

Innovation strategies articulating supply side and demand side aspects

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1. Introduction

The idea of the adoption of an Innovation Strategy guiding policies has gained momentum and became an integral part of RTDI policies in all Member States. Strategies and strategy documents are discussed in different EU fora, the OECD and beyond. Their design ranges from simple analyses and quick decisions based on past specialisation indicators to complex models relying on systematic data gathering and foresight exercises. There are increasing resources dedicated to analyses and other tools to help underpin findings and choices and make strategy documents better documented and, as a consequence, facilitate their adoption and implementation. One specific element of recent innovation strategies, strongly supported at the EU level, is the mobilisation of resources for demand-side policies to balance the traditional emphasis on supply side only.

Innovation strategies are designed at the local, regional, national and European level. Research and innovation strategy papers exist in all Member States and many European regions. The idea of the strategy is always to concentrate resources to promising themes combining elements of existing competitive advantages and promising future performance. This concentration is then expected to increase competitiveness through interaction and cross fertilisation of ideas. However, innovation strategies have only partly paved the way to higher effectiveness of public policies. In other cases they remained exercises on paper because they were over-ambitious, ill-conceived or misjudged the resistance to change. In particular the latter prevents the foreseen concentration of resources or adoption of new, unfamiliar policy measures. Evidence suggests that the latter applies in particular the adoption of demand-side policies.

The purpose of this document is to review innovation strategy design and implementation exercises at the national level (and its interaction with the EU) and understand how this process works at the member state level. Once this is discussed the focus will shift to the demand-side elements of strategies: despite increasing rhetoric in EU fora and more recently in national debates, the balance is still significantly skewed towards supply –side measures. Evidence from policy papers clearly demonstrates the small number of demand-side initiatives, most of them being concentrated in few countries (innovation leaders and followers) and few types of intervention (public procurement for innovation and SBIR-type programmes).

The paper is divided into two main sections: the first explains why strategy is important and what the important components of innovation strategies are, making also explicit reference to the newly-emerged concept of smart specialisation and its relevance for innovation strategy; the second explains the notion of demand-side policies and why it is crucial that they (in particular in the context of austerity policies) become a critical ingredient for the

implementation of innovation strategies. A concluding section gives an overview and concludes with three consolidated questions for a debate on the topic.

2. Research and innovation strategies in the Member States

Strategy is about making choices and making choices is a particularly difficult task. It entails risks of outward mistakes and lock ins. This is why, despite recognising the relevance and role of strategy, very often strategies are diluted when it comes to implementation. Or they are updated and complemented with new, complementary or refined strategies, thus making the notion of strategy less clear.

2.1 Why is strategy increasingly important?

The need for developing innovation strategies stems from increasing international competitive pressures, whereby it is clear that developed regions can only compete with the low-wage developing world by successfully developing new, innovative products and production processes, improving quality and achieving productivity gains. This requires maximising economies of scale and scope at the company level and economies of agglomeration at the spatial level. As market forces alone are insufficient to generate such economies and individual success stories remain rare, successful strategies have incorporated policies supporting clusters and networks to generate linkages and to maximise spill-overs.

However, while the need to formulate an overall horizontal strategy is now well recognised, there is always some reticence to make sectoral and thematic choices because of the generic fear of substituting market failures with government failures; there are indeed numerous instances in the past where picking-winners policies have failed. At the same time neo-liberal policies could not ensure smooth, continuous growth. Hence, it is increasingly believed that effective innovation strategies give the business sector a prominent role and largely rely on public-private interaction for addressing societal challenges. The more traditional supply-side interventions, supporting research or even innovation without taking commercial opportunities seriously into consideration (or without being able to do so) have not generated the expected results. Supply side alone tends to prove an insufficient instrument for change. While research can lead to science-based innovations, which trigger considerable productivity growth, new products and improved competitiveness, still in many other cases conventional research support fails to produce anything more than specialised new knowledge unable to transform into economic and social benefits. At the same time, interventions embedded in the plans of the business sector (able to identify market needs) or targeted at societal challenges (creating public markets) prove highly beneficial in the long term. Stakeholder consultation has been generally adopted as a means to steer strategy towards the needs of the business sector.

