



Complex innovation policy systems: Towards an evaluation mix



Edurne Magro*, James R. Wilson

Basque Institute of Competitiveness and Deusto Business School, University of Deusto, Mundaiz 50, San Sebastián 20012, Spain

ARTICLE INFO

Article history:

Received 7 March 2012

Received in revised form 9 February 2013

Accepted 24 June 2013

Available online 25 July 2013

Keywords:

Innovation policy

Policy mix

Policy evaluation

Multilevel governance

ABSTRACT

The mix of contemporary innovation policies impacting on a given territory are typically characterised by quite different underlying rationales and instruments. Complexity is further increased by multi-level considerations. Thus policies with different characteristics and from different administrative levels are continually interacting with one another in complex policy systems. These interactions significantly complicate the evaluation of individual policies, and raise a series of difficult questions around how their respective evaluation processes should interact to facilitate learning around the performance of policy systems. This paper contributes with a simplified definition of an innovation policy system as the conjuncture of policy mix and multi-level dimensions, from which a series of steps are proposed for arriving at an evaluation mix relevant for the specific characteristics of a given policy space. These ideas are explored with respect to the case of the Basque Country region of Spain and signal an agenda for further applied policy research.

© 2013 Elsevier B.V. All rights reserved.

1. Introduction

The panorama of policies designed to stimulate and facilitate innovation has undergone growth and evolution during the last few decades. In particular, policy rationales have widened. Evolutionary-systemic rationales emphasising the importance of institutions and interactions within ‘systems’ have emerged alongside existing neoclassical rationales focused on boosting investment in science and technology (Borrás, 2009; Laranja et al., 2008; Smith, 2000). This has resulted in a large increase in policy complexity, whereby it is common for many innovation policies to co-exist within the same country or region, based on different rationales, employing different instruments, and corresponding to different policy domains. In this context it has become fashionable to talk about an innovation ‘policy mix’. Yet despite the proliferation of normative assertions about desirable ‘policy mixes’, the term remains ill-defined and under-conceptualised (Flanagan et al., 2011), perhaps unsurprisingly given the “expanding portfolio of innovation policy instruments” (Flanagan et al., 2011, 703). What is more, judgements about what constitutes the policy mix at any given level of territorial analysis are further complicated by the multiple administrative levels from which policies with impact in that territory are designed and implemented.

Leaving aside the precise definition of policy mix employed to capture this complexity, the reality is that a range of different

policies oriented towards improving innovation are continually interacting with one another. As a result of these interactions policy outcomes are generated that do not necessarily correspond neatly with the stated aims of individual policies, and are indeed potentially greater than the sum of their individual impacts. Moreover, as emphasised by Flanagan et al. (2011, 706), the dynamics of the policy process is itself a considerable source of complexity, given that the agency of actors is “enabled, shaped and constrained by the behaviour and expectations of other actors and by institutions, which themselves have been shaped by earlier action and institutions.” They suggest therefore that “the focus for innovation policy analysis should be on incremental/adaptive learning, experimentation, reflection, debate and argument about means/ends, and even creative tensions” (Flanagan et al., 2011, 711).

Policy evaluation should play a central role in these important processes of reflection, learning and constant adaptation. However, the typically-adopted approach of employing specific techniques to evaluate isolated policy interventions has strong limitations in systemic contexts, and its widespread adoption may in fact provide an obstacle to more sophisticated understanding of innovation policy mixes and their evolution. The motivation for this paper is thus rooted in a pressing need for new forms of evaluation processes that can better capture the interactive effects that characterise complex policy systems. Contributions by Arnold (2004) and Edler et al. (2008) have made some conceptual advances with regards the requirements of system evaluations. What is missing is a more precise articulation of the practical steps that can be taken with respect to a given policy space. The paper seeks to fill this gap, providing insight on how policy-makers can practically approach the challenges of increasingly complex policy systems. This is achieved

* Corresponding author. Tel.: +34 943 297327x5641.

E-mail addresses: edurne.magro@orquestra.deusto.es (E. Magro), jwilson@orquestra.deusto.es (J.R. Wilson).

through conceptual and methodological developments, and their subsequent application to the case of the Basque Country region in Spain. This is a particularly interesting case from which to learn because it represents a 'policy space' where core innovation policy competences exist at regional level, but are exercised alongside meaningful policies from both higher (Spanish government and European Commission) and lower (Provincial councils) administrative levels. It is also a case in which a significant amount of research has been conducted in recent years, both with regards the evaluation of specific, isolated elements of this policy-mix using a variety of techniques (Aragón et al., 2010; Aragon et al., 2012; Aranguren et al., 2013a,b; Covarrubias et al., 2013; De La Maza-y-Aramburu et al., 2012; Magro, 2012), and with regards the functioning of the system as a whole as a success case in regional innovation upgrading (Bilbao-Osorio, 2009; Navarro, 2010; OECD, 2011).

The paper begins in Section 2 with a theoretical discussion that brings together existing thinking on innovation policy mix and current approaches to policy evaluation. This results in a simplified conceptualisation of 'innovation policy system' corresponding to a given 'policy space' (for example a region), and establishes the need for an appropriate, holistic 'policy evaluation mix' so as to generate dynamic policy learning and continual adaptation within such a system. Section 3 then sets out a methodology for arriving at an evaluation mix relevant for the specific characteristics of a given policy space in a series of practical steps. This 'evaluation mix protocol' is illustrated and explored in the context of the Basque case in Section 4, providing the basis for concluding discussion and arguments for a new applied research agenda in Section 5.

2. Innovation policy mixes, policy systems and policy evaluation

2.1. Towards a simplified concept of innovation policy system

Application of the 'policy mix' concept to the innovation arena is very recent (Nauwelaers et al., 2009; Flanagan et al., 2011; OECD, 2010), and there is not yet a clear understanding of its implications for the design, implementation and evaluation of innovation policies. According to Flanagan et al. (2011), the concept of policy mix originates from Mundell's (1962) observations on the relationship between monetary and fiscal policy and found its way into the innovation policy discourse around 2000 via the R&D considerations emerging in environmental policy debates and macroeconomic policy discussions around the Lisbon Council. Its attractiveness in an innovation context is clear given the progressively increasing complexity that has characterised this policy field over recent decades, which is itself related to an evolution in innovation theories and in the theoretical (and policy) rationales for intervention.

