

# Policy learning and organizational capacities in innovation policies

Susana Borrás

Bengt-Åke Lundvall's work has underlined the importance of policy learning for inducing innovation systems' adaptability. In spite of his efforts and of the general interest in this topic, studies of policy learning in innovation policy continue to be scarce. Elaborating from recent theoretical advances, the paper identifies three levels of policy learning and argues that their effects on innovation systems are related to specific capacities of the relevant organizations implementing change. This analytical framework is used in the study of trans-national policy learning in Europe in the area of science–industry relations, showing the importance of capacities (or lack thereof). This calls for the practical need of addressing organizational capacity-building, in particular of analytical capacity, for truly strategic innovation policy-making.

**B**ENGT-ÅKE LUNDVALL has repeatedly reminded us of the importance of policy learning in order to induce and stimulate the constant adaptability of innovation systems (Lundvall, 1992). From the perspective that looks into different types of activities performed by the system, governmental action focuses not only on the activities related to the provision of knowledge (R&D investment, and competence-building through individual skills), but also at the other sets of activities referring to demand-side activities, provision of constitutive elements, and business support services to firms (Edquist, 2008). Furthermore, as the learning economy is more than a mere accumulation of scientific knowledge, but an economy based on the adaptability of individuals, firms and other organizations (Lundvall and Johnson, 1994), governments are increasingly looking at innovation policy as a way to promote sustained economic growth (Lundvall and Borrás, 1998).

In spite of Lundvall's efforts and of the growing general interest in this topic, studies of policy learning in innovation policy continue to be scarce. There might be two possible reasons for this scarcity. The

first one is the intrinsic conceptual and methodological difficulties of studying learning processes. Conceptual ambiguity in the literature about what exactly can be defined as policy learning, and the methodological problems of causal assignation in complex social contexts, have been considerable hurdles in approaching this theme. A second possible reason is that the innovation literature has tended to approach the issue of innovation policy mainly from a normative perspective — identifying 'policy implications' or formulating theoretical policy rationales — rather than considering innovation policy as an object of study in its own right. The scarcity of studies about policy learning is reflected in a similar scarcity of studies investigating, for example, the actual factors determining most common policy failures or the unexpected policy outcomes of innovation policy schemes.

Yet, the few studies that examine innovation policy learning and change have shed important light on this. We know, for example, that the remarkable change in innovation policy during the past three decades has been a process of co-evolution between theoretical ideas and policy design, and that this has been largely based on the activism of experts and social scientists (Mytelka and Smith, 2002). This resulted in the transformation of policy agendas in the late 1990s and early 2000s from 'science and technology' towards an 'innovation' policy paradigm (Lundvall and Borrás, 2005).

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We know as well that information-gathering about the instruments of innovation policies of other countries tends to be *ad hoc* and that there are a series of common barriers in the process of trans-national policy learning (Malik and Cunningham, 2006). These barriers are mainly budgetary limitations and language difficulties, but can include as well the lack of awareness among stakeholders and the lack of time for policy-makers to develop an understanding of the foreign experience.

Another very interesting set of studies on innovation policy learning refer to the issue of research programs' evaluation and their intake in policy-making. Efforts towards evidence-based policy making have boosted exercises of research evaluation, but paradoxically enough they have not tended to be used actively in processes of policy learning in most countries. Besides, it seems that policy-makers have recently become more interested in promoting *ex-ante* evaluation exercises,

the answers to which are intended to provide analytical frameworks, metrics or methodologies relevant to future decisions, rather than *ex post* questions asking whether programs are working or had worked. (Feller, 2007)

This poses considerable methodological challenges and analytical uncertainties, but above all, more political leeway to evaluators.