Recent efforts to reinforce the role entrepreneurs play in innovation strategies have taken two different but not necessarily distinct forms:

1. Give entrepreneurs a leading role in designing innovation strategies. The notion of smart specialisation was developed relying on entrepreneurs' knowledge for the selection of sectors, niches or themes for individual regions to specialise. This specialisation would then lead to generate investments not only in the area selected but also in related variety and even in deriving completely new areas where technologies are appropriate.
2. Use demand stimulation as leverage for increasing investments and productivity by creating or stimulating product markets that act as incentives for business investments. In addition to directly supporting entrepreneurs, opening market opportunities and giving them the possibility to compete for such new markets seems to be an important way to complement supply-side policies.

2.2 Existing strategy documents in the Member States

Each member state is now expected to produce explicit strategy documents, which directly or indirectly pave the way for an innovation strategy.

1. The National Reform Programmes constitute an important instrument in the implementation of the Europe 2020 strategy for smart, sustainable and inclusive growth. In these programmes, the Member States spell out how they translate the targets and policy priorities established at European level into their own national policies. Within the framework of the European Semester, in April each year governments submit their NRPs together with their Stability or Convergence Programmes that are to be prepared in line with the Stability and Growth Pact. In many Member States research and innovation are priority areas.
2. The 27 National Strategic Reference Frameworks agreed between Member States and the Commission, set out the investment priorities for the new generation of regional and sectoral programmes to be supported by the European Union over the seven-year period 2007-13. They draw their inspiration from the priorities of the "Community Strategic Guidelines for Cohesion", where innovation plays a prominent role. New strategic documents (in the form of Partnership Agreements) are expected within 2013 suggesting strategies for the next programming period.
3. In the Member States with significant Structural Fund support there are Operational Programmes for Competitiveness, which include RTDI strategies and pave the way for the creation of a better performing national innovation system.

The basic idea is that the strategies included in these documents are not only compatible but should be complementary. In many Member States there are several national strategies touching upon innovation, delivered with different timelines, by different organisations and following different rationales. A thorough look at the Erawatch/Trendchart database¹ suggests that there are more documents of generic nature or complementing general strategies with specific inputs for R&D infrastructure, education or internationalisation. Indicative documents, extracted from the database include:

¹ <http://erawatch.jrc.ec.europa.eu/>

Austria	Road to innovation leader Strategy 2020
Belgium	Flanders: Policy Plan Science Communication 2012-2014 Belgian Position Paper on Horizon 2020
Bulgaria	National Strategy of Scientific Research to 2020
Czech Republic	Back to the Top. The International Competitiveness Strategy for the Czech Republic 2012 – 2020 Competitiveness Strategy Framework Economic Growth Strategy
Finland	Government Statement on Innovation Polciy
France	2011 Yellow Paper on National Policies in Research and Higher Education Training National Strategy for Research and Innovation
Germany	High tech strategy 2020
Hungary	Science Innovation Programme
Ireland	Report of the Research Prioritisation Steering Group Innovation Ireland, the report of the Innovation Taskforce
Latvia	Priority scientific areas for funding fundamental and applied research in 2010-2013
Lithuania	Lithuanian Innovation Strategy for 2010-2020 Lithuanian Progress Strategy 2030
Netherlands	To the top: Enterprise policy in action(s) Stability Programme of the Netherlands April 2012 Update
Poland	National Scientific Research and Development Programme Poland 2030 - Development Challenges Science Strategy in Poland until 2015
Slovakia	The Fenix Strategy: Update of the Long-Term Objective of the State Science and Technology Policy up to 2015 Long-term Objective of the State S&T Policy up to 2015
Sweden	The Swedish Innovation Strategy (2012)
UK	Annual Innovation Report 2010 New Industry, New Jobs - Building Britain's Future Science and Innovation Investment Framework - Annual Report 2009

Strategy documents are important and many of the documents mentioned above are highly relevant. Two reservations are, however, expressed: one is the way multiple strategy documents interact with each other; the second is that demand-side is (if at all) only sparsely mentioned.