The traditional neoclassical rationale for innovation policy intervention is rooted in market failure analysis, whereby markets are posited to provide sub-optimal knowledge creation given externalities and appropriability concerns. This is linked to so-called 'linear' approaches to innovation, which have a predominantly in-firm focus on boosting science, research and technology, and lead in practice to policies designed to subsidise R&D and/or strengthen innovation incentives through ensuring intellectual property rights (Smith, 2000). The linear model of innovation is no longer the prevailing perspective, however. The last two decades have seen the rise of theoretical rationales that respond to evolutionary or system failures (or problems),¹ which are typically related to the creation and transfer of knowledge within 'innovation systems' (Edquist,

2001; Laranja et al., 2008; Metcalfe, 1995; Smith, 2000). While there is no clear consensus in the literature about these failures (Laranja et al., 2008), there are some attempts at classifying them, both on a theoretical basis (Bach and Matt, 2002; Carlsson and Jacobsson, 1997; Chaminade et al., 2009; Edquist, 2001; Lundvall and Borrás, 1997; Smith, 2000) and from a regional perspective (Laranja et al., 2008).

Despite this evolution of theoretical rationales, there is not a direct substitution of rationales in the policy-making process. Rather, policy path dependency implies a situation in which there are neither pure neoclassical nor pure evolutionary-systemic policies (Flanagan et al., 2011), but a co-existence of policies with different underlying rationales.² This can be seen in the evolution of the policy instruments employed (Smits and Kuhlmann, 2004). Innovation policy instruments have traditionally been *hard* instruments, mainly economic instruments, which aim to impact on the quantity and distribution of goods and services (Howlett, 2005). From the 1990s they have become more sophisticated, however, introducing new demand-based and interactive elements. In addition, *soft* and non-coercive instruments, in particular emphasising cooperation between actors, have appeared as a consequence of the evolution towards systemic policy rationales (Borrás, 2009). However new instruments do not simply substitute previous ones, whose objectives can also be modified in order to adapt them to the new systemic rationales (Laranja et al., 2008; Lundvall and Borrás, 2005; Nauwelaers and Wintjes, 2003). In consequence the mix of policy rationales characterising a given innovation system is complemented by a mix of policy instruments, themselves targeted towards a mix of different actors within the system.

Different policy domains add another facet to the policy mix. Innovation theories have evolved from viewing science and technology as the key drivers of innovation, to the assumption that learning in a broader sense is the central process. Moreover, innovation itself is now seen to include non-technological aspects such as organisational and social innovations. A consequence can be appreciated in what Borrás (2009) calls innovation policy deepening. Explicit innovation or R&D policies are not unique in including innovation-related objectives, and there has been widespread infiltration into other policy domains, including industrial policy, financial policy and also sector specific domains such as health, education or energy.

Defining complexity in terms of the policies that impact on a given territory rests therefore on the clarification of innovation policy boundaries (Flanagan et al., 2011), and specifically on the identification of the mix of co-existing policy rationales, instruments (and associated targeted actors), and domains. However, there is a further element of complexity with respect to the different administrative levels from which policies originate. The 'de-territorialisation' of socioeconomic relationships associated with globalisation (Scholte Jan, 2000) has simultaneously served to emphasise the importance of proximity-based relationships rooted in regional and local systems (Morgan, 2004; Scott Allen, 1998; Storper, 1997). This has corresponded on the one hand with a decentralisation in the governance of innovation policies from national to regional and local levels, in line with the theoretical evolution in innovation system analysis from national to regional systems. On the other hand, there has also been an extension of policy competences at certain supra-national levels, for example the European Union. Thus the mix of rationales, instruments and

¹ Edquist (2008) pleads for a substitution of the term 'failure' for 'problem', arguing that failure is a neoclassical concept.

² In addition to failures that are linked to economic theories (theoretical rationales), a broadening set of 'policy rationales' can be identified in recent years. This broadening is related to policy-makers' desire to tackle wider societal challenges alongside the traditional economic challenges associated with theoretical rationales. Such a process leads to even more complex sets of innovation policies.

domains that impact at any given territorial level typically include mixes of policies administered at a range of territorial scales: city, regional, national, supra-national, etc.³

This situation implies a *governance gap* between the different levels of innovation policy administration (Kuhlmann, 2001), which might lead to overlaps among policy initiatives. Indeed, in this regard Uyarra and Flanagan (2010) refer to regions as ‘policy spaces’ in which policy mixes from European, national, regional and sub-regional levels all have impacts. In practical terms we suggest that it is useful to conceptualise two dimensions to the innovation policy complexity that characterises policy spaces; a ‘policy mix’ dimension and a ‘multi-level governance’ dimension.⁴ When these two dimensions interact in a given space – for example a region – they constitute a concrete ‘innovation policy system’ (see Fig. 1).

2.2. Evaluation for learning and transformation in complex policy systems

Policy evaluation can and should play a critical role in improving our understanding of how complex innovation policy systems operate, fostering what is known as ‘policy learning’ (Nauwelaers and Wintjes, 2008).⁵ Evaluations have traditionally been conducted for accountability purposes, and for this reason have generally taken place *ex-post*. However, evaluations focused on formative learning processes are becoming more popular as it is acknowledged that they can contribute to improving the design and implementation of policies in real time. As such, evaluations are evolving from being static pieces of information about policies’ effectiveness towards being integrated, dynamic learning processes that interact with policy-making practices (Aragon et al., 2012; Aranguren et al., 2013b; Kuhlmann, 2003). Such a dynamic and transformative role for evaluation is particularly important in complex and systemic realities, in which individual and narrow evaluations only give information about part of the policy effects on the system and its components. Moreover, the strategic intelligence and policy learning resulting from formative evaluation processes are critical for effective multi-level governance (Koschatzky and Kroll, 2007; Kuhlmann, 2003).

The intersection between the complex policy systems conceptualised above and existing state of the art in policy evaluation techniques therefore presents a crucial area for analysis and advance. Indeed, there is an emerging consensus on the need for better understanding of policy interactions and their impacts, through for example systemic evaluations (Arnold, 2004; Edler et al., 2008; Flanagan et al., 2011; Molas-Gallart and Davies, 2006). However, while in some respects evaluation approaches have fol-

lowed a similar evolution to innovation policies, they have not yet reached the degree of sophistication required to capture the complex interactions that take place within policy systems. In this sense the practice of policy evaluation continues to lag behind advances in innovation theory (Molas-Gallart and Davies, 2006).

The emergence in evaluation theory of the concept of behavioural additionality (Bach and Matt, 2002), alongside the market-failure concepts of input and output additionality, constitutes a move towards addressing elements of system failures (Georghiou, 2002). However, there have been few evaluation practices that have focused on understanding behavioural additionality (Clarysse et al., 2009). This is because while traditional quantitative evaluation tools fit rationales that are relatively linear, they are more difficult to apply to systemic innovation policies due to the difficulty of capturing complex cause–effect relationships and intangible benefits (Aranguren et al., 2013a). As a consequence, policies such as networking or cluster policies have tended to be approached using qualitative, case-based analysis (Aranguren et al., 2008; Borrás and Tsagdis, 2008; Pitelis et al., 2006), and it is rare to find approaches that integrate different additionality measures. Yet policy systems typically include both neoclassical and systemic policies targeted at the same group of agents; for example, specifically targeted STI policies and more generic networking policies. For that reason an overall understanding of the functioning of the policy system requires the integration of different approaches to additionality (input, output and behaviour). This implies both an underlying approach that appreciates the systemic context of innovation policy, and a triangulation of the evaluation methods appropriate for different elements of the policy mix (Diez, 2002; Aranguren et al., 2013a).

