



# Supply and Demand Side Innovation Policies

Final Report



Research and  
Innovation

**EUROPEAN COMMISSION**

Directorate-General for Research and Innovation  
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Unit A.4 — Analysis and monitoring of national research policies

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# **Supply and Demand Side Innovation Policies**

## **Final Report**

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# 1. INTRODUCTION AND METHODOLOGY OVERVIEW

## 1.1. Study aims, remit of the research team

This document is the final report of the study undertaken under the framework contract "provision of services in the field of research evaluation and research policy analysis" Lot 3 on behalf of the DG Research and Innovation. The scope of the study was to provide an overview and analysis of innovation supply side and demand side policies and their interactions in the context of a broad policy reflection about how to develop the use of demand side instruments as part of a more integrated policy approach for improving the effectiveness and efficiency of research and innovation (R&I) systems at regional, national and EU level. This reflection and the study methodology selected sought to develop an analysis based of the experiences of countries which are the more advanced on the path of integrating supply- and demand-side policies in their overall innovation strategies.

The study had four principal objectives:

- Identify, classify and characterise demand-side innovation policy measures and how they are being combined with the supply side;
- Assess the specific impact of demand-side innovation policy measures on the efficiency and effectiveness of the innovation policy mix;
- Analyse in detail and present five detailed case studies to highlight specific policy features which can be considered as obstacles, limitations or best practices;
- Recommend how to strengthen the demand-side of innovation strategies at national, regional or sectoral level.

The work undertaken by the study team was mainly analytical and based on reviewing existing materials (secondary sources and evaluation reports when available) that have been complemented with telephone interviews of policy makers to collect evidence related to the nature of the interactions between demand and supply side innovation policies and a policy makers project workshop to review the preliminary study findings. It is worth noting that this exercise was not an evaluation of the policies studied and thus didn't aim to produce conclusions related to the relevance or efficiency of the policies, but the overall goal was to rather emphasise key success factors and key lessons from examples of good practices of interactions between demand and supply side policies.

The principal aim of the final report is to summarise the main policy issues and lessons learnt from the 20 case studies, the 5 detailed policies studied and the discussions held at a project workshop in Brussels on the 14<sup>th</sup> of November 2014. These policy lessons and key messages are provided to give insights about the challenges to design innovation policies that combine supply and demand side interactions and suggest possible approaches to coordinate and manage such types of policy interventions.

## 1.2. Approach, methodology and work undertaken

### *Reminder of the methodology*

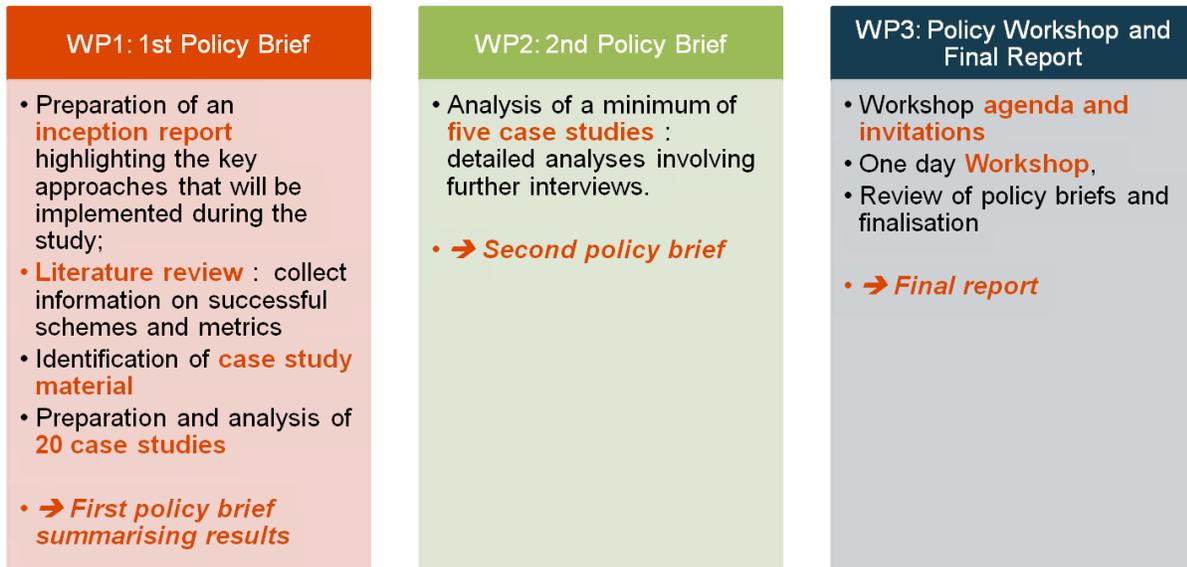
The methodological approach adopted by the study team comprised the following steps:

- A detailed literature review of demand and supply-side innovation policies (a separate annexe).
- The analysis of 20 international cases of innovation policies, instruments and tools selected as representative of good practices (and sector and geographical coverage) to address demand side and/or to combine or interact with supply side approaches.
- A detailed analysis of 5 international cases that focused on shedding further light upon both the Supply and Demand side mechanisms available to policymakers when designing and implementing the policy measures and how the interaction has played out during and after the deployment of the policy measures.
- An open discussion on these cases with a panel of over 30 international experts during a one day workshop held in Brussels.

Several documents have been produced in the course of the study including:

- A first policy brief that presented the main outcomes of the literature review and the 20 cases studies.
- A second policy brief that presented the five detailed cases studies

The figure below summarises the overall methodological approach of the study.



**Figure 1: methodological approach of the study**

The two policy briefs and the literature review documentation gathered during the study are reproduced in the form of separately bound annexes.

### **Summary of the Supply/Demand case studies**

Twenty cases were selected with the aim of addressing some of the more interesting supply and demand innovation policies measures that cover a variety of situation and sectors. The selection of the 20 international cases of demand-side innovation policies was undertaken to include a focus on how supply-side approaches are combined into demand-side policies and to ensure a broad thematic, sectoral and geographical coverage.

The table below presents a summary of the case studies selected for the analysis in terms of content, beneficiaries and promoting institutions. The case presentation is structured according to the typology set out at the beginning of chapter 2.0. The cases represent policies developed at different levels of governance: local, national, EU level as well as successful examples from Overseas (United States and Korea). In this way the study was able to examine and address how demand side policies are implemented at different levels and what type of differences can be observed regarding their interactions with the supply side. Most of the policies taken into consideration were policies devoted to Small and Medium Enterprises and to economic sectors such as: health, energy and food industries or defence. This latter element provides per se a first hint to the underlying relationship between supply and demand side interactions in the design of demand policies, with sectors selected on the basis of their technology (potential) push on the overall economy and the related legislator intention to increase the demand pull in order to diffuse innovation along both production (suppliers) and overall value chain (consumers and customers).

The table presented overleaf also includes a "subjective" judgement undertaken by the team regarding the perceived "bottlenecks/limitations and/or enablers" of each of the cases.

