud/)

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used; exceptions: No.: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
	EAS Recruitment of development personnel (R&D)	2009	2013			45 000 000	623 407	50 000 000	5 059 382	Companies	(2004–09) 3 companies	Number of submitted applications, number of annually supported companies, who has received mobility support for highly-qualified employees, number of supported companies and R&D institutions, number of supported projects, private and public co-funds in supported projects, growth in innovation expenditues in supported companies, volume of R&D and innovation investments in supported companies (MEEK, growth in %), share of export sales in net sales, growth in exports ales (measures after 2 years of support), average value added per employee (EEK), growth in value added per employee		

No	Programmes	Duration (programmes co-financed by EU SF – present end date 2013+2)		BUDGET (EEK)						Beneficiary	Number of companies received direct/indirect support (if available, data from EAS)	Periodically (monthly, quarterly) monitored indicators – basic, please also see EAS and Kredex annual activity plans and reporting	Previous evaluations (Ex-ante (EA), interim (I), final (F); year)	
		Start date	End date	2004–2006		2007–2009		2010		All eligible beneficiaries			Internal (see also annual activity reports of Kredex and EAS)	External
				Planned	Actual incl. state budget (only state budget: No 14, 21)	Planned incl. state budget	Actual (state budget not used; exceptions: No.: 1, 14, 19, 20, 21, 24)	Planned	Actual (state budget incl. No 14, 21)					
26	EAS Innovation support structures (science, technology parks, supported until 2006), semi-industrial and testing laboratories (since 2010)	2010	2013	66 000 000	55 000 000	0	0	0	5 503 716	Companies, foundations or non-profit organisations	NA	Number of testing methodologies, number of accredited testing methodologies, new sales from testing and other services, number of companies, who started to use external testing services in result of support		Reid, A., Walendowski, J., 2005 (Technopolis Group) Evaluation of the Design and Implementation of Estonian RTDI Policy (http://www.mkm.ee/innovatsiooni-uuringud/)
27	EAS regional competence centres (co-financed by the Ministry of Interior)	2010	2013						1 858 931	R&D institutions, educational institutions, regional business repr. organisations, foundations, non-profit organisations	NA			

Appendix A.4. Possibility to monitor specific output and result indicators per measure

INDICATORS	Start-up division		Tourist board				
	Start-up and growth subsidy	*Start-up loan*	*Tourism Product Development Grant*	*Tourism Product Development Grant, small projects*	*Tourism marketing grant*	*Turismi development grant for public and third sector*	*Tourist information distribution channels*
Number of applications	X	X	X	X	X	X	X
Number of projects	X	X	X	X	X	X	X
Number of companies supported	X	X	X	X	X	X	X
Value added of supported firms (annual figure up to X +1)	X	X	X	X	X	X	X
Turnover (annual figure up to X +1)	X	X	X	X	X	X	X
Export turnover (annual figure up to X +1)	X	X	X	X	X	X	X
Supported employment in businesses (annual data up to X +1)	X	X	X	X	X	X	X
Annual number of start-ups supported	X	X					
Survival rate amongst supported start-ups after 3 years	X	X					
Number of supported start-up companies with export turnover after 3 years	X	X					
Number of spin-off companies from universities and institutes of higher education							
Number of projects to promote creative industries							
Science and Technology Parks (MEAC collects data) and incubator companies (EAS collects data): increase in turnover of resident companies							
Share of export turnover in net sales of supported enterprises (%, calculated in the OP)	X						
R&D expenditure of supported companies per year (including both the EAS and business co-financing as well as non project R&D costs)							
Increase of innovation expenditure in companies in receipt of mobility grants (%)							
Private sector R&D investment (MEEK) - business co-financing in supported projects							
Involving private sector investments (MEEK)	X	X	X	X	X	X	X
Involving private sector investment in new machinery and equipment (MEEK)	X	X					