The importance of triangulating evaluation methods in response to a new mix of policy rationales and of developing a learning-centred focus to evaluation are both captured in recognition of the value that systems concepts can add to evaluation. Imam et al. (2007, 8), for example, argue that systems concepts can contribute different perspectives to evaluation that include “seeing the complicated as simple but not simplistic; being highly critical of boundaries that define what is “in” and what is “out” of the frame of enquiry; and the notion that deeper meaning-making is more likely to promote valuable action than valuable data”. With regards the issues faced in the evaluation of innovation policies, there is significant value in each of these propositions. Firstly, the balance between simplifying without being simplistic is critical in designing evaluations that are sensitive to the real complexities of innovation policy systems, yet easy to relate-to for policy-makers. Secondly, the complex mix of rationales, domains and instruments from different administrative levels implies that drawing boundaries effectively is a key aspect of ensuring this balance. Finally, the shift in evaluation priorities towards facilitating policy learning tends to premium valuable action over valuable data.

In practical terms the integration of system dynamics into innovation policy evaluation implies a move from isolated, individual evaluations to meta-evaluations or secondary analyses that build on individual evaluations in trying to capture the systemic nature of policies. Arnold (2004), for example, proposes three levels of evaluation in a systemic world. The evaluation of individual policy interventions constitutes a bottom-up element, while assessment of the overall health of innovation systems provides a top-down element, and “bottleneck analysis” is also required at meso (or sub-system) level “to explore the systems role of institutions, classes of actors, clusters and so on” (Arnold, 2004, 12–13). Edler et al. (2008) propose what they call ‘evaluation synthesis’ as a modified form of meta-analysis that combines multiple individual evaluations of similar programmes so as “to assess the overall combined effects, redundancies, contradictions and remaining bottlenecks of policy interventions” (Arnold, 2004, 176). The first step in this process

³ While there may be some policies more suitable for national levels (i.e. science and R&D policies that need greater concentration of resources) and others more suitable for regional and sub-regional levels (i.e. networking policies that rely on proximity) (Koschatzky and Kroll, 2007; Koschatzky and Stahlecker, 2010), in practice a wide range of innovation policies are implemented at all levels.

⁴ Note that Flanagan et al. (2011) take a different approach to conceptualising this complexity. They identify four dimensions to policy mix in terms of the spaces in which policy interactions can occur. These include an abstract ‘policy space’, which they link to the co-existence of different policy domains, and more concrete ‘geographical’ and ‘governance’ spaces, referring respectively to physical and multi-level dimensions. The fourth dimension is time. We opt for a simplification into a broader ‘policy mix’ dimension and a more specific ‘multi-level’ dimension to ease the application to policy evaluation at a regional level. While time is not included as a separate dimension, we recognise its importance for evaluating the policies within the system, as rationales, domains and instruments are likely to differ and evolve over time.

⁵ Policy learning itself is a fairly ambiguous and under-developed concept, although Borrás (2011) suggests that the most widely accepted definition in the literature remains that of Bennett and Howlett (1992, 278) as “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.”

is a meta-evaluation in the mould of Cooksy and Caracelli (2005, 31): “systematic reviews of evaluations to determine the quality of their processes and findings”. This serves as a preparatory stage for either a statistical ‘meta-analysis’ or an ‘evaluation synthesis’. An evaluation synthesis is effectively “a narration of policy implications” (Edler et al., 2008, 182) that aggregates the findings of individual evaluations and should also take into account policies for which an individual evaluation has not yet been conducted. It is a qualitative, adaptable approach in line with the limitations of completeness and consistency that exist when evaluating innovation policy systems. As such it reflects Arnold’s (2004, 14) argument that “evaluation, like the policy-making process, becomes increasingly evolutionary, no longer seeking an overall optimum” and “in a certain sense less rigorous (because it is less complete) as we move to higher levels”.

While these advances provide theoretical justification for holistic approaches to evaluating inter-connected innovation policies, they fall short of developing a practical approach that can feasibly be adopted to facilitate policy learning within policy systems. The theoretical debates remain abstract and distant from the realities faced by policy-makers seeking to evaluate and improve their interventions, but often with severe practical limitations. The complexity of Edler et al.’s (2008) evaluation synthesis, for example, does not sit easily with the typically low development of evaluation practices with regards innovation policies in many places. As such it is important to provide a framework that not only facilitates secondary analysis of already-conducted evaluations, but that can also guide the development of appropriate primary analysis of programmes in ways that are sympathetic to systemic realities. This would enable evaluation methods to be adapted from the outset in ways that facilitate the analysis of interactive effects between different policies.⁶

Most importantly, there is a need to articulate an evaluation process that can be used in practice by the policy-makers that have remit and capabilities to act in a given policy space. Indeed, just as innovation theories and policies have evolved in recent years, policy management itself must become more systemic and connected (Braun, 2008). This is no easy task, but the rapid increase in the complexity of innovation policy systems demands advances. Innovation policy systems need to become more sensitive to the interplay between their different parts, or in other words to develop a greater degree of ‘internal intelligence’. More sophisticated, learning-centred and joined-up evaluation processes that remain practical can play a central role in this evolution. Our proposal in the remainder of the paper is for a step-by-step process that enables individual evaluations to be integrated in an ‘evaluation mix’ appropriate for their systemic context, and that also facilitates policy learning at each step.

3. Methodology: the evaluation mix protocol

We propose a six-step ‘evaluation mix protocol’ as set out in Table 1. This is designed to be applied in a given policy space such as a region.⁷ Sub-national regions are acknowledged as an important unit of analysis for innovation policy by the large literature dedicated to regional systems of innovation (Cooke, 1992; Cooke et al., 1997; Tödling and Trippl, 2005). Moreover, it is an administrative scale at which multi-level considerations are pronounced, certainly within most European countries. In this

Table 1
Evaluation mix protocol.