The studies above represent valuable approaches to important aspects of innovation policy learning, and the way in which knowledge has been used (or barriers to it) in the policy process. However, they do not shed sufficient light on the organizational aspects of policy learning. This is important in view of the specific institutional and organizational context in which innovation policy learning takes place, namely, in the interface between policy-making and the innovation system. The dynamics of policy learning are subject not only to cognitive dimensions (policy theory, or research evaluation methods and results), but also to distinctive national institutional and organizational specificities that define the course of policy learning as the intake of that knowledge into the policy-making process (Hall, 1989). Too often, the argument is made that with better data, methodologies, or information bases,

policy-makers would be in a position to develop and implement more effective policies. While the former are certainly necessary, this paper points to the very relevant aspect that these are not sufficient: without organizational capacity and intelligence in policy-makers' circles, this knowledge will never be translated into effective policies.

Policy analysts have recently started to examine this organizational dimension, paying special attention to aspects of organizational capacity in policy-learning processes. Capacity has been examined within one single country (Howlett, 2009) or in multi-level settings (Schout, 2009), and also in research policies (Braun *et al.*, 2003). This capacity approach acknowledges that learning is not a faceless process, but a process that depends on the features of organizations as they are the agents of learning. This agency approach in the policy-learning literature is taking its first steps. From the point of view of innovation policy learning in the context of changes in innovation systems, the perspective on organizational capacities offers many possible insights, but it still needs to be defined accurately in relation to which organizations learn, what they learn about, and how they learn in this systemic context.

Elaborating on recent theoretical advances, this paper reviews the literature identifying three levels of policy learning. Thereafter it argues that their effects on innovation systems are related to specific capacities of the relevant organizations implementing change. This analytical framework is illustrated empirically in a case study of trans-national policy learning in Europe. The case is the specific field of science–industry relations. This field has received considerable attention during the past years, and there is increasing evidence of policy learning in different countries. This case illustrates the point that variation in policy learning is associated with differences in organizational capacity at different levels of the innovation systems. The paper concludes by making a plea for building organizational capacity in innovation systems.

## 2. The literature about policy learning and its gaps

Social scientists' interest in learning processes in policy-making and within bureaucracies emerged in the 1980s following from a cognitive turn in policy analysis. Contesting previous assumptions that policies change only on the basis of interest pressure or political struggles, the policy-learning school acknowledges the ability of the state and its bureaucracy to produce/make use of/accumulate knowledge and experience in processes of policy change. Therefore, the building block of this approach is that learning is an important source of policy change, and that learning is based on knowledge and experience produced and used through time.

Yet, the relationship between policy learning and policy change is still somehow blurred analytically. In the literature of policy analysis, change generally refers to a historical process of transformation in the direction, content and patterns of specific areas of public action. Alternative theories and analytical frameworks have provided different interpretations and assumptions regarding the factors that explain change, typically with emphasis on cognitive factors, agency and interest representation, as well as on institutional path dependencies (Sabatier, 2007). Policy learning refers to the specific process in which knowledge is used in the concrete development of policy formulation and implementation. In principle policy change is possible without policy learning, that is, when a major disruption induces policy changes, or when there is capture by interest groups. In reality, however, policy change is mostly associated with a certain (greater or lesser) intensity of policy learning, not least anchored in the collective memory of the agents.

There are, however, many different definitions in the literature about what is policy learning. Sabatier and Jenkins-Smith, for example, define policy-learning as:

relatively enduring alternations of thought or behavioural intentions that result from experience and/or new information and that are concerned with the attainment or revision of policy objectives. (Sabatier and Jenkins-Smith, 1999: 123)

In a similar vein, for Dolowitz (2009), learning can be based on soft or hard forms of knowledge, but it must necessarily entail an element of relatively permanent change in the policy. In their seminal work, Bennett and Howlett have mapped several understandings of learning in the literature, some of which have clear overlapping definitional contours. Their own definition of learning is, however, the one with widest acceptance in the literature, namely,

the commonly described tendency for some policy decisions to be made on the basis of knowledge and past experiences and knowledge-based judgments as to future expectations. (Bennett and Howlett, 1992: 278)

There is an important element of purposefulness in this process of learning, as it aims ultimately at improving the functioning of policies, by detecting and correcting errors (Olsen and Peters, 1996). Hence, learning is not an automatic process; it is a consequence of a specific intentionality towards problem-solving. This does not mean that learning is a rationalistic process. On the contrary, the production and use of knowledge for identification, diagnosis and eventual policy change is embedded in complex settings characterized by specific conflict of interests, changing power relations and legitimacy conditions (Radaelli, 1995).