2.3 A new strategic approach: smart specialisation

Smart specialisation as a notion is recent but is making a significant impact on the policy audience, as it has been adopted by the World Bank, the OECD and the European Commission. DG Region in particular has made it an ex ante conditionality for the next programming period. In addition the Commission has decided to build a platform of services

(Smart Specialisation Platform²) to support regions in their efforts to devise and implement a smart specialisation strategy.

In theoretical terms the Smart Specialisation “concept is not *tight* – it lacks transparency, verifiability and consensus. Many statements and arguments about smart specialisation are not yet based on sound empirical foundations so that the plea in favour of smart specialisation and the tools and instruments to support a smart specialisation strategy may reflect wishes and hopes or worse, opportunistic special pleading, rather than a robust and defensible strategic case for action. There is therefore a growing gap between the policy practice and the theory” (Foray et al. 2007).

The practical aspects that characterise Smart Specialisation are composed of four important structural processes:

1. *Entrepreneurial discovery*: SWOT methodologies and stakeholder involvement from the business sector have always been used for strategy development. The novel and persistent element in Smart Specialisation is that priorities should not emerge from theoretical models and long exercises but from entrepreneurial knowledge. Entrepreneurs in the broadest sense (innovative firms, research leaders in higher education institutions, independent inventors and innovators) are in the best position to discover the domains in which a region is likely to excel given its existing capabilities and productive assets.
2. *Imitative entry and clusters’ formation*: While entrepreneurial discovery marks the beginning of exploitation opportunities, imitative entry constitutes the confirmation that others see this discovery as meaningful. When the initial experiment and discovery are successful and diffused, other agents are induced to shift investments away from older domains with less potential for growth than the new one. Imitative entry is the *continuous* confirmation that the choices were correct and trigger further business expectations. Clustering in the form of sectoral specialisations and/or related variety comes next.
3. *Structural evolution*: Entrepreneurs are best positioned not only to discover present opportunities but are also flexible and resilient enough to redirect opportunities as clusters and technological knowledge build up. Probably the most important contribution of Smart Specialisation is precisely this evolutionary approach to strategy. In this approach specialisation changes over time responding to a constant regeneration of opportunities. Structural change is the main outcome of a successful Smart Specialisation process and invariably involves some kind of related diversification³, a process that builds upon existing capabilities and industrial knowledge and physical infrastructure (an industrial commons). Structural evolution is an accumulative process that bridges present with future strengths through permanent transition, modernisation and diversification which can lead to the radical restructuring of the foundations of a domain.

² s3platform.jrc.ec.europa.eu/

³ See Koen Frenken, Frank Van Oort & Thijs Verburg (2007), “Related Variety, Unrelated Variety and Regional Economic Growth”, *Regional Studies*, 41:5, 685-697

4. *The space of Smart Specialisation and the role of extra-regional resources:* Neither pre-defined 'regions' nor specific sectors can be used *ex ante* to determine the boundaries of a Smart Specialisation process. The collective R&D, engineering and manufacturing capabilities that sustain innovation are not necessarily deployed and contained within strict regional boundaries and their development and evolution is likely to defy administrative frontiers.