Step 1	Draw the policy system and establish its boundaries in terms of rationales, domains and instruments (policy mix dimension) and administrative scales (multi-level dimension)
Step 2	Select a policy rationale
Step 3	Analysis of the mix of domains and instruments at different administrative levels that fall under the selected rationale, looking for overlaps and complementarities
Step 4	Identify current evaluation practices and the extent to which they take into account interactions between policy instruments
Step 5	Design and conduct an integrated evaluation (including policy interactions) of policy instruments following the same rationale
<i>Repeat steps 3–5 for each rationale</i>	
Step 6	Integrate rationales’ evaluation into a holistic evaluation: evaluation mix.

case the focus of the protocol is the universe of policies that have an impact in the region in question, even where they originate from other administrative levels. As such the first step in the protocol is to carefully draw the policy system that corresponds to the region. This is a critical initial step given the need to be clear about boundaries if we are to sufficiently simplify the existing complexity (Imam et al., 2007). In line with our definition of policy system (Fig. 1), these boundaries need to be defined in terms of the policy mix dimension (rationales, domains and instruments), and the multilevel dimension, in each case asking which aspects are considered ‘in’ and which aspects ‘out’ of the system to be analysed. While ideally this step should seek to reflect the complete innovation policy system, the degree of completeness can be adapted to the situation; for example, if there are compelling reasons to present a more simplified picture of reality.

Once the policy system has been drawn, step two is to select a rationale for in-depth analysis. Rationales are often fuzzy and for that reason difficult to identify. Given this fuzziness, it is useful to focus on ‘policy rationales’ (or ‘policy goals’) rather than ‘theoretical rationales’, which in practice are difficult to directly associate to specific policies. These policy rationales can be seen to sit at the top of the hierarchy of elements in the policy mix, and within each rationale it will be possible to identify domains where policies exist and a range of specific instruments that are implemented from different administrative levels. It will also be possible to associate these instruments with the actors that are targeted as policy recipients. The third step in the process is therefore to conduct a cursory analysis of the mix of domains, instruments, administrative levels and targeted actors that are relevant for the specific policy rationale selected, looking in particular for overlaps and complementarities.

The fourth step is akin to a meta-analysis (Arnold, 2004; Edler et al., 2008), and involves identifying current evaluation practices with respect to the policy scenario depicted in step three. There are three key issues: (i) to identify what is evaluated and what is not evaluated (i.e., where there are gaps); (ii) to identify the approaches and methods that are employed where evaluation does currently take place; and (iii) to evaluate to what extent existing evaluations take into account the interactions between instruments and administrative levels within this policy rationale.

Building on this secondary analysis, the aim of the fifth step is to first design and then put into action an integrated framework for evaluation of the policy instruments that follow the selected rationale. This step thus moves beyond a meta-analysis and seeks

⁶ For a case in study see Magro’s (2012) application of a method to account for the interactive effects of policies targeted at the same recipient firms from different administrative levels in Spain.

⁷ In principle the protocol could also be applied to policy spaces that correspond with other levels of territory, for example the national level.

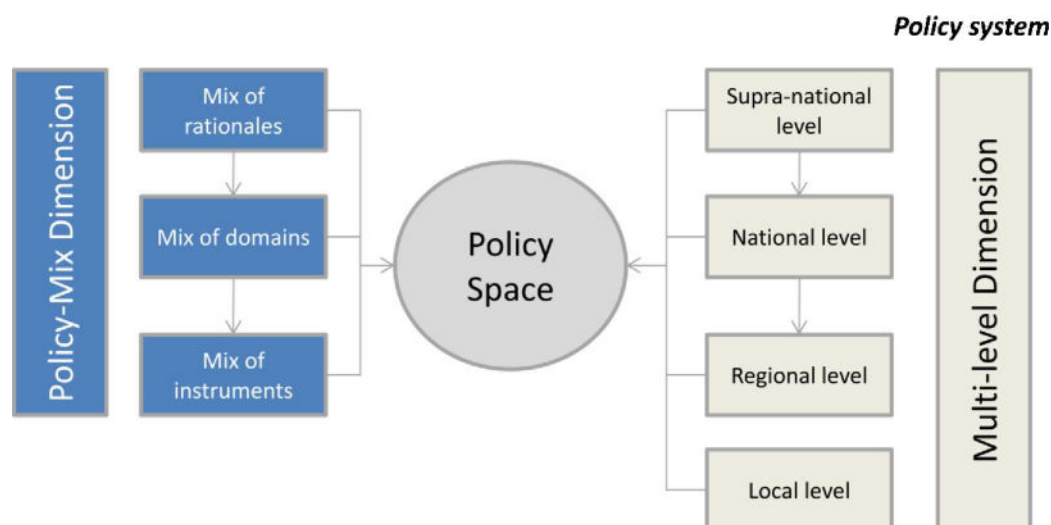


Fig. 1. Dimensions of an innovation policy system.

to influence evaluation practice in two key ways: (i) improving existing evaluation processes, where possible, so as to integrate techniques that facilitate a better understanding of systemic interactions with other policies; and (ii) designing such evaluation processes from scratch where they currently don't exist. The end result should be a coherent evaluation framework for the range of different instruments that seek to respond to the same rationale, taking into account interactions between the different policy domains and administrative levels where these instruments are located.

If steps 2–5 are repeated for different policy rationales then there is a potential step 6, which involves conducting an integrated secondary analysis of the results of the evaluations corresponding to each rationale. The aim of this final phase is to consider also interactions between policy rationales, so as to arrive at an evaluation of the functioning of the policy system as a whole. While the use of a secondary analysis in this phase places limitations on analysis of the interactions between instruments that fall under different rationales, it is nevertheless an interesting step towards a more complete picture that recognises potential interactions and can feed back into future design of individual evaluations of the component instruments. Indeed, a key advantage of this step-by-step evaluation approach is that each step provides a different policy learning output. The learning purpose of evaluation is therefore reached with every step, which facilitates valuable, actionable, strategic intelligence to policy-makers throughout the process.

4. The evaluation mix protocol applied to the Basque innovation policy system

4.1. Background to the case

In this section we explore the evaluation approach formulated in Section 3 through a specific case study: the Basque region in Spain. A complete application of the approach is beyond the scope of this paper, and an issue for future research. Rather, the aim is to concretely illustrate how this step-by-step approach would be applied in practice, so as to demonstrate better its feasibility and clarify what we mean by each of the steps. We will also use the case to deepen our theoretical analysis of why it is better to adopt a comprehensive evaluation approach to the 'policy system' corresponding to a given policy space, rather than applying existing and traditional methodologies to individual policies in isolation.

The Basque region is located in the south of Europe, on the north coast of Spain and bordering the south-west of France. It is a relatively small region composed of three 'historical territories' or provinces, which combined represent around 5.1% of the total Spanish population. The Basque autonomous region enjoys important policy competences, including tax collection and the design and implementation of innovation policies. Indeed, there is no region in the EU that enjoys more political autonomy (Cooke and Morgan, 1998), and it is one of the few European regions that can be considered a true 'regional innovation system' (Tödling and Kaufmann, 1999; Cooke et al., 2000; OECD, 2011). The interest derived from these unique political characteristics is augmented when observing the performance of the region, which has evolved from a crisis situation in the 1980s to its currently high position among Spanish (and indeed European) regions in terms of macroeconomic performance (GDP per capita, unemployment, R&D expenditure,⁸ and innovation performance more generally (European Commission, 2012)). It therefore constitutes an interesting case of an innovation policy system that in principle functions fairly well.