Policy	Promoting Institution	Beneficiaries & Driving Factors	Description	Bottlenecks/Enablers	Policy Type & Interaction <sup>1</sup>
<b>Category A Public Demand</b>					
<b>Small Business Innovation Research (SBIR)</b>	Governmental Federal Agencies  (United States)	SMEs and Universities  Increase private-sector commercialization of innovations derived from Federal research and development funding	Award-based programme encouraging US Small businesses to engage in R&D with potential for commercialisation	<p><b>Bottleneck-limitations:</b></p> <ul style="list-style-type: none"> <li>• Lobbying (serial participation of under-achieving firms whose probability of winning an award is strongly increased by relationships with federal officials).</li> <li>• Risk of non-additionality</li> <li>• Some government agencies may regard SBIR as a "tax" on their programmes and will not invest time in choosing the award-winners and follow-up on programme outcomes.</li> <li>• Long time between the application phase, and phase I and phase II awards (this can be an issue for SMEs with constrained cash flow).</li> <li>• Technology developed only to a certain readiness level (commercialisation requires substantial additional funding)</li> </ul> <p><b>Enablers:</b></p> <ul style="list-style-type: none"> <li>• Budgetary encouragement to spend with SMEs (by reserving a specific percentage of federal R&amp;D funds for small businesses).</li> <li>• Award recipients retain the IPR developed using the SBIR award, with no royalties owed to the government.</li> <li>• SBIR facilitates links with angel and venture capital investments.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Demand side:</b> Public procurement</li> <li>• <b>Supply Side:</b> Subsidy for R&amp;D commercialisation</li> <li>• Explicit interactions between demand and supply side</li> </ul>
<b>Procurement conditioned SME R&amp;D</b>	Small and Medium Business	SMEs  Ensuring SMEs an	Zero-interests R&D funding to develop new	<p><b>Bottleneck-limitations:</b></p> <ul style="list-style-type: none"> <li>• Initially, purchasers were unwilling to commit target shares of their budgets to</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Demand side:</b> Public demand and public procurement</li> </ul>

1 Where supply and demand-side interventions are combined in the same programme so that beneficiaries are subject to both, we refer to this as "explicit interactions". If the supply and demand interventions are separate programmes we refer to "implicit interactions"

Policy	Promoting Institution	Beneficiaries & Driving Factors	Description	Bottlenecks/Enablers	Policy Type & Interaction <sup>1</sup>
<b>Programme</b>	Administration (SMBA)  (Korea)	access to capital funding for R&D	products. Successful products will be marketed. There is a no-collateral policy on the received funding	the programme. Later this became mandatory for public agencies <b>Enablers:</b> <ul style="list-style-type: none"> <li>Embedded in system which identifies priority areas and provides non-financial support to SMEs</li> <li>Operates in conjunction with New Technology Purchasing Assurance Programmes (see below)</li> </ul>	<ul style="list-style-type: none"> <li><b>Supply side:</b> Measures to increase SME collaborations, SMEs support and R&amp;D subsidies</li> <li>Explicit Interaction between the supply and the demand side</li> </ul>
<b>Defence-related R&amp;D Procurement Schemes</b>	Department of Defence (DARPA)  (United States)	Enterprises and Universities  Enhancing the development of research with military applications	A vast programme covering high payoff research with the aim of bridging the gap between fundamental research and its military application	<b>Enablers:</b> <ul style="list-style-type: none"> <li>Small, Flexible and flat organisation with relative freedom from bureaucratic impediments</li> <li>World class technical staff involved in team and networks</li> </ul>	<ul style="list-style-type: none"> <li><b>Demand side:</b> Public demand and Strategic procurement</li> <li><b>Supply side:</b> Funds and subsidies for R&amp;D</li> <li>Explicit interactions between the demand and the supply side</li> </ul>
<b>Innovation Procurement Scheme by the Ministry of Defence</b>	Ministry of Defence (MoD)  (United Kingdom)	Enterprises (with particular attention to SMEs)  Enhancing the development of research with military applications	The aim of this policy is to drive innovation by generating and exploiting new technologies and services	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>The policy developed to streamline the MoD procurement process</li> <li>R&amp;D planning with supply-side providers of technology</li> </ul> <b>Enablers:</b> <ul style="list-style-type: none"> <li>Avoid inefficiencies</li> </ul>	<ul style="list-style-type: none"> <li><b>Demand side:</b> Public demand and general procurement</li> <li><b>Supply side:</b> R&amp;D joint plans for the supply side</li> <li>Explicit interaction between the supply and the demand side</li> </ul>
<b>Pre-commercial Procurement by NHS</b>	National Health Service (NHS)  (United Kingdom)	Enterprises  Improving the service delivered by the National	Bespoke procurement scheme applied to:  (1) identify	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>Development of innovative solution by challenging competitive suppliers to design.</li> </ul> <b>Enablers:</b> <ul style="list-style-type: none"> <li>Prototype and demonstrate their</li> </ul>	The policy intends to adopt a systemic approaches  <ul style="list-style-type: none"> <li><b>Demand side:</b> Pre-commercial procurement</li> </ul>

Policy	Promoting Institution	Beneficiaries & Driving Factors	Description	Bottlenecks/Enablers	Policy Type & Interaction <sup>1</sup>
		Health Service	<p>clinical needs;</p> <p>(2) understanding the market positioning of the clinical needs;</p> <p>(3) contract firms to design, prototype and demonstrate their solutions;</p> <p>(4) evaluate and adopt the solution</p>	<p>solution, the contract will be awarded to the best R&amp;D solution.</p>	<ul style="list-style-type: none"> <li>• <b>Supply side:</b> Part of series of policies designed to foster innovation</li> <li>• Explicit interaction between the supply and the demand side</li> </ul>
<b>New Technology Purchasing Assurance Programme</b>	<p>Small and Medium Business Administration (SMBA)</p> <p>(Korea)</p>	<p>SMEs</p> <p>Bringing SMEs and purchases together. Stimulate SMEs involvement in technology creation</p>	<p>Policy to stimulate technological development by SMEs. The products are certified and purchases indemnified against non-performance thus reducing the risk associated with procurement of new products P</p>	<p><b>Bottleneck-limitations:</b></p> <ul style="list-style-type: none"> <li>• Reluctance on the part of public agencies to commit target shares of their budgets to procurement programmes was inhibiting their effectiveness.</li> <li>• Concerns that product quality and functionality might be below requirements.</li> <li>• These issues are directly addressed by this programme.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Demand side:</b> Public demand; Public procurement. Private demand from large corporations which are also involved in the programmes Certification of products</li> <li>• <b>Supply side:</b> Parallel programme to fund R&amp;D</li> <li>• Implicit interaction between the supply and the demand side</li> </ul>
<b>Forward Commitment Procurement</b>	<p>Department of Business Innovation and</p>	<p>Enterprises (with particular attention to SMEs)</p>	<p>Originally developed to address the lack of market for</p>	<p><b>Enablers and Critical success factors:</b></p> <ul style="list-style-type: none"> <li>• Identification, articulation and commitment to meet unsatisfied public demands;</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Demand side:</b> Public demand and public procurement</li> </ul>