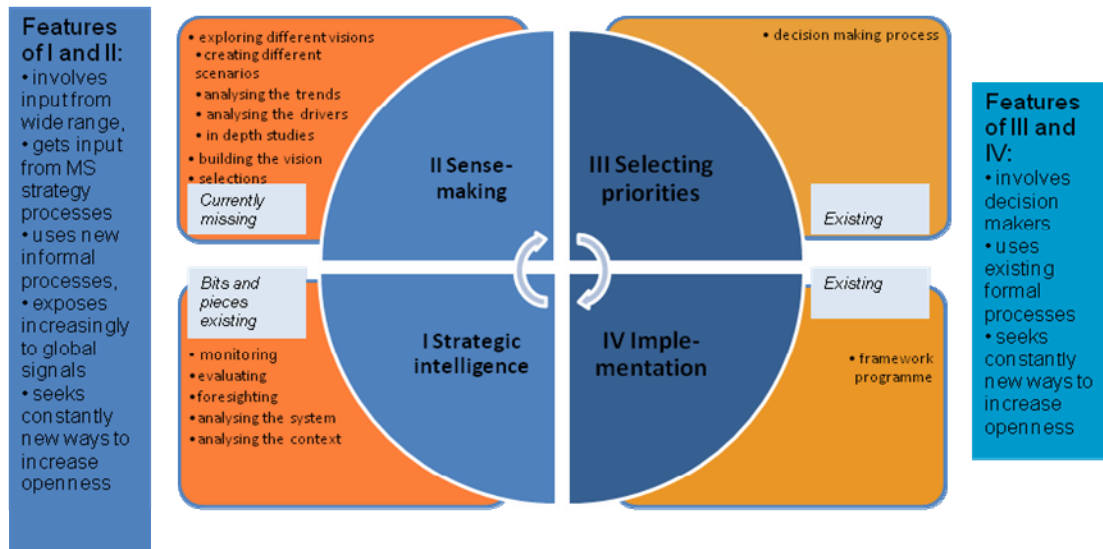
While the Smart Specialisation process is embraced with enthusiasm, questions are raised about its articulation with existing strategies and with the expected Partnership Agreements, the revised National Reform Programmes and specific national strategies.

2.4 Challenge-driven R&I strategy processes: need for coordination?

All Member States and most European regions have innovation papers, which include SWOT analyses and future trend expectations. Evidence-based policymaking – at the core of strategies - relies on a process of systematic collecting, analysing and sense making of all strategic intelligence of the area for which the strategy is formulated. In addition, analysing global trends (technological, market-related such as consumer patterns and policy related such as environmental regulations) is necessary in order to be able to provide further evidence, future perspectives and options. Important global studies from international organisations (UN, OECD, EU) but also research units, think tanks and sectoral associations are used to enrich knowledge on global trends. Foresight activities play an increasingly important role in this process.

A systematic study of innovation strategies identified that “there are numerous forward looking activities both at European and Member state levels, these activities are uncoordinated and their results have a very limited impact on the actual preparation of policies and policy measures” (EFFLA 2012). EFFLA proposes a framework that builds on four main steps (Figure 1). The different steps, from Strategic Intelligence to Implementation, engage different stakeholders and integrate national and European levels. Strategic Intelligence (step I) will mainly involve “knowledge” stakeholders such as academics, thought leaders and independent researchers. This step is mainly bottom-up. The sense-making (step II) also engages the former stakeholders but the process is led by the Commission (n.b. the established 'FLA-hub'). The first part of the third step (selecting priorities) engages a wide spectrum of more formal stakeholders in open consultations (including the public, NGOs and other lobby groups) including inside the Commission ('thematic DGs'). The most important part of this step is the decision part, which is in the hands of the Council, European Parliament and the Commission. The implementation (step IV) is entrusted to the Commission which normally is assisted by Programme Committees with representatives from Member States. However, a well-functioning first and second step should be able to feed in also to the implementation, e.g. in detecting gaps and emerging needs.

"Tekes: Foresight (I) > Insight (II) > Strategy (III) > Action (IV)"



It is important to make a clear distinction in the overall strategy process between formal and informal steps. The first two – strategic intelligence and sense-making – are predominantly informal processes. This implies that they must rely on intelligence and participation on a personal level⁴. The last two steps are formal where intelligent stakeholders can further support the process. The informal stakeholders can be seen as ‘supply’ stakeholders whereas the formal stakeholders (Member States/Council, European Parliament, Commission) can be seen as ‘demand’ stakeholders.