What is more, the Basque region is a particularly good example of multi-level policy complexity due to the coexistence in the same region of policies from at least four different administrative levels (European, Spanish, Basque and three sub-regional provinces with significant policy competences). The singularity of the region and its particular relevance for this case study rely on the fact that both regional and provincial government not only implement policies designed at other administrative levels (mainly national and European), but also design, resource and implement their own policies. The multi-level dimension is easily found, therefore, in addition to a large heterogeneity among the policies aimed at impacting on innovation activities within the system (policy-mix dimension). These policies respond to a range of different policy rationales or goals, which include *developing and supporting STI infrastructures; supporting investment in S&T and innovation; enhancing competencies in firms; strengthening linkages within innovation systems; providing appropriate framework conditions for STI; and developing regional governance capacities* (Magro, 2012; Walendowski et al.,

⁸ R&D expenditure has evolved from 0.1% of GDP in the early 1980s to 1.6% in 2006 (as compared to the Spanish average of 1.2% in 2006) (Bilbao-Osorio, 2009). More than 50% of firms that have R&D activities have started these activities between 2000 and 2006 (Navarro, 2009).

Table 2
Matrix of rationales and domains for the Basque innovation policy system.

Policy rationale	Policy domain					
	Industrial and cluster policy	Science, technology and innovation policy	Health policy	Environmental policy	Education policy	Fiscal policy
<i>Developing and supporting STI infrastructures</i>		<ul style="list-style-type: none"> • National • Regional 	<ul style="list-style-type: none"> • National • Regional 		<ul style="list-style-type: none"> • National • Regional 	
<i>Supporting investment in S&T and innovation</i>		<ul style="list-style-type: none"> • European • National • Regional • Provincial 	<ul style="list-style-type: none"> • European • National • Regional 	<ul style="list-style-type: none"> • European • National • Regional 		<ul style="list-style-type: none"> • Provincial
<i>Enhancing HR competencies in firms</i>	<ul style="list-style-type: none"> • National • Regional 				<ul style="list-style-type: none"> • National • Regional 	
<i>Strengthening linkages within innovation systems</i>	<ul style="list-style-type: none"> • European • National • Regional 	<ul style="list-style-type: none"> • European • National • Regional 				<ul style="list-style-type: none"> • Provincial
<i>Providing appropriate framework conditions for STI</i>					<ul style="list-style-type: none"> • National • Regional 	<ul style="list-style-type: none"> • Provincial
<i>Developing regional governance capacities</i>			<ul style="list-style-type: none"> • European • National • Regional • Provincial 			

2011). Moreover, policies from different policy domains – innovation, industrial, fiscal, health, education, etc. – are included under these rationales, with their corresponding instruments targeted at a range of different actors.

Concretely, the Basque regional government has implemented a wide range of individual policies in different domains that include, though are not confined to: industrial and cluster policy; science, technology and innovation policy; educational policy; environmental policy; and health policy. These policies are targeted both at firms and at other agents of the Basque innovation system, such as technology centres, universities, hospitals and cooperative research centres. At the provincial level the policy influence is largely in the fiscal policy domain, as it is at this level that tax competencies are located. Indeed, provincial fiscal policies target firms with a range of incentives, including tax reductions for innovation activities. It is clear that Spanish innovation policies also impact in the regional policy space in a range of domains, both through policies that are directed at firms and policies targeted at the system's other components such as universities or technology centres, often with the aim of enhancing links between the region and the Spanish innovation system. Finally, the Basque system also benefits from European support programmes in various domains in order to promote science, technology and innovation throughout the system as well as an overall 'knowledge society'.

4.2. Evaluation mix protocol: Step 1

We can therefore identify a complex Basque policy system that brings together specific instruments in various policy domains that respond to a range of policy rationales (policy mix dimension), and from four distinct administrative levels (multilevel dimension). Table 2 summarises the main elements of this policy system in a matrix of rationales and domains, highlighting the relevant administrative levels at each juncture, from which specific policy instruments are targeted at recipients.⁹ This corresponds to the activity of mapping a policy system in line with step one of the

⁹ This does not purport to represent a complete characterisation of the system that corresponds with the Basque policy space, and indeed the placing of policies from different levels within precise domains and rationales is a process open to some degree of subjectivity.

protocol proposed in Table 1.¹⁰ Such a mapping would not have been carried out in a typical policy evaluation process. The focus would have been only on the individual programme or instrument subject to evaluation, or in the best case on the comparison and analysis of several individual instruments from the same or different domains administered at the same level (Aranguren et al., 2013b; Covarrubias et al., 2013) or the analysis of complementarities between the same instrument at different levels (Garcia and Mohnen, 2010; Magro, 2012). The primary advantage of this initial step in the process, therefore, is to give a near-complete picture of the policy system, and provide a reference point to guide policy-makers throughout their ongoing evaluation processes.

Given the mix of policies administered from different levels that is shown in Table 2, evaluation is clearly a complex task for this regional innovation policy system. As the system contains significant policy overlaps under each rationale it will be difficult to gain an accurate reflection of the impact of each using isolated evaluations. By exploring the subsequent steps in the protocol we aim to show that is a useful approach for understanding the significance of these overlaps, and moving towards a more integrated evaluation perspective.

4.3. Evaluation mix protocol: Step 2

The second step in the process is to select a policy rationale and analyse the mix of domains and instruments targeted at different actors underlying this rationale. We illustrate this with respect to a precise sub-rationale of the 'strengthen linkages within innovation systems' rationale, which can be stated as *promoting cooperation in innovation activities among firms and other actors within the Basque innovation system and between this system and others (national and European)*. This is a rationale mainly based on systemic theories, which seeks to mitigate network problems that might occur in a regional innovation system (Smith, 2000; Edquist, 2001; Malerba, 2010). We identify three different policy domains where policies with this rationale are located: Science, technology and innovation policy; industrial and cluster policy; and fiscal policy. As illustrated

¹⁰ In a thorough application it will be necessary, in particular, to recognise the more detailed sub-rationales that comprise many of the general rationales specified here, and to undertake a series of interviews with policy-makers from each policy domain to assure that as complete as possible a picture is generated.