In order to clarify the multiple understandings of policy learning, and establish a clearer link between learning and change, Bennett and Howlett (1992) have offered an acclaimed and useful three-level classification. Looking at who learns, what is learnt and the effects of the learning in terms of change, these authors distinguish three levels of learning, namely:

- *Government learning* by state officials learning about processes in policy-making and generating organizational change;
- *Lesson-drawing* by policy networks learning about policy instruments and generating policy programme change (we call this level 'policy network learning');
- and
- *Social learning* by policy communities learning about ideas and generating policy paradigm shifts.

These triple levels of learning links learning to the three orders of policy change defined earlier by Peter Hall (1993), where the most encompassing and profound form of policy change is the paradigm shift, motivated by new core ideas (see more below).

Most recent literature on policy change has made interesting conceptual and theoretical advances on two main fronts. The first one is the effort to integrate the literature on policy learning (cited above) with the literature on policy transfer, as these somewhat overlap. The second one is the increasing attention to issues of organizational capacity of the organizations involved in learning processes. As will be argued in the next section, both new approaches in the literature need to be better interrelated conceptually. This is because the growing incidence of mechanisms to enhance trans-national transfer-based policy learning (which are part of the so called 'new modes of governance') seems to be putting pressure on the capacities of the organizations dealing with them (Héritier, 2004).

With some exceptions, the literatures devoted to policy learning and policy transfer have not related much to each other during the past decade. Again, lack of conceptual clarity and a significant degree of overlap were part of the problem. Following Dolowitz, policy transfer is:

the processes by which agents become aware of information relating to the policy domain of one political system and subsequently transfer this into another policymaking system — where it is used or stored for potential use. (Dolowitz, 2009: 8)

For him, this transfer might entail learning when that information is combined with forms of knowledge within the policy-making process. There is, therefore, the possibility that policy transfer takes place with very little learning, namely, in the absence of that knowledge-basis.

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As such the strategic use of information is an important consideration when attempting to disentangle just how much learning was involved in the transfer process. (Dolowitz, 2009: 8)

This fits well with the recent focus on agency and its use of knowledge in the process. Dunlop (2009) suggests the need to examine the extent to which agents control the production of knowledge that informs the policy process. This agent-based understanding of the use of knowledge is particularly interesting in cases when information comes from outside the political system. The rise of independent think-tanks and policy research institutes have become important agents in policy-transfer processes on international and global scales (Stone, 2000; Ladi, 2005). Yet, for the purpose of this article, it is important to understand that information and knowledge are largely embedded in institutional and political idiosyncrasies, as there are important institutional conditions for policy transfer.

A second recent approach has to do with the importance of organizational capacities in policy learning and transfer. In a sense, organizational capacity can be seen as another institutionally determined factor explaining diversity in processes and degrees of policy learning and change. For some scholars, capacities are defined very broadly. In their study of policy changes in publicly funded research systems in four countries, Braun *et al.* define learning capacity in a very broad and encompassing manner:

So, when we speak of learning capacities, we mean more in particular all formal rules and regulations on the one hand (the 'hardware') and norms, scripts, causal stories and structures of consensus-building on the other hand (the 'software') that allow social learning in public research funding. (Braun *et al.*, 2003: 7)

'Capacity' here refers to the entire system's capacity, and is related to the structures and procedures that allow learning to take place at all levels of the system. Something similar is proposed by Schout (2009) in multi-level governance systems.

Other authors have approached the issue of capacity from a narrower perspective, focusing on a specific form of capacity. For Howlett, for example, policy learning is essentially related to the degree of policy analytical capacity of public administrations. The recent political emphasis on fostering evidence-based policy-making requires actors, and especially governmental actors, to acquire a set of analytical capabilities in order to generate and make sense of the evidence that shall inform policy-making (Howlett, 2009). He endorses Riddell's definition of analytical capacity as:

a recognized requirement or demand for [analysis]; a supply of qualified [analysts]; ready availability of quality data; policies and procedures to facilitate productive interactions with other [analysts]; and a culture in which openness is encouraged and risk-taking is acceptable. (Riddell, 2007: 7 in Howlett, 2009: 156)

It is worth noting that, for these two authors, analytical capability is not just a matter of mastering a bundle of methodical-analytical techniques but a whole organizational context where these are unfolded interactively.