Policy	Promoting Institution	Beneficiaries & Driving Factors	Description	Bottlenecks/Enablers	Policy Type & Interaction <sup>1</sup>
	Skills (BIS)  (United Kingdom)	Satisfy identified public needs and enterprise development	environmental innovations, today is more generally oriented in these sectors where there are demand-pull R&D efforts needed	<ul style="list-style-type: none"> <li>Hands-on project management and the provision of intermediation and brokerage in new/innovative ways to set out procurement</li> </ul>	<ul style="list-style-type: none"> <li><b>Supply side:</b> Support to R&amp;D</li> <li>Explicit Interaction between the supply and the demand side</li> </ul>
<b>Small Business Innovation Research Programme (SBIR)</b>	Ministry of Economic Affairs  (Netherlands)	Enterprises  Increase innovativeness in the business sector	The programme outsource the development of innovative solutions for socially relevant research particularly in logistic, renewable energy, care, security sector and food	<p><b>Bottleneck-limitations:</b></p> <ul style="list-style-type: none"> <li>The initial phase of the programme was rather slow due to the unfamiliarity of the business with the scheme and inexperience of the agency in dealing with SMEs</li> </ul> <p><b>Enablers:</b></p> <ul style="list-style-type: none"> <li>Quick turnaround, low barriers for participation, and low administrative burdens</li> <li>Companies receive an R&amp;D contract – with contractual obligations) rather than a subsidy</li> </ul>	<ul style="list-style-type: none"> <li><b>Demand side:</b> Public demand and catalytic procurement</li> <li><b>Supply side:</b> Funding high-risk innovation projects</li> <li>Explicit interaction between the demand and the supply side</li> </ul>
<b>Small Business Research Initiative (SBRI)</b>	Innovate UK (formerly: Technology Strategy Board)  (United Kingdom)	SMEs  Connect public sector challenges with innovative ideas; SMEs development	It is a multilevel initiative (national and regional) involving various departments. It is a public procurement scheme developed in order to provide innovative solutions to challenges faced	<p><b>Enablers:</b></p> <ul style="list-style-type: none"> <li>Core technology demonstrates firms' innovativeness</li> <li>Use of intermediary body to lead companies to apply for SBIR</li> <li>Support from Innovate UK to participating companies</li> <li>Clear articulation of the demand and needs of the public user</li> </ul>	<ul style="list-style-type: none"> <li><b>Demand side:</b> Public demand and public procurement</li> <li><b>Supply side:</b> R&amp;D support</li> <li>Explicit interaction between the demand and the supply side</li> </ul>

Policy	Promoting Institution	Beneficiaries & Driving Factors	Description	Bottlenecks/Enablers	Policy Type & Interaction <sup>1</sup>
			by the public sector		
<b>Transformation of the Greater Manchester Waste System</b>	Greater Manchester Waste Disposal Authority  (United Kingdom)	Enterprises  Foster the implementation of greener technologies	Strategy for the implementation of the EU Regulation including public procurement policy to substitute landfill waste practice with state of the art technology for waste separation, recycling and composting	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>Time to mobilise and involve key and “right” stakeholders</li> </ul> <b>Enablers:</b> <ul style="list-style-type: none"> <li>Evolution to take on board societal needs and interests</li> </ul>	<ul style="list-style-type: none"> <li><b>Demand side:</b> General procurement and public demand/behavioural change</li> <li><b>Supply side:</b> Funding for the acquisition of new technologies</li> <li>Explicit interaction between the supply and the demand side</li> </ul>
<b>European Innovation Partnerships</b>	Directorate General for Research and Innovation  (European Commission)	National, regional and local stakeholders along the whole research and innovation chain  Foster international competitiveness	Policy working across supply and demand focusing on societal challenges and the modernisation of the associates sectors and markets	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>Lack of dedicated structure at the European Commission has hindered progress</li> <li>Clearer channels for bringing in new stakeholders requires</li> </ul> <b>Enablers:</b> <ul style="list-style-type: none"> <li>Effective means of mobilising stakeholders and integrating and aligning new and existing interventions with priorities</li> </ul>	<p>The policy is intended as a systemic approach</p> <ul style="list-style-type: none"> <li><b>Demand side:</b> Integration of demand and supply side logics and measures</li> <li><b>Supply side:</b> Complex and integrated set of policies and actions to leverage on demand side elements to foster development across the whole value chain</li> <li>Explicit interaction between the supply and demand side</li> </ul>

Policy	Promoting Institution	Beneficiaries & Driving Factors	Description	Bottlenecks/Enablers	Policy Type & Interaction <sup>1</sup>
<b>SMEs Standardisation Initiative</b>	French Ministry of Economics and Finances, Directorate General of Competitiveness, Industry and Services	SMEs  Foster internationalisation and competitiveness	Provide financial assistance to intermediary organisations representing SMEs in order to participate in standardisation committee at the EU level	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>Limited budgets available</li> </ul> <b>Enablers:</b> <ul style="list-style-type: none"> <li>Positive use of intermediaries to access SMEs</li> </ul>	<ul style="list-style-type: none"> <li><b>Demand side:</b> Private demand</li> <li><b>Supply side:</b> Financial support</li> <li>Explicit interaction between the supply and the demand side</li> </ul>
<b>Category B Private Demand</b>					
<b>Green Energy incentives</b>	Ministry of Economic Development and Ministry of the Environment  (Italy)	Enterprises  Foster the implementation of greener technologies	National policy for renewables developed to promote: energy production; heating and cooling; energy sources for the transport sector	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>The incentive system has not been able to develop a national industry since the growing demand has been satisfied by foreign production.</li> <li>Several factors and contradictions caused distortions in the implementation phases: green technologies were mainly imported rather than developed nationally; the green jobs created were in sectors such as installation and maintenance.</li> <li>Other barriers were due to a lack of long term perspective which caused insufficient investments in energy infrastructure and technologies</li> </ul> <b>Enablers:</b> <ul style="list-style-type: none"> <li>The effectiveness of the system of incentives used has achieved good results in terms of green energy production, CO2 reduction and creation of Green Jobs.</li> <li>The incentive system has led to significant costs for the system, with an impact on consumers' energy bills.</li> </ul>	Part of a complex set of environmental policies <ul style="list-style-type: none"> <li><b>Demand side:</b> Private demand and direct financial support of private demand</li> <li><b>Supply side:</b> Complex set of extended incentives</li> <li>Explicit interaction between the supply and the demand side</li> </ul>

Policy	Promoting Institution	Beneficiaries & Driving Factors	Description	Bottlenecks/Enablers	Policy Type & Interaction <sup>1</sup>
				<ul style="list-style-type: none"> <li>The National Energy Strategy of 2013, which could be a first step towards a better integrated and coordinated system of support policies.</li> </ul>	
<b>German (Solar Panel Policy (Renewable Energy Heating Act and Market Incentive Programme))</b>	Federal Ministry for Economic Affairs and Energy (BMWi) and Federal Office of Economics and Export Control (BAFA)  (Germany)	Private individuals; enterprises; NGOs; and municipalities investing in renewable energy.  Foster the implementation of greener technologies	The policy seeks to encourage the use of renewable energies in the heating process by obliging owners of new buildings to have a certain amount of renewable energy in their heating processes	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>Inability of national/EU suppliers to meet demand.</li> <li>High export impacts</li> </ul> <b>Enablers:</b> <ul style="list-style-type: none"> <li>Mixed policy covering new installations and refurbishment guidelines</li> </ul>	<ul style="list-style-type: none"> <li><b>Demand Side:</b> Private demand, subsidies and financial incentives</li> <li><b>Supply side:</b> Technology push for solar energy</li> <li>Interactions between the supply and the demand side are implicit</li> </ul>
<b>Danish Program for User-Driven Innovation</b>	Business Innovation Fund  (Denmark)	Firms; Public Organisations; and Research Institutions  Collaborating with users to identify and act on innovation needs	Provide financial support in studying users or improve collaboration with users in order to identify and act on innovation needs in strategic sectors such as: design, welfare, health and food	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>Programme was focused on developing capabilities to assess user-needs. There is some limited evidence that it was successful in this respect but no information on whether methodologies have been adopted by businesses.</li> </ul>	The intent of the policy is forward-looking and systemic <ul style="list-style-type: none"> <li><b>Demand side:</b> Identify private demand, integrate demand and supply side logics and policy measures</li> <li><b>Supply side:</b> Grants for innovative projects</li> </ul> Aim to develop research capabilities in Denmark <ul style="list-style-type: none"> <li>Explicit interaction between the supply and the demand side</li> </ul>
<b>Top Sectors</b>	Ministry of	Enterprises	Industrial policy focusing public	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>Difficulties in engaging smaller</li> </ul>	<ul style="list-style-type: none"> <li><b>Demand side:</b> Stimulate private demand</li> </ul>