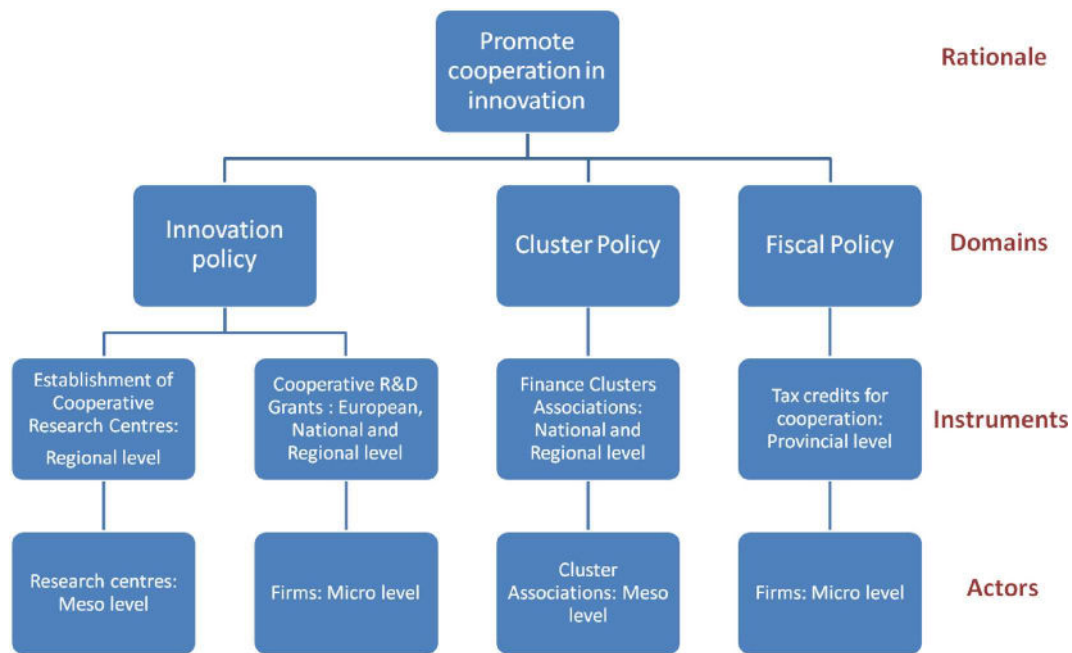


Fig. 2. Example of a selected rationale in the Basque policy system.

in Fig. 2, each presents its own set of instruments employed from one or more administrative levels (European, national, regional and provincial), and directed at different actors. A traditional evaluation would start by looking at the instrument, programme or policy object of the evaluation first, and then try to understand the rationales. The advantage of starting from a rationale and identifying the relevant instruments is that it is much easier to spot the synergies, complementarities and overlaps between instruments that share a rationale.

4.4. Evaluation mix protocol: Step 3

The third step of the protocol consists of analysing potential overlaps and complementarities between the policy instruments responding to the selected rationale. In the science, technology and innovation (STI) policy domain, we can distinguish between an instrument directed at the establishment of cooperative research centres and another to promote consortia of firms to engage in cooperative R&D activities. The former is a systemic instrument implemented by the regional government, and its main beneficiaries are the joint research centres created by the policy to strengthen research cooperation in specific fields. The latter instrument targets firms, providing grants to undertake R&D projects in cooperation with other firms or agents, and is implemented from three different levels (regional, national and European). There are clearly potential overlaps and/or complementarities both between these two instruments – firms can form consortia with research centres to receive cooperative R&D grants – and across different administrative levels. Indeed, most strikingly a Basque firm can participate simultaneously in cooperative R&D grants awarded from all three levels. While these might be subsidising projects with different consortia and therefore provoking additional effects, there could also be overlaps in some subsidised activities that generate negative additionality or substitution effects. It is therefore important to undertake an integrated evaluation of these policies, as opposed to evaluating the impact of each in isolation. Indeed, a study by Garcia and Mohnen (2010) in the Austrian context finds that when R&D support instruments from national and European

levels are combined in an analysis of impacts, the national level support dominates the European. Such findings are an important consideration for policy-makers designing and resourcing policies at different levels.

In the industrial and cluster policy domain, instruments to support cooperation among clusters of firms in specific activities/sectors and/or based on specific complementarities are present at both national and regional level. The regional instrument, however, is by far the dominant one in the Basque policy space. The Basque government's cluster policy provides basic funding for the establishment and operation of 22 'cluster' and 'pre-cluster' associations covering almost all significant sectors in the regional economy (Aranguren et al., 2013a, 2013b). The national policy in contrast takes the form of a competitive grant for groups of innovative enterprises that today supports 8 of the 22 established Basque clusters. In this case, therefore, we can observe an overlap in the policies with regards the 8 clusters that receive both subsidies, again suggesting the importance of an integrated evaluation capable of detecting the interaction impacts of both policies. Furthermore there are likely to be complementarities between both of these cluster policies and the multi-level cooperative R&D grants that fall under the STI policy domain, given that cluster relationships provide a strong foundation for establishing cooperative consortia. Likewise there are some clear inter-relations between the cluster policies and the establishment of some of the cooperative research centres that operate in similar or related fields.¹¹

Finally, the fiscal policy domain at provincial level includes tax instruments that provide for reductions in corporate taxes for firms that invest in R&D activities, including cooperative activities. Given

¹¹ Cooperative research centres were created to foster basic and problem-solving oriented research in strategic topics for the Basque Country. They are mostly physical research centres which have to articulate their research around the existing capabilities in the Basque System (taking into account other agents as RTOs or universities). Potential overlaps with cluster associations can therefore be found in terms of the agents that participate. For example, there is a bioscience cooperative research centre (bioGUNE) and a bioscience pre-cluster (BioBasque), and likewise an energy cooperative research centre (enigiGUNE) and an energy cluster (Cluster de Energia).

that Basque firms pay their taxes in one of the three provinces, there are also likely to be overlaps and/or complementarities between the operation of this tax instrument when applied to cooperative activities and the other policies already mentioned at regional, national and European level.

As we can see from this analysis, this step constitutes an added-value to evaluations designed without taking into account a systemic perspective. It highlights specific overlaps or interactions among different instruments that should be taken into account if evaluations are to fulfil their policy learning potential in such complex policy systems.

4.5. Evaluation mix protocol: Step 4

Step 4 in the protocol is to undertake a meta-evaluation or identify and analyse the existing evaluations of those policy instruments identified in step 3. In this case, while it is possible to identify various evaluations of the overall Basque system of innovation and its associated policies (Navarro, 2010; OECD, 2011; Bilbao-Osorio, 2009),¹² there are several evaluation gaps with regards the specific instruments related to this rationale.

Regarding instruments belonging to the STI policy domain, Magro (2012) has conducted an evaluation of cooperative R&D grants directed at Basque firms, taking into account not only the regional level but also the Spanish and European levels. The results of this evaluation show a complementary and positive effect of R&D grants on Basque firms when taking into account grants for three administrative levels (European, national and regional). Thus, input and output additionality are both higher when considering regional, national and European grants together, although behavioural additionality is only found with regards the regional support measures. With respect to the Cooperative Research Centre policy, on the other hand, there is less of an evaluation base. While the Basque Government evaluates the performance of the Cooperative Research Centres, and the grants the centres receive every year are conditioned on the results of this evaluation, it does not evaluate from an impact assessment point of view.