The recent perspectives on the importance of agency and organizational capacities for learning have the potential to offer interesting insights about the conditions that explain diversity in policy change. However, two aspects remain underexplored and under-related in conceptual terms. First, from the point of view of innovation policy learning, a clear link between levels of policy learning and system change needs to be established. This is important in relation to identifying analytically which organizations learn and how within innovation systems. Second, the current definitions of capacities are problematic for our analytical purposes: the broad definition does not capture when the lack of capacities becomes a problem/hindrance for learning; and the narrow does not link with the recent literature concerned with policy outcomes and public management capacities (see below).

The next section suggests an analytical framework that aims at addressing these gaps in the literature. Naturally the aim is not to re-invent the wheel, but to refine our analytical tools in order to understand when and how policy learning takes place and with what consequences. In so doing it follows Bennett and Howlett (1992) in identifying three levels of policy learning and change, arguing that their respective effects on innovation systems are related to the specific capacities of relevant organizations at each level. Hence, the main argument of this article is that policy learning and change depend in part on the level of capacities that organizations in the system enjoy, combining knowledge sources from within and from outside that system.

### 3. Policy learning and organizational capacity in innovation policy

One useful starting point for examining the link between policy learning and organizational capacities is the classical, three-level policy learning typology proposed by Bennett and Howlett (1992). The first level of learning is ‘government learning’ or the learning that government and public-related organizations in the system employ in relation to organizational practices. In a sense, this learning aims at avoiding (aims at learning from) administrative or management failures that can take place within the organization itself or between organizations. Therefore, *government learning relates to the ‘administrative capacity’ of the government itself*, or the set of organizational practices and structures by which the administration manages tangible or intangible resources. In other words, ‘resources’ are the given fixed stock of different types of capital available at a certain point in time, and ‘administrative capacity’ is the managerial dimension of ‘using’ them appropriately. Hence, administrative capacity can be defined as:

the ability to develop, direct, and control resources to support the discharge of public policy and programme responsibilities. (Donahue *et al.*, 2000: 384)

A similar definition reads:

[Administrative capacity is the set of] rules, procedures and resources governing administrative action and designed to improve [public administration] performance. (Hou *et al.*, 2003: 300)

Common to both definitions are the notions of civil servants controlling, designing and governing resources as well as civil servants’ action towards a specific (better) level of performance of public policy outcomes/services.

The second level of learning is ‘policy network learning’, which corresponds to stakeholders’ and governmental actors’ learning processes about the interaction between policy and the innovation system. This is a particularly important level of learning and change, as it is mainly intended to investigate and avoid innovation system failures (including market failures and policy instrument failures), defining suitable policy action. Policy network learning requires ‘analytical capacity’, or, as understood in the narrow definitional sense suggested by Riddell above, the set of competences that deals with use and command of techniques of policy analysis.

In the field of innovation policy, such analytical techniques are not only the generic ones, but also the innovation-related techniques such as research programme evaluation, constructive technological assessment, technological forecasting, etc. This is what some authors have referred to as the ‘intelligence’ and measurement techniques necessary for strategic

innovation policy design (Nauwelaers and Wintjes, 2008b; Borrás *et al.*, 2009a), which necessarily involves not only governmental actors but also the major stakeholders in the policy field.

The third and widest form of learning is social learning. It is wider because the subjects that undergo the learning process are the communities of socio-economic actors in the innovation system (here including media and other actors traditionally regarded as non-stakeholders in innovation policy). What is learned here concerns the state–economy–society relations that are associated with innovation creation and diffusion processes. Hence this form of learning is essentially aimed at purposefully avoiding potential innovation systems’ governance failures, in terms of the way in which state–economy–society relations are generally organized. Change here is naturally of a paradigmatic character, as these relations are not easily transformable.