Policy	Promoting Institution	Beneficiaries & Driving Factors	Description	Bottlenecks/Enablers	Policy Type & Interaction <sup>1</sup>
<b>Initiative</b>	Economic Affairs (Netherlands)	Foster international competitiveness	activities and resources in the nine top sectors in which the Netherlands excel globally. Main objective are: to leverage private sector R&D; create a greater coherence in supporting businesses tailoring the policy to specific sectors	entrepreneurial companies in developing strategy and implementation <b>Enablers:</b> <ul style="list-style-type: none"> <li>• Diversion of innovation resources from other sectors which may have socio-economic importance</li> <li>• (Large) companies actively engaged in developing as well as implementing strategy</li> <li>• The process of developing strategies is thought to have introduced a positive dynamic in some cases</li> </ul>	and direct financial support <ul style="list-style-type: none"> <li>• <b>Supply side:</b> Funding instruments such as knowledge vouchers, support hiring experts, R&amp;D grants, networking activities and innovation brokers</li> <li>• Explicit interaction between the supply and the demand side</li> </ul>
<b>Category C Regulations</b>					
<b>Biometrics Standardisation</b>	Department of Business Innovation and Skills (BIS) (United Kingdom)	Enterprises  Interaction between standards and innovation in order to support crucial emerging technologies and stimulate industrial development.	Align biometrics sectors with advances in technology and facilitate exchange of information with other countries	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>• Importance of the use of open standards to avoid monopolistic positions</li> </ul> <b>Enablers:</b> <ul style="list-style-type: none"> <li>• Use of government-sponsored standardisation can create lead-market initiatives by creating or enabling capacity for competing contractors</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Demand side:</b> Regulations: process and use of norms. Demand-pull action to identify solutions to emerging R&amp;D technologies</li> <li>• <b>Supply side:</b> Link R&amp;D in promising / emerging technologies</li> <li>• Implicit interaction between the supply and the demand side</li> </ul>
<b>Smart Grid technology Standardisation</b>	National Institute of Standards and Technology	Enterprises and Citizens	The policy is part of a wider energy plan to foster the use of clean energy. It		<ul style="list-style-type: none"> <li>• <b>Demand side:</b> Regulations</li> <li>• <b>Supply side:</b> Investment grants and loans</li> </ul>

Policy	Promoting Institution	Beneficiaries & Driving Factors	Description	Bottlenecks/Enablers	Policy Type & Interaction <sup>1</sup>
	(United States)	Foster the implementation of greener technologies	promotes interoperability standards which will enable the networked elements which make up the Smart Grid to communicate and work more efficiently		<ul style="list-style-type: none"> <li>• Explicit interaction between the supply and the demand side</li> </ul>
<b>• Category D Systematic Approaches</b>					
<b>Health Information Technology for Economic and Clinical Health Act</b>  <b>(HITECH)</b>	Department of Health and Human Services  (United States)	Healthcare ecosystem: health care industry; health care providers; health care consumers.  Build the best conditions to promote the adoption of electronic medical records	The programme is designed to accelerate the adoption of health care technology and specifically of electronic medical records in order to enhance medical service delivery	<b>Bottleneck-limitations:</b> <ul style="list-style-type: none"> <li>• An Act rather than a programme providing legislative power</li> </ul> <b>Enablers:</b> <ul style="list-style-type: none"> <li>• System wide approach involving all stakeholders, including users, from outset.</li> <li>• Strong central coordination</li> </ul>	HIGHTECH is systemic; it includes supply and demand side as well as interactions. The objective is to create a national ecosystem. <ul style="list-style-type: none"> <li>• <b>Demand side:</b> Combination of demand and supply side instruments</li> <li>• <b>Supply side:</b> Related programmes targeting supply side factors</li> <li>• Interactions between the supply and the demand side are implicit</li> </ul>

## 2. POLICY ISSUES AND LESSONS

In this section the report explores the issues emerging from the 20 case studies, the 5 detailed policies studied and the discussions held at the policy workshop with the aim of highlighting some of the main policy lessons identified.

One strong and overarching message is that demand side innovation policies cannot be confined in one well defined and rigid typology: the taxonomy (see below) introduced by Edler (2013) offers practical guidance in the identification and classification of demand side policies but leaves out the nuances of the effects of these on the system of innovation. In particular, demand side innovation policies, more often than not, span the boundaries of the 'box' into which they have been classified and, as we have seen in the two policy briefs, tend to encompass strong elements of the supply-side. In other words, there is a great level of interaction within the various typologies of the demand-side and between demand and supply-side policies.

**Table 2: Demand Side Measures Typology**

<p><b><u>Public demand (Group A)</u></b></p> <ul style="list-style-type: none"> <li>• <b>General procurement</b> (innovation as an essential criterion in the tendering and assessment processes)</li> <li>• <b>Strategic procurement</b> (the demand for certain technologies, products or services is encouraged)</li> <li>• <b>Cooperative and catalytic procurement</b> (public agencies purchase in connection with private demand)</li> </ul>	<p><b><u>Private demand (Group B)</u></b></p> <ul style="list-style-type: none"> <li>• <b>Direct/financial support</b> (demand subsidies and tax incentives)</li> <li>• <b>Indirect/soft steering support</b> (awareness building; labelling and information campaigns; training and further education; articulation and foresight; user-producer interactions)</li> </ul>
<p><b><u>Regulations (Group C)</u></b></p> <ul style="list-style-type: none"> <li>• <b>Regulation of demand</b> (to create a market; process and "usage" norms)</li> <li>• <b>Regulation of the demander – producer interface</b> (regulating product performance and manufacturing; regulating product information; supporting innovation-friendly private regulation activities)</li> </ul>	<p><b><u>Systemic approaches (Group D)</u></b></p> <ul style="list-style-type: none"> <li>• <b>Integration of demand-side measures</b> (strategically co-ordinated measures which combine various demand-side instruments)</li> <li>• <b>Integration of demand- and supply-side logic and measures</b> (combination of supply-side instruments and demand-side impulses for selected technologies or services; conditional supporting of user-producer interaction; pre-commercial procurement)</li> </ul>

*Source: Authors adapted from Edler (2013)*

Issues such as combining demand side policies with the supply side, have raised important policy questions such as: coordination of measures; the appropriate level of institutional involvement in terms of skills necessary to design, launch, implement and evaluate policy effects; the choices of financial instruments to avoid crowding-out and other negative effects; and finally the role of evaluation at different stages of the policy deployment taking into consideration issues such as additionality reach and effectiveness of the intervention, time consistency etc.

**When unpacking these issues, it emerges that further scrutiny is necessary, especially with regard to the exploration of the value generated by combining demand side policies with the supply side**, the modes and models of governance reflected in the design of policies and their overall management and finally on the contextual conditions surrounding the policy effort.