More evaluation work has been done with regards the industrial and cluster policy domain, where we can highlight the research of Aragón et al. (2010), Aragon et al. (2012), Aranguren et al. (2013a, 2008) and De La Maza-y-Aramburu et al. (2012) at regional level. These evaluations generally demonstrate (qualified) positive effects on different aspects of firm-level innovation performance from regional cluster support for cooperative behaviour, but they have not sought to explore links with national support for clusters. There is however a recent study that analyses the interactions between regional cluster support and regional cooperative R&D grants in the STI policy domain (Covarrubias et al., 2013). The results, using social network analysis techniques, show a complementary and positive effect between these two instruments at regional level.

Finally, in the fiscal policy domain we have not detected any existing evaluations that deal with the impacts of corporate tax breaks for cooperative behaviour. The Basque Country is quite unique in that tax collection authorities exist at sub-regional level, but the wider literature is suggestive of likely complementarities between these policy competences and some of the more interactive policies contained in the other domains analysed. Indeed, while instruments such as tax breaks tend to generate input or output additionality, there may be multiplier and complementary effects from their combination with interactive instruments

that seek behavioural additionality (Nauwelaers and Wintjes, 2003; Magro, 2012).

In summary, there are gaps in terms of which instruments have been evaluated under this rationale, and limitations in the existing evaluations in terms of accounting for interactions with other policies from the same and other administrative levels that are seeking the same rationale; for example, the interaction between cooperative research centres and R&D grants at different levels; between cluster support at different levels and cooperative research centres, etc. The very identification of these gaps and limitations, however, again demonstrates the advantage of the evaluation mix protocol over a traditional set of isolated evaluations, which would not have highlighted these key drawbacks in current analysis for understanding the dynamics of the policy system as a whole. Opportunities for policy learning would therefore have remained uncovered.

4.6. Evaluation mix protocol: Steps 5 and 6

Indeed, these gaps and limitations should be turned into opportunities in the fifth step of the evaluation mix protocol, which consists of designing and conducting an integrated evaluation of all the instruments identified for the selected rationale. This evaluation should triangulate different methods (quantitative and qualitative), adapting existing practices so as to better understand the systemic impacts among the actors targeted with this set of policies. These opportunities are starting to be explored in the Basque context by studies such as Magro (2012) and Covarrubias et al. (2013), and an important agenda for applied research is to put these together in a more complete way so as to cover the whole set of likely interactions that we have identified here. Indeed, successful application of step five for this specific rationale would generate powerful policy learning outcomes regarding the interplay of instruments in this part of the policy system, and contribute to enhanced 'internal intelligence' of the system as a whole. It would also open the way for repeating steps two to five for other rationales that have been identified for the Basque policy system (Step 6). This would not only lead to more sophisticated evaluation practices within each rationale, but also facilitate a secondary analysis to explore interactions between rationales, resulting in a holistic view of the policy system and an appropriate policy evaluation mix.

5. Conclusions: Challenges and ways forward

Policy evaluation can and should play a more dynamic and transformative role in the context of increasingly complex innovation policy landscapes. To do this policy evaluation techniques need to be incorporated themselves in systemic frameworks that are capable of shedding more light on the interactions between the wide range of different innovation policies that impact in any given policy space. While there have been some conceptual advances in understanding the significance of policy mixes (Flanagan et al., 2011) and of systemic approaches to evaluation (Arnold, 2004; Edler et al., 2008), what is missing is an articulation of the practical steps that can be taken in the context of a given policy space to provide policy-makers with intelligence on the overall functioning of the system of policies. In this paper we contribute to this gap through conceptual and methodological developments which have then been applied and explored in the context of a specific case.

Conceptually we advance a practical definition of a policy system as the interplay between two dimensions: the mix of rationales, domains and instruments that make up the universe of innovation policies in a given policy space, and the mix of administrative levels from which these policies originate. This simplification is useful in facilitating a clear depiction of the policy

¹² These evaluations correspond broadly with Arnold's (2004) notion of a top-down evaluation of the overall health of innovation systems.

system that impacts in actual policy spaces, for example regions. This is combined with theoretical reflections on the interface between innovation policy systems and policy evaluation techniques, where it is acknowledged that existing evaluation practice lags behind advances in innovation theories. It is argued that more sophisticated, learning-centred and joined-up evaluation processes that remain practical are needed to generate greater ‘internal intelligence’ within innovation policy systems, so that they learn to become more sensitive to the interplay between their different parts. We therefore propose a methodological development in terms of a practical, step-by-step ‘evaluation mix protocol’ that enables individual evaluations to be integrated in an evaluation mix appropriate for their systemic context, and that facilitates policy learning at each step. This framework is built from secondary analysis of already-conducted evaluations as a basis for developing and adapting future primary analysis of programmes in ways that are sympathetic to systemic realities. As such it represents an advance towards the holistic evaluation of complex innovation policy systems as compared to existing evaluation approaches.

While it is impossible to capture in detail all of the possible interactions between innovation policies, the proposed protocol facilitates the analysis of complexity in a way that emphasises policy learning at each step. It therefore brings us a step closer to bridging the significant gap between abstract theoretical analysis of the need to systemically evaluate complex policy interactions, and the ability to do so in practice. Indeed, application of this framework to the case of the Basque Country regional policy space highlights the policy learning potential of the approach. Within a well-regarded innovation policy system, the analysis shows that there exist significant overlaps and complementarities between policy instruments with the same rationale that are implemented from different administrative domains and levels. The interplay between these policies has not typically been taken into account in existing evaluations, implying that evaluators and policy-makers remain unaware of the significance of interactions between different policies. Further applied research is therefore needed to get to the heart of these interactions and root future evaluations within the proposed holistic framework. Indeed, these findings are likely to be generalisable to other policy systems, where the proposed protocol can guide a similar process. Such applied analysis is critical if policy evaluation practice is to catch up with existing policy complexity, but it nevertheless raises a number of challenges.