*The organizational capacity required in this case is more diffused than the previous two, as it entails a certain degree of reflexive skills in a widely dispersed set of organizational actors, and their ability to communicate and create a sense of collective understanding.* One example of social learning occurs in specific socio-technical systems like water management where important changes have been related to wider processes of learning (Ison *et al.*, 2007). Another example is the social learning within the research system, which some authors have linked to the role of ‘reflexive institutions’ generating, accumulating and diffusing relevant reflexive knowledge (Braun *et al.*, 2003). Table 1 summarizes these levels of policy learning.

The three levels of organizational capacities are strongly interdependent. A system with strong analytical capacity in policy networks able to analyze policy and instrument failures without administrative capacities to put those into practice would probably have problems implementing policy change effectively. Likewise, a system with strong administrative capacity might redress management failures and improve in efficiency gains. However, without the analytical capacity in policy networks and stakeholders those efficiency gains will not be strategically oriented in terms of redressing innovation system failures.

After the paradigmatic changes in the 1990s, innovation policies have experienced important second-order change, particularly in the development and introduction of new policy instruments. A real wave of experimentalism in policy instruments has been visible in most advanced economies, as a new generation of policy instruments has been developed in several dimensions of the innovation system, and with different rationales. What is also very remarkable is the development of mechanisms for transnational learning designed to let policy-makers and stakeholders ‘learn from each other’. These include, among others, ‘benchmarking’, ‘best practices’, ‘peer reviews’ ‘mapping and trend charts’, all of them aiming at trans-national policy learning.

Table 1. Levels of policy learning, organizational capacity and their effects on policy change

Levels of policy learning	Who learns	Learning about what	Organizational capacity	Policy change
Government learning	Government and public-related organizations in the innovation system	Organisational practices/processes (administrative, management failures)	Administrative capacity	Innovation policy management change
Policy network learning	Networks of stakeholders in innovation policy	Innovation system (identifying systemic failures)	Analytical capacity	Innovation policy programme change
Social (governance) learning	Socio-economic actors in the political system	State–economy–civil society relations related to innovation and diffusion processes (innovation systems' overall governance failures)	Major reflexive and institutional capacity	Innovation policy paradigm shift

Note: Author's own elaboration from Bennett and Howlett (1992)

Generic analyses about effectiveness show that the identification of 'best practices' is context-dependent and subject to judgment, and that it is difficult to codify all critical elements of success in specific cases of policy-making due to elements of tacit knowledge among policy-makers and stakeholders (Nauwelaers and Wintjes, 2008a). Likewise, in the context of the European Union, there is evidence that the open method of coordination has generated some degree of learning across countries, even if limited (Borrás and Radaelli, 2010). More specific studies of the open method of coordination in the field of research and innovation policies show more concrete learning effects, such as some degree of convergence in national priorities (McGuinness and O'Carroll, 2010), or the cross-national introduction/reform of specific instruments for internationalization of R&D or tax incentives (Borrás *et al.*, 2009b).

In a similar vein, other studies dedicated to policy learning in the field of innovation policy have pointed out the importance of 'evaluation cultures', or the politico-administrative cultures regarding the evaluation of research and innovation programs (Edler *et al.*, 2008). What these findings have in common is that learning seems to be highly diversified across countries, with some countries learning more than others (Nauwelaers and Reid, 2002). This calls for a more intelligent use of these trans-national learning mechanisms (Lundvall and Tomlinson, 2002). But the questions that remain open are: What explains this cross-national diversity? Why are some countries learning more than others? This paper argues that the answers are linked to organizational capacities at the national level in all three levels (governmental, policy network and social learning).

#### 4. Learning in trans-national contexts: the case of science–industry relations in Europe

The analytical framework delineated above, linking organizational capacity to the three levels of policy

learning, is a useful guiding line to examine cross-national differences in learning processes. In particular, it is useful to examine the role of these capacities in situations where efforts towards change have taken place in similar conditions. The proliferation and development of trans-national 'mechanisms for learning' offer one such situation. Why do we observe diversity in policy learning when countries have been exposed to the same sources of knowledge exchange about the same concrete areas of innovation policy?