3. Giving demand-side policies a nudge

3.1 Some definitions

There is an increasing recognition that innovation-driven economic success depends on more than traditionally conceived S&T policies—exemplified by the emergence of ‘systemic’ rationales and new typologies of innovation policies that emphasise the role of ‘indirect’ as well as traditional ‘direct’ measures, ‘demand-side’ as well as ‘supply-side’ instruments (Flanagan et al. 2011). As there is extensive research, knowledge and policy experiences in supply side instruments, mutual learning is more important for complementing the existing wide array of supply-side measures with demand-side interventions.

Demand-side policies are those that can induce investment in technologies by enlarging markets for them. Rising expectations about future demand for new technologies increase the incentives for investments in innovation by enlarging payoffs to successful innovations.

⁴ These are referred to as “knowledge stakeholders”, which highlights the fact that these participants are selected because of their ability to contribute to these processes through their personal insight and competence and are only representing themselves in these processes and not any background organisation with vested interests to influence the outcome of the process. Sometimes the same persons might later participate in the formal processes as representatives of “formal stakeholders” with vested interests, but at this stage they are not bound by their affiliation and only represent themselves as individuals. A “knowledge stakeholder” can also be an organisation engaged solely or mainly in strategic intelligence and/or sense-making activities, as long as it is fully independent from any “formal stakeholders” (EFFLA 2012).

Typically demand-side policies are those addressing social and societal concerns, where the state is an important user (public procurement) or needs to regulate markets (standards, environment, radio-waves). In the case of social challenges, which address public goods (like climate change), there is a rationale for state intervention, which is not in contradiction with market and competition rationales.

Adopting demand-side innovation policies has several implications for the public sector. The combination of policy measures (sectoral, supply- or demand-oriented) to support demand for innovation makes good governance and policy co-ordination within the public sector essential. The systemic nature of demand-side innovation policies also implies that alignment needs to be achieved not only across levels of government, but also with industry and other influential stakeholders. It is therefore necessary to establish shared visions and roadmaps between the public sector and firms to implement demand-side policy instruments successfully. A demand-side innovation policy gives a more pivotal role to public administrations (e.g. through procurement, regulation, and setting and certifying standards). This requires investments in skills and competencies in public administration, as well as organisational and cultural change. It also raises the question of how the public sector can be encouraged to participate in this innovative effort (e.g. promotion of innovation-friendly public procurement) (OECD, 2011).

3.2 Types of demand side instruments

In the literature many authors have emphasised the importance of the demand-side of innovation. Involving users and interaction with public and private users is essential for the dynamics in innovation systems. The implementation of targeted demand-side innovation policies is a rather recent trend and is mainly designed at national level, although recent debates start to check their relevance for the regional level, indicating that “There is still a large under-used potential at regional level regarding innovative procurement. Since a large part of public spending is done at the sub-national level, a large potential exists for every region to increase the regional demand for innovations by promoting the public procurement of innovative goods and services⁵”.

A policy typology used for demand-side instruments includes:

Public procurement

- Public procurement of innovation
- Pre-commercial public procurement (although there are doubts expressed to the extent to which this type is really a demand-side instrument⁶)

Regulation

- Use of regulations
- Standardisation

Supporting private demand

- Tax incentives
- Catalytic procurement
- Awareness raising campaigns

Systemic policies

- Lead market initiatives
- Support to open innovation and user-centred innovation

⁵ Technopolis et al (2012)

⁶ Eqduist et al, (2012)

When gathering information on implementation in all Member States⁷ of demand side measures, all indications show that these measures are lopsided towards Public Procurement and there are only few cases of co-ordinated supply and demand policies. Evidence indicates that, when appropriately implemented, public demand makes a difference⁸.