The following sections emphasise some key messages that could be highlighted from the study results.

## 2.1. Different ways of combining demand side interventions with the supply side

It is clear that demand-side policies are not designed and implemented in a vacuum and that connections with the supply-side are either implicitly or explicitly linked in the policies. A demand side policy may affect a company's performance by providing a kick-start to the economic activity (through demand pull) that is then consolidated through further public and private efforts on the supply side. From the examples studied it is clear that demand-side policy interactions are linked to the supply-side in a number of ways and their outcomes rely often on contextual conditions which in many cases are an integral part of the policy process together with policy design and implementation.

Regarding the objectives of the policies, several cases of combinations appear: demand side policies could be combined with supply side by design, but demand side policies may also implicitly include elements of the supply side that are not explicit in the policy design. Finally, demand side policies can be designed independently from the supply side but having supply side effects.

On another hand, the interaction between demand and supply side innovation policy can be organised through the policy framework in which the policies are embedded. Demand side policies are "nested" with supply side policies into a policy mix and the results of the interaction between supply and demand and the systemic outcomes are often difficult to disentangle.

**Key policy message: Demand-side and supply side policies are frequently combined together. The level and nature of interaction take several paths:**

- 1) **Supply-side policy (respectively demand-side) are explicitly designed into demand side policies (respectively supply-side) ;**
- 2) **Demand-side policies are linked to supply side policies already in place ;**
- 3) **Demand side policies see to pursue policy objectives typical of the supply-side innovation policy ;**
- 4) **Policy mixes are designed and combined into a more general policy framework.**

The box below illustrates examples for each of the categories based on the case study materials (reminder the full case studies can be found in the Annexes to this report).

### Evidence box 1

#### Supply-side policy explicitly designed into Demand side policies

The three cases of **SBRI-SBIR programmes** studied (US, UK and NL) show the intent of a systemic approach by design whereby demand side actions such as buying in R&D from SMEs through the means of public or catalytic procurement are integrated with the supply-side through support of R&D in high-risk innovation areas.

The **HIGHTECH act** (2009) was designed in order to improve efficiency and effectiveness of healthcare in the US by enhancing availability and use of Electronic Health Records (EHR). The Act integrates demand-side measures such as IT/Data standardisation to promote systems' interoperability and certification procedures with the supply side. The supply side included the creation of infrastructure (physical and intangible) involving healthcare providers, universities and patients in the design and implementation of EHR.

#### Demand side policies linked to the supply side implicitly

An example of demand-side policies linked implicitly to the supply-side (i.e. not by design) is the case of the **Green Energy Incentives** in Italy. Launched in 2000 to support the Renewable Energy Sector, it consisted mainly of three instruments: Green Certificates, All-inclusive tariffs and the Energy Account. Whilst the incentive system has been reviewed since, the main instruments, the Green Certificates and the Tariff system (all inclusive and feed-in tariff) are both demand side instruments. The first is a regulatory measure and the second concerns financial measures to stimulate private demand. On the supply side there are several instruments in place to support the Renewable Energy Sector (RES) including tax incentives, R&D grants, skill-upgrades and technical services amongst others. In other words, demand-side policies co-exist with supply side measures even though these are not the result of a coordinated action in support of the RES.

#### Demand side policies pursuing typical supply side effects

**SME Standardisation in France.** Standardisation instruments are typical demand-side measures. The objectives of SME Standardisation are to push expected benefits from innovation directly by developing networks of SMEs and indirectly by improving and maintaining SMEs' competitiveness at a national and international level. In particular, this measure was inspired and influenced by focusing on the various supply (by being directly funded) and demand benefits that SMEs can expect to secure by participating in standardisation design and processes. Key points include:

**1) Maintain or increase competitive advantage due to:**

- Better information than their competitors on the content of standards
- Better understanding of the technical content which facilitates its application and improves SME's ability to ensure its product respects standards
- Anticipation of the evolution of the regulations
- Better control of interoperability and compatibility of SME's products with others products/systems that fit with customers' expectations.

**2) Access new markets at national, European and International level due to:**

- Collaboration and networking fostered during standardisation processes
- Better information about market trends and strategic evolutions
- Benchmarking of good practices and experiences of other companies
- Ease with which to enter new markets thanks to market harmonisation.

**3) Disseminate and exploit innovation outputs due to**

- Influence on technological content of standards which depend of size of SME, but also of its engagement and strategic role into the standardisation committees.

**4) Increase credibility and visibility**

- Standards are considered as a guarantee of quality by clients and customers. Better use of standards thus provides opportunities to increase sales and market shares and hence influence supply factors.

**Demand side policies "nested" in a policy framework including supply side (policy mix)**

The **Smart Grid Technology Standardisation in the US** was instituted in 2007 by the Energy Independence and Security Act (2007) through which the Obama Administration aimed at developing a framework to foster interoperability between the Smart Grids operating in the States. The National Institute of Standards and Technology - NIST oversees the process. The standardisation effort, a typical demand-side innovation policy, interacts with the supply side by the complementary plan set out by the Department of Energy aiming at developing and capitalising on the Smart Grids. In practice the policy objective is to unify the national energy networks into a federal Smart Grid which would create the condition for a more secure and efficient energy distribution network. This effort is also complemented by Smart Grid Investment Grants and other loan guarantees for renewables and spans complementary areas such as sensor technologies and smart meters.

The **Procurement Conditioned SME R&D Programme** was launched by the South Korean Small and Medium Business Administration (SMBA) and is an example of a demand side policy that has been employed to generate external economies and therefore have supply sides effects. This policy involves Government Agencies, public institutions and private businesses to commission the development of new technologies to SMEs. The organisation commissioning the technology will purchase the products directly for a longer period (ideally three years). The projects selected are in areas where South Korea has an innovation deficit and are targeting SMEs in the national technology clusters and for technologies that have a potential for substituting exports. The SMBA has also instituted a Large conglomerate – SME Technology Co-operation Centre in order to provide technical support to SMEs and monitor the import substitution effect of the programme.

The study of the policy objectives have shown that demand-side policies are, to some extent, linked directly or indirectly with supply side policy within a wider innovation policy framework. The value of combining demand side policies with the supply either explicitly or implicitly derives from the policy makers' needs/aims to outreach the scope of the policy intervention and eventually even extend its beneficial effects to a domain larger than the targeted areas of intervention. In other words, the policy makers tend to create **additionality** either within the policy remit and, when they see the opportunity, outside its domains.

**Key policy message: Demand-side policies may be linked to the supply side in order to reach more efficiently and more effectively their original aim. Certain types of interactions may be more conducive to additional effects than others in specific contexts**

The box below illustrates this policy message through the Greater Manchester Waste system case.

### **Evidence box 2**

#### **Linking demand side policy with the supply to reach more efficiently/effectively a policy objective and/or promote particular types of interactions**

The **Transformation of the Greater Manchester Waste System** is an example of negotiated public procurement, a demand-side type of measure, undertaken within a strategic plan of requalification of the waste management disposal in the area of Greater Manchester (UK). The local waste authorities had to prioritise: reduction, re-use, recycling and composting, energy recovery and disposal of waste. Given the amount of funds involved, the instrument employed was negotiated public procurement which favoured the interaction between supply and demand. Although further R&D was not expected, some demonstrations were performed in order to assess a better delivery of the final process. Other notable supply side outcomes and interactions included the development and support of a strong Environment Business Cluster in the North West and various RDI collaborative projects with local businesses. For the deployment of the project the procedures also include both *customer and suppliers engaged in training activities*. New business-to-business relationships were established in the form of consortia between the suppliers, which had to create partnerships in order to fulfil their contractual obligations and between firms providing the technology, modifying it, distributing and managing the (technological) process as well as acquiring the recyclables generated.