INDICATORS	Start-up division		Tourist board				
	Start-up and growth subsidy	Start-up loan	Tourism Product Development Grant	Tourism Product Development Grant, small projects	Tourism marketing grant	Turismi development grant for public and third sector	Tourist information distribution channels
Share of supported businesses reporting newly developed technologies, products and services (%)							
Sales revenue from new products and services - EAS (revenue as the share of the total turnover of the supported enterprises - MEAC)							
Universities and R&D institutes income from the commercialisation of intellectual property and contract work for companies (MEEK)							
Cooperation between enterprises and research institutes (number)							
Long-term cooperation projects between enterprises and research institutes (number of participating companies)							
Supported projects between companies and universities - number of students participating							
Supported business R&D and innovation investment (MEEK)							
Number of companies resident in science and technology parks (including those located in incubators) (MEAC - parks, EAS - incubators)							
Supported companies per year, which have received a mobility grant, which have a more highly skilled workforce							
Annual number of supported firms that have received support services and consultancy (ESF)							
Annual number of firms that have received support services and consultancy (export counselling speifically funded by ERDF)							
Number of companies which have received training support from EAS. (Share of all potential beneficiaries (self-employed not included) - MKM)							
Supported tourism businesses reporting an increase in export turnover (average, %)			X	X	X		
The number of new distribution channels							X
The number of distribution channels with improved quality							X
Project results: number of jobs created			X	X	X		X
The volume of foreign investment involved (compared to 2009)							

INDICATORS	Export division					Enterprise capability division				
	Export development grant (new)	Export marketing grant (old)	Single Market grant (old)	Trade Fairs (old)	Supporting employee development: international marketing	Creative industries support programme	Manufacturing technology investment grant	Support cluster development (full application)	Knowledge and skill development grant	Employee development grant: product design and processes
Number of applications	X	X	X	X	X	×	×	×	×	×
Number of projects	X	X	X	X	X	×	×	×	×	×
Number of companies supported	X	X	X	X	X	×	×	×	×	×
Value added of supported firms (annual figure up to X +1)	X	X	X	X	X		×	×		×
Turnover (annual figure up to X +1)	X	X	X	X	X		×	×		×
Export turnover (annual figure up to X +1)	X	X	X	X	X		×	×		×
Supported employment in businesses (annual data up to X +1)	X	X	X	X	X		×	×		×
Annual number of start-ups supported										
Survival rate amongst supported start-ups after 3 years										
Number of supported start-up companies with export turnover after 3 years										
Number of spin-off companies from universities and institutes of higher education										
Number of projects to promote creative industries						×				
Science and Technology Parks (MEAC collects data) and incubator companies (EAS collects data): increase in turnover of resident companies						×				
Share of export turnover in net sales of supported enterprises (%, calculated in the OP)	X	X	X	X	X		×	×		×
R&D expenditure of supported companies per year (including both the EAS and business co-financing as well as non project R&D costs)					X					×
Increase of innovation expenditure in companies in receipt of mobility grants (%)					X					×
Private sector R&D investment (MEEK) - business co-financing in supported projects										
Involving private sector investments (MEEK)							×			
Involving private sector investment in new machinery and equipment (MEEK)							×			

INDICATORS	Export division					Enterprise capability division				
	Export development grant (new)	Export marketing grant (old)	Single Market grant (old)	Trade Fairs (old)	Supporting employee development: international marketing	Creative industries support programme	Manufacturing technology investment grant	Support cluster development (full application)	Knowledge and skill development grant	Employee development grant: product design and processes
Share of supported businesses reporting newly developed technologies, products and services (%)										
Sales revenue from new products and services - EAS (revenue as the share of the total turnover of the supported enterprises - MEAC)										
Universities and R&D institutes income from the commercialisation of intellectual property and contract work for companies (MEEK)										
Cooperation between enterprises and research institutes (number)								×		
Long-term cooperation projects between enterprises and research institutes (number of participating companies)								×		
Supported projects between companies and universities - number of students participating										
Supported business R&D and innovation investment (MEEK)										
Number of companies resident in science and technology parks (including those located in incubators) (MEAC - parks, EAS - incubators)										
Supported companies per year, which have received a mobility grant, which have a more highly skilled workforce					X					×
Annual number of supported firms that have received support services and consultancy (ESF)									×	
Annual number of firms that have received support services and consultancy (export counselling speifically funded by ERDF)	X	X	X	X						
Number of companies which have received training support from EAS. (Share of all potential beneficiaries (self-employed not included) - MKM)									×	
Supported tourism businesses reporting an increase in export turnover (average, %)										
The number of new distribution channels										
The number of distribution channels with improved quality										
Project results: number of jobs created										
The volume of foreign investment involved (compared to 2009)										