The case under study here concerns the policy changes introduced in one of the most complex problems of innovation systems in advanced economies, namely, 'science–industry relations'. The methodological reason for the choice of this particular case is because it represents a 'most likely situation', meaning a most conventional case in the field. We are not interested in the novelty or in the specificities of the problems to be addressed, but in the fact that science–industry relations is a topic that has received considerable attention in innovation policy-making over the past decade, and it has been subject to learning processes at different levels. It is these learning processes and how they relate to the organizational capacities of the organizations involved that are the focus of study in this paper.

Improving and reducing the barriers for the transfer of scientific and technical knowledge from public research to industry has been one of the core issues of concern in contemporary innovation policies, particularly since the late 1970s. There is a general acknowledgement that socio-technical knowledge does not flow automatically from public research institutions to industry, yet, the mechanisms for addressing bottlenecks and for improving that flow are multiple and the way they function is far from self-evident. This is why governments have been particularly keen to 'learn from others' on this topic, searching for external sources of information and knowledge in the form of best-practices, benchmarks, exchange of information, peer-reviewing, etc.

In Europe, several mechanisms for trans-national learning on this particular topic have been put in place since the early 2000s. The most relevant of those have been:

- Three rounds of the EU's open method of coordination expert group's identification of good practices since 2000 (CREST Expert Group, 2004, 2006, 2008);
- The OECD pilot benchmark exercise in early 2000 (OECD, 2002);
- A series of EU PRO-Inno actions on this topic in the 2000–2010 period (Thematic TrendChart reports, INNO Learning Platform, Workshops, etc.); and
- A series of detailed reviews of national innovation policies under the EU and OECD (Annual Trend-Chart country reports 2000–9 [EC, 2003], and annual ERA-Watch country reports).

All these trans-national initiatives denote a high density of trans-national activity in Europe in terms of information flows regarding innovation policies, organizational platforms for interaction, and an important intellectual mobilization of experts and national policy-makers across Europe discussing, studying and reporting about each others' policy experiences (Gornitzka, 2005).

The argument of this paper is that diversity of policy learning across countries has to do with their different organizational capacities at different levels in the system. Hence, it is mainly national internal capacities, and not only the intrinsic virtues (or lack thereof) of the trans-national exercises aiming to compare and increase the availability of information from external sources, that matters. In other words, there is an assumption in this paper that those countries with the strongest forms of organizational capacities would be those which tend to learn and change more. To be sure, capacity is not a static feature of the organizations, but an interactive one, meaning that their organizational capacity has to do with their interaction in the wider institutional context. Hence, when looking more concretely at policy changes in the topic of 'science–industry relations' it is important to examine the three levels of policy change in our analytical framework.

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Starting with the level of 'government learning', which is the specific form of learning about administrative practices and processes, there have been quite interesting administrative reforms in many countries. The 'innovation policy' paradigm (below) and the emphasis on multiple instruments for enhancing science–industry relations (below) have had effects on the administration of innovation policy by governmental organizations. Traditionally these tasks are spread across different ministries (economy, industry, science, education); hence priorities on science–industry relations have enhanced efforts for cross-departmental coordination.

Virtually all EU countries have reorganized aspects of coordination of innovation policy since early 2000; however, with important differences as to their ability to address complex knowledge-related interactions in the innovation system (Braun, 2008). Strategic coordination structures seem to have been put in place in Austria recently, with a watershed transformation of its R&D support system, not only due to previous problems of opacity but also with a view to fostering science–industry relations. Finland seems to be a paradigmatic case of a vertically coordinated governmental system with significant levels of success in terms of articulating governmental actions towards science–industry relations. In countries like Spain, Poland and Hungary, in spite of priority-setting and awareness of the problems of science–industry relations, the governmental coordination mechanisms in place are much newer and seem to be less well articulated and resourced.