## **2.2. Governance, policy design and management**

Given the nature of demand side policies, especially concerning the links, interactions and overlapping with the supply side, there are a series of issues related to the governance systems which reflect a range of factors regarding the coordination between the various public agencies involved in the policy action and coordination between public agencies and other actors involved.

There are many possible governance arrangements through which the issue of coordination may affect the deployment of the policies. These usually may play out amongst policy's governing bodies and between the policy's governing bodies and target organisations (and eventually citizens). Sometimes governance arrangements include intermediaries.

As well financial issues the governance needs to encompass the required skills sets, for example procurement experience or technical competence, and good links with the actors the intervention is targeted at in order to encourage their effective participation. The governance actors also need to carefully consider the interactions with intermediaries and similar actors who are often present, notably in interactions with SMEs.

Furthermore, strategic demand side policies can often seek to encompass multiple objectives including wider behavioural or societal changes within the population or within a sector. In these cases, successful examples of policies or strategies show that including all stakeholders within the governance arrangements might be an important success factor.

**Key policy message: there is a large diversity of options that can be chosen in terms of governance. Multi-level and multi-stakeholders governance arrangements should be considered and the involvement of the target organisations and citizens appears important in those areas where the policy objectives aspire to a wider and more all-encompassing effect. Finally, the use of intermediaries could also play an important role to spread effects and facilitate interconnection between stakeholders.**

The boxes below illustrate examples of this key message.

### **Evidence box 3** **Importance of involving all stakeholders**

The **Transformation of the Greater Manchester Waste System**. In order to fulfil the EU directive, in the early 2000s GMWDA first proposed to build new generation energy-from-waste incinerators. This first solution however was strongly rejected both by Manchester City Council and other stakeholders such as citizens and environmental groups, which demanded broader answers and a longer term strategy for waste disposal and encouraged the opening of new routes for the implementation of the EU Landfill Directive. The stakeholders' response triggered a process of internal adjustment in the structure of GMWDA: the Authority needed to acquire the internal capabilities necessary to respond to the challenges and, after his retirement, also had to find a new director. In our opinion, GMWDA's transformation itself marks an example of demand side policies incorporating system-wide changes and societal transformations: a local-level demand side initiative was developed calling for a technological push in the adoption of innovative technologies for waste disposal. Such development was modulated by the intervention of local stakeholders and provides an example of demand policy design and technological adoption selected following social impulses and hence reaching out from public procurement to a wider systemic action.

On a much larger scale, the **US HIGHECH Act** also has such an ambition. It involves many public and private healthcare providers and patients and is overseen by the Office of the National Coordinator for Health Information Technology (ONC). Whilst the programme does not have a specific economic focus – it aims at improving efficiency and effectiveness in healthcare – it differs from other programmes in that there is a substantial overlap between the user (demanders) and supply communities in that healthcare providers are the main users of Electronic Health Records and also suppliers of the required information. The participants to the programmes include labs, pharmacies, public health agencies as well as hospitals, general practice and patients. One strategic goal of the ONC is to empower individuals to improve their health and the health care system through health IT. It is, therefore, distinctive from the other case studies in that there is explicit 'consumer' involvement.

### **Evidence box 4** **The use of intermediaries**

Since 2007, in the **French SME Standardisation** programme, intermediaries have the designated role of acting on behalf of the network (or group) of SMEs in standardisation committees, representing the SMEs' interests and reporting back. The logic behind intermediaries involvement is that standardisation is a complex process that impacts upon companies in a variety of ways (requirement to follow standards, especially in sectors with a high degree of control such as health, children's products, construction, etc.) therefore, experts are called in to act on behalf of the companies which do not possess the necessary competences. The employment of intermediaries can also be considered as an opportunity to disseminate the knowledge acquired during the standardisation process back to the group of companies with a multiplicative effect as one participant to the process reports back to a group of SMEs, a consortium or a federation. Between 2010 and 2012, 42 agreements have been signed, mainly with professional federations or unions (86%) and with SME groupings (14%).

It came to the attention of the research group that intermediaries have been serially used in the application phase of the **US SBIR**. It is understood that intermediaries in this phase have facilitated the matching of university and industry partners in many cases where collaboration would have not emerged spontaneously. Moreover, intermediaries, involved in the application phase have reportedly managed to compile proposals more efficiently, increasing the odds of receiving the funding for the project. In this case however, a risk has been identified in the higher success rate of intermediaries due more to their capabilities and knowledge of the system than to the impact of the project on the technological advance. In other words, the use of intermediaries might have favoured the approval of projects focusing on commercially-ready technologies rather than projects aiming at developing new technological solutions.

## **2.3. Contextual conditions**

From the analysis of the interactions of the demand-side with the supply-side a further host of factors emerge for our consideration. At a general level, policies play out in a complex social, technological and economic system whereby characteristics of the systems can be described by the

elements forming them and the relations between the various elements. In this setting, policy intervention, whilst focusing on a particular objective, or set of objectives, has an effect on all components of the innovation system and their relationships. For example, employing public money, through procurement, to support a particular technology may divert attention from other technologies which are at a more embryonic stage of development but might have greater impact on the social, technological and economic system.

**Key Policy Message: Demand side innovation policies might have both unexpected or unintended consequences on the elements of the innovation system. If the aim is to stimulate local production of innovative services and products (as well as their adoption) policy makers need to be confident that local suppliers are able to respond to increased demand.**

**Evidence box 5**

**Unintended consequences of innovation policy**

The **Green Energy Incentives in Italy**, in particular the feed-in tariffs for photovoltaic. The incentives were employed to increase the diffusion of photovoltaic energy generation panels, a sector just emerging in Italy and based on a technology which, albeit in a development stage, had already achieved some level of standardisation. As the feed-in tariffs increased demand for photovoltaic installations, the sourcing of the products shifted from Italy to other countries which had a competitive advantage in terms of labour cost for the provision of a standardised good, mainly China. The end result is that the Italian economy benefitted only from the increase in services related to the sector: installation and maintenance. It should be noted however that this policy intervention resulted in a massive increase in the percentage share of energy produced from RES in Italy as opposed to non-renewable sources. Furthermore, similar RES type policy interventions have been developed in other EU states such as France, with very similar outcomes.

Public effort on standardisation might produce soft infrastructure for interoperability and introduce quality assurance between technologies, components and technological platform which may certainly benefit further development and innovation; however, this effort might be focussing on technological domains then may not prevail on the market place. The risk is that standards can slow or even inhibit the launch of new innovative products and standards. Nonetheless, the interactions in place and relationships developed during the policy implementation stage might themselves create new avenues for innovation.

**Demand side innovation policy might have unexpected consequences**

**Evidence Box 9**

**Unexpected consequences of ‘SME Standardisation’**

Leaving aside the individual performance of the French SMEs in terms of their participation on the standards initiative, the effects of the **SME Standardisation in France**, has been in fact more important in introducing SMEs to international standards and create, through networking, competences and capabilities that have enhanced the internationalisation and export awareness of the French SMEs.