3.3. Cases of specific interest⁹

Demand-side policies are higher in the debate than in policy implementation. An OECD study identified growing emphasis on demand side policies and instruments¹⁰. A number of OECD countries, from the United Kingdom to Finland, Spain and Japan, as well as the European Commission, have made explicit policy statements on the need to give greater importance to demand-side innovation policies. Japan, for example, has re-oriented its innovation strategy towards a series of demand-oriented national goals such as the transition to a low-carbon economy and tackling the challenges of an ageing society. Finland has adopted a general plan for demand-side innovation – The Finnish Policy Framework and Action Plan for Demand and User-Driven Innovation Policy (2010). The United Kingdom’s plan, Innovation Nation (2008), introduced demand-side initiatives affecting public procurement and regulation. Spain is currently implementing the State Innovation Strategy (2010) which has a programme oriented towards public procurement. Demand-side innovation policies are now increasingly integrated in the full portfolio of government policies on innovation in a number of OECD countries.

An emerging concept, where the combination of supply and demand side measures is considered as a necessary condition for success is the *lead market idea*¹¹. Lead markets are attractive because they constitute the test bed for companies to produce innovative products competitively and eventually capture the world market as first movers with high rents and appropriability. Local production then brings substantial benefits to the economy where such companies are located, in the form of job creation, taxes and investments to maintain and regenerate technological lead. Hence, national policies have every interest to create local lead markets and attract private investments in these particular sectors/technologies. An example of a Lead Market Initiative is the initiative of European policy for 6 important sectors that are supported by actions to lower barriers to bring new products or services onto the market. The European Commission, Member States and industry work together to carry out the action plans for these six Lead Markets (e-Health, Protective textiles, Sustainable construction, Recycling, Bio-based products and Renewable energies). The policy instruments deal with regulation, public procurement, standardisation and supporting activities.

Academic literature has identified a number of issues indicating the relevance of demand-side policies. The funding of scientific research is almost always justified in terms of the potential for achieving beneficial societal outcomes. In pursuing a particular societal

⁷ Izsak, K. and Edler J. (2011)

⁸ Underpinn project, <http://underpin.portals.mbs.ac.uk>

⁹ Part of these examples were already discussed in the 2012 Mutual Learning Seminar

¹⁰ OECD (2011), Demand-side Innovation Policies, Paris,
<http://www.oecd.org/fr/science/inno/demand-sideinnovationpolicies.htm>

¹¹ The lead market concept became fashionable with its inclusion in the seminal work of M. Porter (1990)

outcome, Sarewitz et al conceptualize: (1) science in terms of a “supply” of knowledge and information, (2) societal outcomes in terms of a “demand” function that seeks to apply knowledge and information to achieve specific societal goals, and (3) science policy decision-making as a process aimed at “reconciling” the dynamic relationship between “supply” and “demand.” (Daniel Sarewitz, Roger A. Pielke Jr.2007).

Public procurement has been at the centre of recent discussions on innovation policy. By synthesising the broader framework of public policies to stimulate innovation: regulations, R&D subsidies and basic research at universities - conceptually and quantitatively comparing their effects on innovation success for 1100 firms in Germany - Aschhoff and Sofkaa found that public procurement and knowledge spillovers from universities propel innovation success equally. The benefits of university knowledge apply uniformly to all firms. However, public procurement is especially effective for smaller firms in regions under economic stress and in distributive or technological services (Birgit Aschhoff, Wolfgang Sofkaa 2009).

4. Conclusions and main questions

Resources for public policy are becoming scarcer in the context of austerity measures and there are increasing indications that demand-side policies can work effectively if appropriately planned and implemented. This can work best if strategies are suitably designed and coordinated. But more research and innovation strategies and a proliferation of policy documents does not necessarily mean better strategies and, more often than not, strategy documents do not go in-depth into the demand side of innovation policies. A number of interesting examples, in particular in the case of public procurement, are increasingly mentioned but less frequently implemented.