To be sure, it is difficult to learn from other administrative practices given the specific public-administrative traditions of each country, the size of the country, and the dimension of the task at hand. However, learning is also related to the different degrees of administrative capacity of governments to design and enforce change on their own bureaucratic organizations. Hence, the degree of administrative capacity has an impact on the nature of administrative responses and on their ability to solve effectively the problem of coordinating a complex and cross-cutting theme like science–industry relations. True, for countries with a weak level of industrial R&D activity, improving science–industry relations might be a daunting task. But it is precisely for this reason that administrative responses must be more strategically organized and better resourced.

Most interesting, perhaps, is to look at the second level of learning, namely 'policy network learning', which is specifically concerned with the design of innovation policy. It is most interesting because trans-national learning mechanisms have essentially focused on this. In the area of science–industry relations, instruments are typically classified in the following way (OECD, 2005):

- Institutional/legal framework for universities and public research organizations (PROs);
- Incentives for PROs to respond to industry needs;

- Provision of funding for collaborative research;
- Strengthening of intermediary organizations, such as technology transfer offices;
- Encouragement of the mobility of researchers between the public and private sectors.

This is admittedly a wide topic within innovation policy, as it touches upon some of the core activities of the system such as universities and PROs, to more cross-cutting activities like the mobility of researchers.

Qualitative data from the annual reports of the INNO-Policy Trend Chart points at the fact that EU member states have very different policy mixes regarding science–industry relations, quite different degrees of sophistication of those instruments, and, what is most relevant here, a significant variation in terms of the pace of policy change (some countries changing old instruments and introducing new ones at a higher rate than others). It is worth noting that there is a clear degree of overall policy transfer in spite of these differences. One case in point is that the successful instrument ‘innovation vouchers’, created in 2006 in the Netherlands, has been extensively introduced in other EU countries since 2008, in particular, in Wallonia-Belgium, Austria, the UK, Denmark, Cyprus, Estonia, Greece, Poland, Portugal, Hungary and Slovenia. This instrument support small and medium-sized enterprises’ (SMEs) extramural research expenditures, bridging PROs with industry while stimulating R&D in SMEs. It should be noted that this instrument is highly variable and flexible to a variety of needs — the fact that it is so customizable to the specific context to which it is applied may contribute to its popularity.

Competence poles/centres are another example of policy instrument in the area of science–industry relations where there is clear evidence of transnational learning. The Austrian K-program was created in 1998 (K-ind and K-net), and it has been widely seen as a success. Flanders-Belgium, Estonia, Denmark, Germany, Norway, France, Sweden and Switzerland have introduced such policy instruments since the early and mid-2000s. The instrument aims to create and diffuse knowledge between PROs and industry by creating institutionalized networks or consortia typically organized in a bottom-up manner from the industry. As in some countries these networks and consortia have a regional dimension, the instrument also has links to cluster policies more generally.

Regarding analytical capacity, we can find evidence that in those countries with the most novel policy instruments and most policy changes have also used a strong level of analytical capacity. This is, for example, the case in Austria, which undertook a major change of direct R&D support in 2004 as the result of an extensive evaluation exercise. Likewise, the creation of its K-program was largely associated with the active involvement of a series of key policy experts in different stakeholder organizations who

had been nurtured through previous governmental socio-economic analysis programmes in the 1990s (Biegelbauer, 2007).

The UK has a very strong analytical capacity base, not only within the government, but also at university level (with world-wide acknowledged institutes for innovation policy analysis) and other non-governmental, analytically strong think-tanks. Something similar happens in Germany, Finland, the Netherlands and Sweden, for example, with both strong analytical capacities in governmental and non-governmental organizations. In other countries, analytical capacities are mainly in governmental organizations (Denmark or France); whereas in yet others they seem to be mostly in non-governmental organizations (Italy).

Last but not least, at the broadest level, the ‘social learning’ level, it is worth noting that, as mentioned above, major innovation policy change took place in the 1990s. The innovation policy paradigm shift placed the issue of science–industry relations at the core of the policy priorities of most European countries. In fact, by the year 2000 virtually all EU member states had already envisaged this topic among their highest priorities, a trend that has remained constant since, but was particularly intense in the first period (EC, 2003).