Contextual factors clearly impact upon all types of policy interventions. However for the specific characteristics of demand and supply side interventions it is important that the policy maker, when designing and implementing a particular policy, acquires a detailed knowledge of the system within which said policy is due to be deployed, and the clarity of the objectives it wishes to tackle. We have seen that the choice of the policy governance model and a clear articulation of the demand (or the policy objectives) are essential during the phases of design and implementation of the policy, these usually work in tandem and are strong contributors of policy success.

The effects of the selection of the financial instruments employed, the procedures for selecting the participants and the mode of delivery of the policy objectives might have an influence on the final outcome of the policy intervention. Particular emphasis has to be placed on the risk of causing crowding out or reward underperformers.

Summarising, supply and demand-side innovation policy design and implementation faces ‘hurdles’ that are dependent on the characteristics of the innovation system they intend to affect.

These contextual conditions are multilevel and present a high degree of complexity. At the higher level of aggregation we might look at the innovation capabilities already present within the system, the various innovation ecologies and their interdependencies, the level and structure of skills available within said sub-systems and the structure of economic activities. The design and implementation of policies is heavily dependent on whether the intention is diffusion of innovation, development of new innovation or a mix of both. In the latter case a problem of finding the right balance between diffusion of existing innovation and developing of new ones needs to be solved.

#### **2.4. Transferability and adaptation of policies through different contexts**

Since the 1990s the debate in policy circles has focussed on issues such as transferability of policies, lessons learnt from policy analysis and adaptation of policy (see Rose, 1991; Dolowitz and March, 1996 and 2000; James and Lodge, 2003 for an overview of the debate). Although this rendition of the debate might exceed in simplification, it was clear enough that transferring successful policy to other contexts would lead to a sub-par outcome and this was beginning to cast doubts on the practice of implementing successful policies across different settings with marginal policy adaptation. The consequent policy failures made scholars and policy makers to review the reasons of such failures in relation to the transfers that took place. Uninformed transfer, incomplete transfer and inappropriate transfers were seen as causes for the policy failure (James and Lodge, 2003). Yet, these accounts do not take into consideration the specific features or the process of transfer that might originate from the systemic aspects of - and differences between - the systems of relations across which policies were originally designed and then transferred. These systemic issues include differences in the institutional settings, differences due to "lock-in" effects and path dependency, differences in the structure of social, technological and economic relations, and the links between the policy makers and the stakeholders in the policy process (legitimacy). All these issues indicate that policy transfer practices *tout-court* are poor practices in policy making which do not take into account policy learning and appropriate adaptation.

Whilst this is not the appropriate place to discuss the theoretical aspects of policy transfer, learning and adaptation, there is certainly scope to draw some valuable insights from the case studies. Furthermore, through this study we have also deepened our knowledge on the policy making process from the perspective of the stakeholders involved. In particular we have seen that legitimacy and shared objectives tend to be determinant during the phases of policy design, implementation and deployment and need to be taken into account when considering issues of transferability. In some cases, the stakeholders triggered a series of actions including the re-adjustment of the organisational structure as in the case of the Greater Manchester Waste Disposal Agency, acquisition of new knowledge and technological competences to be applied for the case at hand and prompted a cooperative approach to procurement - in line with the regulation on negotiated public procurement. Legitimacy and shared intents carry important weight during the phase of policy design and are particularly important for understanding transferability issues.

***Key policy message: Adaptation, contextualisation and policy learning are an essential part of policy transfer. Involving the appropriate stakeholders is also an importance factor to support the legitimacy of the policy and understanding the conditions for enhanced transferability.***

The boxes below illustrate how similar policies have been designed and implemented (transferred) differently across systems and contexts and the importance of involving the 'right' stakeholders

#### **Evidence Box 10 Policy transfer**

In the **Small Business Research and Innovation** cases (US - UK - NL) we can see how 1) within each context policies have evolved in order to take into account the social, technological and economic dynamics within the specific systems they were meant to affect and 2) similar policies have been designed and implemented differently across the systems. SBIR-type policies are in fact a 'popular' instrument in the policy toolbox and have been implemented in over 50 national context to some extent during the last 3 decades. Yet the cases we have studied demonstrate how, though the main objective was common to the three cases - increase R&D by SMEs -, 1) In the US, UK and the Netherland the policies were tailored and evolved in order to accommodate national features and facilitate the implementation process and 2) the policy levers activated, the general (systemic) aim of the policies have been rather different and targeted to specific the social, technological and economic systems.

## **Evidence Box 11**

### **Involving the 'right' stakeholders**

The case of the **Transformation of the Greater Manchester Waste System** has demonstrated that important policy objectives might be reached by only involving all stakeholders from the inception of the decision making process. The first attempt to implement locally the European Landfill Directive (1999) in fact failed due to fragmentation of the governance: *The organisation of the waste collection and disposal was operated separately within the area with nine Councils devising and implementing their own strategies independently. Although all the Councils involved were part of the Greater Manchester area, their strategies were disjoint and no common structure was in place in order to manage waste disposal homogeneously. The picture was complicated by the separation between the Authority responsible for municipal waste management (GMWDA) and the Authority responsible for waste collection and lack of involvement of all parties to the decision table:*

## **2.5. Evaluation and Metrics**

Few of the 20 interventions selected as cases studies have been subject to detailed impact assessments. In some cases this reflects their relatively recent introduction and the intention is to evaluate them in the future, but it also reflects the inherent complexity of these interventions. They are complex for the same reasons which apply to any policies or instrument/tool designed to stimulate innovation; including the often long timescales to economic impact and the difficulties of separating policy outcomes from the activities of others in the innovation process.

Instead of impact evaluations, assessments of the interventions have focused on process evaluations and monitoring data. Several, especially in their early stages, have through expert panels and surveys of participants and non-participants considered whether programmes are developing as intended and have recommended adjustments as appropriate. Some interventions seem to have evolved over many years in this respect with fluctuating budgets depending on political or economic priorities.

Monitoring data is, of course, collected by all, but tends to focus on activities rather than outputs and outcomes; for example, expenditure, number of firms involved and more specific measures related to the programme, such as share of procurement budgets.

Some programmes have also collected data on intermediate outcomes which could be used to inform an assessment of economic and other impacts. The most common, which obviously reflect programme aims, are:

1. Employment (and growth) of participating firms;
2. Sales and growth;
3. R&D and growth;
4. Profitability and growth;
5. Various measures of innovation related outputs, notably patents.

As noted above, it is very much the exception for these metrics to be developed into economic impact measures, or for assessments of what would have happened without the intervention. One of the results is that it is very difficult to assess the transferability of interventions from one geographic area or market to another. There are some exceptions to this, but, as box 10 shows the results are not always easy to interpret or indeed consistent

***Key policy message: Interventions need to be regularly monitored and process evaluations can be an important input to development in response to changing needs and contexts. Moreover, rigorous evaluations can give valuable insights.***

The box below illustrates this message

### **Evidence box 10** **Using monitoring to develop programmes**

The Korean Procurement-conditioned SME R&D programme has, in various forms, been in operation for many years. It is regularly reviewed by research teams and expert groups and has evolved in response to perceived deficiencies and changes in national needs. Key changes include: increases in the share of public procurement budgets mandated for the programmes; the introduction of product certification for suppliers (and indemnities for purchases); and establishing technological support centres.