Three crucial questions can shape the debate for enhancing demand-side policies in the context of appropriate strategy planning in the future:

1. ***When designing innovation strategies, are demand and supply side aspects equally taken into consideration?*** All Member States have innovation strategy papers, some countries even more than one. When preparing strategy papers, what is the process? Repeating past rationales and interventions or organising new evidence creation and experimenting with new measures? How are demand side policies perceived during the strategy design phase? Are there specific demand side measures favoured over others? If yes, why?
2. ***How are demand side aspects implemented (in connection with strategic priorities)?*** There is more experience with supply side measures than with demand side in innovation policies. This often leads policy makers to disregard demand side aspects mentioned in strategy papers and by inertia favour supply side measures. Does the actual policy reflect the role granted to demand side in strategy documents? Is the mix as planned? Are adaptations to the strategy decided explicitly and ex ante or does policy develop (partly) independently of strategy?
3. ***What are the experiences with demand side instruments?*** What are the main demand-side measures implemented in your country? What are the reasons for selecting these instruments and not others? What are the experiences with them? What are the main obstacles to implement demand-side measures? How can these obstacles be eliminated?

References

- Aschhoff, B. & W. Sofka (2009), "Innovation on demand--Can public procurement drive market success of innovations?", *Research Policy*, Elsevier, vol. 38(8), pages 1235-1247
- Bonaccorsi Andrea, Francesca Cappiello, Francesco Molinari (2012), THE CHALLENGES OF BRINGING INNOVATION THROUGH PUBLIC PROCUREMENT AT REGIONAL LEVEL. EARLY EXPERIMENTS IN ITALY, Paper presented to the UNDERPINN Conference - Manchester, 22-23 March 2012
- Camerer, E. and H. van Eijl (2011), "Demand-side innovation policies in the European Union". Chapter in: "Demand-side innovation policy". OECD Publishing.
- Edler, J. and Georghiou, L. (2007), Public procurement and innovation -Resurrecting the demand side. *Research Policy*, 36(9), 949-963.
- Edquist, C., Zabala-Iturriagoitia, J. M. (2012), Public Procurement for Innovation (PPI) as Mission-oriented Innovation Policy, Version of April 7, 2012. Accepted for publication in *Research Policy*. Forthcoming during 2012.
- Edquist C. and Hommen L. (1999). "Systems of innovation: theory and policy for the demand side". *Technology In Society* 21 (1999) 63–79.
- Edquist C., Hommen L., Tsipouri L. (eds.) (2000), *Public Technology Procurement and Innovation*, Kluwer Academic Publishers Group.
- European Forum for Forward Looking Activities (October 2012), Policy Brief No 2, How to design a European foresight process that contributes to a European challenge driven R&I strategy process
- Edquist, C., Zabala-Iturriagoitia, J. M. (2012), Public Procurement for Innovation (PPI) as Mission-oriented Innovation Policy, Version of April 7, 2012. Accepted for publication in *Research Policy*. Forthcoming during 2012.
- Flanagan Kieron, Elvira Uyarraa, Manuel Laranja (2011), Reconceptualising the 'policy mix' for innovation, *Research Policy* 40, 702–713
- Foray Dominique and Bart Van Ark (2007), Smart specialisation in a truly integrated research area is the key to attracting more R&D to Europe, *Knowledge Economists Policy Brief n° 1*, October 2007
- Georghiou, L. (2007), Demanding Innovation – Lead Markets, *Public Procurement and Innovation*, NESTA Provocation 02: February 2007, London: NESTA.
- Hsin-Min Hung (2010), Reconciling the paradox of supply-side and demand-side strategies in industrial innovation, *Industrial Marketing Management* 39, 342–350
- Izsak, K. and Edler J. (2011) Trends and Challenges in Demand-Side Innovation Policies in Europe: Thematic Report 2011 under Specific Contract for the Integration of INNO Policy TrendChart with ERAWATCH (2011-2012)
- OECD (2011), *Demand-side Innovation Policies*, Paris
- Sarewitz Daniel, Pielke Jr Roger A. (2007), The neglected heart of science policy: reconciling supply of and demand for science, *Environmental Science & Policy*, Volume 10, Issue 1, February 2007, Pages 5-16.
- Technopolis, UNU Merit, Fraunhofer ISI (2012), *Regional Innovation Monitor, Thematic Paper 3, Demand-side innovation policies at regional level*