However, there is a considerable cross-country variation, particularly regarding the time lapse between this overall identification of priorities and the actual definition of concrete lines of policy action. This diversity might be associated with the relative reflexive and institutional capacity present within each country. This reflexive capacity is the ability of a wide set of socio-economic actors in the system to make informed and opinionated reflections about the (problems and solutions regarding) state–economy–society relations in innovation and technology diffusion processes.

In some countries there is a high degree of reflexive capacity as issues of technology, innovation and competitiveness are very visible in political debates, the media and the public sphere. Social scientists in these countries are often active participants in these debates, contributing not only with their analytical capacities in the policy instrument design, but also in a more general societal debate about the overall sense of direction. Another form of reflexive capacity can be identified by the institutionalization of strategic advisory units/boards close to national executives and the centres of legislative power. Although the link between high reflexive capacity and degree of social learning in the policy area of science–industry relations might be difficult to establish here, countries with active reflexive institutions (media, strategic advisory boards, etc.), like the Netherlands, Denmark and Finland, were first movers in the adoption of the new innovation policy paradigm in the late 1990s (Biegelbauer and Borrás, 2003), and have continued to adapt rapidly with new instruments and views all through the 2000s.



## 5. Conclusion: enhancing capacities for policy learning

With the widespread political understanding that innovation is crucial for the sustained competitiveness of the economy, there have been very important changes at all levels of innovation policy during the past decades: important re-organizations of ministerial tasks, reforms of universities and PROs, deep changes in the forms of state intervention through public instruments (including granting institutions), or changes in the organization of specific socio-technical systems, to name the most relevant. Yet, not all countries have experienced the same degree of change, nor has the thrust of change had the same outcome across countries.

Our case of science–industry relations has illustrated how innovation policy learning at different levels is related to the trans-national dynamics of information flows. Yet, this learning has not been a homogeneous process throughout European countries. Cross-national diversity is highly dependent on overall national institutional idiosyncracies, and especially it is dependent on the different degrees of analytical capacity in each country. For this reason, the case serves to illustrate the main argument of this article, that organizational capacities play an important role in learning processes.

This raises a set of empirical as well as normative issues. In empirical terms, more evidence is needed about the link between organizational capacities (at all levels) and the increasing use of ‘learning tools’ in innovation policy (such as *ex-post* and *ex-ante* program evaluation, foresight, benchmarking, etc.). The case in this paper illustrated how some of those learning tools have been at work. However, there are many unresolved empirical questions in this regard, for example, whether some policy learning tools are more suitable than others. Future research needs to explore empirically the argument that policy learning tools are useless if not accompanied by a substantive degree of organizational capacities able to make effective use of them.

A second area for future empirical research is the question of the distribution of organizational capacity in a system. One question that rises in this regard is whether a concentration of organizational capacity in a system or a dispersion of that capacity does have an influence on learning processes. In other words, is a strong nucleus of a few organizations with high degrees of organizational capacity better than a dispersion of that organizational capacity in many different organizations? Does concentration–dispersion of capacities make a difference in terms of policy learning across countries? Something similar can be asked in terms of the different levels of capacities: what level of capacity is most decisive for effective policy learning (administrative, analytical or reflexive capacity, as defined above)? What can a cross-country study tell us about this?

Last but not least, the argument of this paper that policy learning is dependent on organizational capacity has a very remarkable normative implication, namely, it calls for decided political attention to build the necessary organizational capacities in innovation policy. Truly strategic policy-making in a highly uncertain and rapidly changing context such as science, technology and innovation can only happen in a context where government, stakeholders and civil society at large have independent, self-critical and creative views of the bottlenecks and problems afflicting the innovation system.

This focus on capacity-building has been a motivation for Bengt-Åke Lundvall’s recent attention to the innovation systems of developing countries. He has not only engaged in studying the innovation systems of these countries, but also has taken an active stance in building their analytical capacity, educating their next generation of scholars and policy-makers.

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