#### **Quantitative evaluations**

The US **Small Business Innovation Research** (SBIR) programme has probably been more extensively evaluated than any other measure and it is one of the very few in our sample where econometric methods have been used to assess counterfactuals. Interestingly, these studies are not unanimous in their conclusions. Some studies which compared SBIR participants with a control group of non-participants found a positive and significant impact on sales and employment. Another, which adopted an instrumental variable approach to correct for omitted variables, found no effect on employment and that the SBIR grant crowded out privately-funded R&D.

A wide ranging review of Korean Innovation policies, including our case study (see above), found that tax incentives have greater effect on the firm's innovation activities, relative to other instruments such as government financial measures, **procurement**, legal and institutional infrastructure, and other indirect incentives.

## **3. CONCLUSIONS AND KEY MESSAGES**

The study has reviewed a diverse range of interventions which, to varying degrees, combine demand and supply-side measures. The diversity arises from their specific aims and activities, but also the innovation systems in which they are operating, timing (and length of operation) and scale. There is limited evaluation evidence with which to judge their effectiveness, but in this section we present the high-level messages which we have drawn from the policy and case study reviews.

The key characteristic of most of the interventions is their complexity. Innovation is complex, and all policies will reflect this to some degree, but the interaction between supply and demand side measures adds to this. In addition, several of the policies reviewed combine more than one demand-side measure and, in a few cases, more than one supply side intervention. A number of conclusions follow from this.

First, it is especially important that there is clarity on what is trying to be achieved and how. In particular, **policy design** needs to carefully consider the rationale for public intervention and the extent to which either demand or supply-side measure might introduce unwarranted distortions in the market (and the potential consequences). In policy brief 2 we discussed the use of 'logic models' in the context of evaluation, but they also clearly have a role in relation to policy design also.

Two key issues for policy design encompass the scope for combining supply and demand-side measures and whether such measures should be integrated in a single programme. Demand-side measures always draw on supply-side interventions, if only because they require skills provided by the education system. But almost all the programmes reviewed integrate supply and demand measures within the programme, for example the various procurement schemes also fund development work. Such integration obviously enables supply-side support to be targeted, and is administratively efficient for participating firms, but also adds to the complexity of programme management. There may also be questions surrounding the efficiency of R&D funded in this way, as well as possible tensions between public funding of R&D and the wider diffusion of resulting technologies.

We would also note a fundamental question which needs to be addressed and that is whether **the aim of the intervention is to diffuse existing innovative processes or products within the economy or to pull through research outputs into innovative products and processes, or (perhaps more likely) a combination of the two**. This is not always made explicit, but obviously has implications for policy design. For example, many of the renewable energy programmes have been criticised because they stimulated imports rather than domestic production and it has been suggested that stronger supply-side policies were also necessary. We have no evidence to suggest that supply-side intervention would have been successful in this way, and we

understand that some European *manufacturing equipment* makers may have benefited from the increased demand for renewable energy equipment. However, it does illustrate the importance of considering the context in which the policy is being introduced (in this case the competitive position of renewable energy equipment suppliers) and their potential supply-side needs.

The second general message concerns **the governance and management of supply and demand-side interventions**. The diversity of measures means that a single agency is unlikely to possess the authority or experience to effectively manage all components. Procurement policies are a good illustration. Agencies responsible for procurement are unlikely to be familiar with R&D funding programmes, especially where these involve competition. In addition, many of those consulted and attending the workshop, pointed out that procurement officials may lack the technical skills to specify innovative products and can struggle to identify new functionalities. We would also note that many sub-national authorities have large procurement budgets and some are showing increased interest in demand-side interventions, but may be financially (and sometimes legally) unable to support the supply-side.

Some of the successful interventions we reviewed have effectively coordinated inputs and activities of a diverse range of organisations and agencies. The HITECH scheme in the US, for example, brings together users, equipment producers and various State and Federal bodies with regulatory responsibilities under the Office of the National Coordinator for Health Information Technology. Innovate UK<sup>2</sup> leads the Small Business Research Initiative (SBRI) in the UK which involves a large number of Ministries and has successfully increased uptake of the scheme. What is required will depend on aims and objectives, but successful programmes have combined:

- Obviously, the required political and financial authority and responsibilities
- Knowledge of the sector and participating businesses. This has enabled the programme to reach relevant participants as well as helping to ensure effective programme design.

We would also note that some of the older programmes have changed and evolved over time. In part, this was a response to changing circumstances, but many undertake regular process reviews (as opposed to impact assessments) and this has sometimes led to significant changes in operation. The SBRI and SBIR and the Korean procurement schemes are good examples of evolution.

The third point concerns **evaluation**. As was discussed in policy brief 1, there is only limited evaluation evidence for the interventions we reviewed. The result is that it is very difficult to assess the effectiveness of supply and demand interactions, their relative importance and the extent to which experience might be transferable between sectors and between regions and/or countries.

The fundamental evaluation challenge is establishing the counterfactual and we recognise that this will not always be feasible as a result of the underlying complexity and/or the resources which are likely to be available for evaluation. Nevertheless, the lack of evaluation evidence is a major gap in current knowledge which could be at least partially rectified by all interventions preparing evaluation plans reflecting:

- Developing logic models at the policy design stage
- Such models should specify what short-term and longer term outputs and outcomes are expected and how the intervention is expected to generate these; i.e. the underlying theory of change. The models will suggest evaluation questions and should be used to identify ways in which relevant data can be collected
- At this stage the scope for techniques, such as randomised control trials, regression discontinuity design and difference in difference estimates should be considered in order to derive a robust assessment of the counterfactual and what the intervention has actually caused. Such approaches are to be strongly encouraged, but they will be expensive compared to “softer” evaluation approaches. There is likely to be a threshold for programme expenditure and one workshop participant suggested any programme above €0.5m should be evaluated in this way. In some cases, it is simply not feasible to introduce such approaches: standards, for example, potentially affect all and it is difficult to see how a control or comparison group could be established in a meaningful way
- Softer approaches such as self-reported benefits (and problems) by participants will also be required. These do not represent a rigorous evaluation, but can provide valuable feedback to programme managers and lead to improvement in the intervention. They also need to be

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2 Formerly the Technology Strategy Board (TSB)

undertaken in as rigorous a way as possible, with careful selection of survey samples to avoid bias in responses.

#### **4. REFERENCES**

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#### **5. EXTERNAL ANNEXES**

Several documents produced all along the study are annexed to this final report:

- **First policy Brief and its annex** which contain:
  - the comprehensive literature review
  - a selected bibliography
  - the comprehensive 20 short cases.

The first policy brief summarize the key lessons from all this collected material. Reference list to be prepared.

- **The second policy brief which contains:**
  - The detailed analyses for five cases: SBIR programmes in USA, UK and Netherlands, Green incentives in Italy, Hitech programme in USA, Great Manchester case on waste management and The French programme supporting SMEs' participation in standardisation committees.

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This document is the final report of the study undertaken under the framework contract “provision of services in the field of research evaluation and research policy analysis” Lot 3 on behalf of the DG Research and Innovation. The scope of the study was to provide an overview and analysis of innovation supply side and demand side policies and their interactions in the context of a broad policy reflection about how to develop the use of demand side instruments as part of a more integrated policy approach for improving the effectiveness and efficiency of research and innovation (R&I) systems at regional, national and EU level. This reflection and the study methodology selected sought to develop an analysis based of the experiences of countries which are the more advanced on the path of integrating supply- and demand-side policies in their overall innovation strategies.

*Studies and reports*