INDICATORS	Innovation division								Foreign investors division
	Employee development grant: product development	Product Development Support (pilot study)	Product Development Support (applied research)	Competence Centre programme	Semi-industrial and test laboratories	SPINNO	Innovation voucher	TOTS	Indicators specifically concerning foreign investors
Number of applications	×	×	×	×	×	×	×	×	
Number of projects	×	×	×	×	×	×	×	×	×
Number of companies supported	×	×	×	×	×	×	×	×	×
Value added of supported firms (annual figure up to X +1)	×		×	×	×				×
Turnover (annual figure up to X +1)	×	×	×	×	×				×
Export turnover (annual figure up to X +1)	×	×	×	×	×				×
Supported employment in businesses (annual data up to X +1)	×	×	×	×	×	×			×
Annual number of start-ups supported									
Survival rate amongst supported start-ups after 3 years									
Number of supported start-up companies with export turnover after 3 years									
Number of spin-off companies from universities and institutes of higher education						×		×	
Number of projects to promote creative industries									
Science and Technology Parks (MEAC collects data) and incubator companies (EAS collects data): increase in turnover of resident companies									
Share of export turnover in net sales of supported enterprises (%, calculated in the OP)	×								
R&D expenditure of supported companies per year (including both the EAS and business co-financing as well as non project R&D costs)	×	×	×	×			×		
Increase of innovation expenditure in companies in receipt of mobility grants (%)	×								
Private sector R&D investment (MEEK) - business co-financing in supported projects		×	×	×					
Involving private sector investments (MEEK)					×				
Involving private sector investment in new machinery and equipment (MEEK)					×				

INDICATORS	Innovation division								Foreign investors division
	Employee development grant: product development	Product Development Support (pilot study)	Product Development Support (applied research)	Competence Centre programme	Semi-industrial and test laboratories	SPINNO	Innovation voucher	TOTS	Indicators specifically concerning foreign investors
Share of supported businesses reporting newly developed technologies, products and services (%)			×	×			×		
Sales revenue from new products and services - EAS (revenue as the share of the total turnover of the supported enterprises - MEAC)			×	×					
Universities and R&D institutes income from the commercialisation of intellectual property and contract work for companies (MEEK)						×	×		
Cooperation between enterprises and research institutes (number)				×		×	×		
Long-term cooperation projects between enterprises and research institutes (number of participating companies)				×					
Supported projects between companies and universities - number of students participating				×					
Supported business R&D and innovation investment (MEEK)		×	×	×			×		
Number of companies resident in science and technology parks (including those located in incubators) (MEAC - parks, EAS - incubators)									
Supported companies per year, which have received a mobility grant, which have a more highly skilled workforce	×								
Annual number of supported firms that have received support services and consultancy (ESF)									
Annual number of firms that have received support services and consultancy (export counselling speifically funded by ERDF)									
Number of companies which have received training support from EAS. (Share of all potential beneficiaries (self-employed not included) - MKM)									
Supported tourism businesses reporting an increase in export turnover (average, %)									
The number of new distribution channels									
The number of distribution channels with improved quality									
Project results: number of jobs created									
The volume of foreign investment involved (compared to 2009)									×

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