For example, we have argued that with isolated evaluations it is difficult to have a ‘big picture’ of all the instruments from different domains and levels that underlie a specific rationale, and that the protocol is helpful in this regard. Nevertheless, while it may provide a useful framework for policy-makers in a given territory, policy management itself still has to evolve in order to effectively incorporate this view of the policy system. Moreover this challenge relies also on the fact that a holistic evaluation would need a coordination between different administrative levels (at least in terms of data and information collection), a task that is very difficult to reach in reality. Thus in taking the protocol forward an important consideration is how to ensure that evaluators are able to engage effectively and constructively with policy-makers from different administrative levels that may feel different levels of commitment to the process.¹³

Finally we can point to a challenge with regards the critical first step of defining the boundaries of the innovation policy system. The very complexity of the mix of rationales, domains and instruments from different administrative levels means that drawing boundaries effectively is extremely difficult. In particular, there is a

trade-off between completeness and simplicity which has implications for the subsequent analysis, and which is complicated further by the lack of a clear congruence between innovation theories, theoretical and policy rationales and the actual implementation of instruments. There are likely to be cases, for example, where policy instruments do not in fact correspond to a clearly defined theoretical rationale, at least in the minds of policy-makers. In practice, therefore, this first step will rely on the interpretations and judgements of the evaluation team, which in turn rests on their capacity to engage with policy-makers in each domain and at each administrative level (for example through interview processes).

Acknowledgements

The authors would like to acknowledge Mari Jose Aranguren, Kieron Flanagan, Mikel Navarro, Elvira Uyarra and two anonymous reviewers for their comments on previous versions of this work.

References

- Aragón, C., Aranguren, M.J., Iturrioz, C. (Eds.), 2010. *Evaluación de políticas clúster: El caso del País Vasco*. Deusto Publicaciones, Bilbao.
- Aragon, C., Aranguren, M.J., Iturrioz, C., Wilson, J.R., 2012. A social capital approach for network policy learning: the case of an established cluster initiative. *European Urban and Regional Studies*, <http://dx.doi.org/10.1177/0969776411434847>.
- Aranguren, M.J., Iturrioz, C., Wilson, J.R., 2008. *Networks, Governance and Economic Development*. Cheltenham, Edward Elgar.
- Aranguren, M.J., De La Maza, X., Parrilli, M.D., Wilson, J.R., 2013a. Nested Methodological Approaches for Cluster Policy Evaluation: An Application to the Basque Country. *Regional Studies*, <http://dx.doi.org/10.1080/00343404.2012.750423>.
- Aranguren, M.J., Magro, E., Wilson, J.R., 2013b. La evaluación como herramienta para transformar las políticas de competitividad. *Economía Industrial* 387, 159–168.
- Arnold, E., 2004. Evaluating research and innovation policy: a systems world needs systems evaluations. *Research Evaluation* 13 (1), 3–17.
- Bach, L., Matt, M., 2002. Rationale for science & technology policy. In: Georgiou, L., Rigby, J., Cameron, H. (Eds.), *Assessing the Socio-economic Impacts of the Framework Programme*. PREST, University of Manchester, Manchester.
- Bennet, C., Howlett, J.M., 1992. The lessons of learning: reconciling theories of policy learning and policy change. *Policy Sciences* 25 (3), 275–294.
- Bilbao-Osorio, B., 2009. *A Review of the Science, Technology and Innovation Policies in the Basque Innovation System*. Orkestra-Basque Institute of Competitiveness: Deusto Foundation, Donostia-San Sebastian, Spain.
- Borrás, S., Tsagdis, D., 2008. *Cluster Policies in Europe: Firms, Institutions and Governance*. Edward Elgar, Cheltenham.
- Borrás, S., 2009. The widening and deepening of innovation policy: What conditions provide for effective governance? *CIRCLE Electronic Working Paper Series*, No. 2009/02, University of Lund.
- Borrás, S., 2011. Policy learning and organizational capacities in innovation policies. *Science and Public Policy* 38 (9), 725–734.
- Carlsson, B., Jacobsson, Staffan, 1997. *In search of a useful technology policy – general lessons and key issues for policy makers*. In: Carlsson, B. (Ed.), *Technological Systems and Industrial Dynamics*. Kluwer Academic Publishers, Boston, Dordrecht and London.
- Chaminade, C., Lundvall, B.-A., Vang, J., Joseph, K.J., 2009. Designing innovation policies for development: towards a systemic experimentation-based approach. In: Lundvall, B.-A., Joseph, K.J., Chaminade, C., Vang, J. (Eds.), *Handbook on Innovation Systems and developing Countries: Building Domestic Capabilities in a Global Setting*. Edward Elgar, Cheltenham.
- Clarysse, B., Wright, M., Mustar, P., 2009. Behavioural additionality of R&D subsidies: a learning perspective. *Research Policy* 38 (10), 1517–1533.
- Cooke, P., 1992. Regional innovation systems: Competitive regulation in the new Europe. *Geoforum* 23, 365–382.
- Cooke, P., Morgan, K., 1998. *The Associational Economy. Firms, Regions, and Innovation*. Oxford University Press, Oxford.
- Cooke, P., Gomez Uranga, M., Etxebarria, G., 1997. *Regional systems of innovation: Institutions and organisational dimensions*. *Research Policy* 26 (4–5), 475–491.
- Cooke, P., Boekholt, P., Tödtling, F., 2000. *The Governance of Innovation in Europe*. Pinter, London.
- Cooksy, L.J., Caracelli, V.J., 2005. Quality, context and use: issues in achieving the goals of metaevaluations. *American Journal of Evaluation* 26 (1), 31–42.
- Covarrubias, J., Daniel, M., Edurne, Murciego, A., Wilson, J.R., 2013. *Evaluación del policy-mix de innovación mimeo*.
- De La Maza-y-Aramburu, X., Vendrell-Herrero, F., Wilson, J.R., 2012. Where is the value of cluster associations for SMEs. *Intangible Capital* 8 (2), 472–496.
- Diez, M.A., 2002. Evaluating new regional policies: Reviewing the theory and practice. *Evaluation* 8 (3), 285–305.
- Edler, J., Ebersberger, B., Lo, V., 2008. Improving policy understanding by means of secondary analyses of policy evaluation. *Research Evaluation* 17 (3), 175–186.

¹³ These challenges would suggest certain benefits from employing external rather than internal evaluators (Sonnichsen, 1999).

- Edquist, C., 2001. Innovation policy – a systemic approach. In: Archibugi, D., Lundvall, B.-A. (Eds.), *The Globalizing Learning Economy*. Oxford University Press, Oxford.
- Edquist, C., 2008. Design of Innovation Policy through Diagnostic Analysis: Identification of Systemic Problems (or Failures). CIRCLE Electronic Working Papers Series, 2008/06. Lund University.
- European Commission, 2012. Regional Innovation Scoreboard 2012. Brussels.
- Flanagan, K., Uyarra, E., Laranja, M., 2011. Reconceptualising the 'policy mix' for innovation. *Research Policy* 40, 702–713.
- Garcia, A., Mohnen, P., 2010. 'Impact of government support on R&D and innovation', UNU-MERIT Working Paper Series, #2010-034.
- Georghiou, L., 2002. Impact and Additionality of Innovation Policy, Innovation Policy and Sustainable Development: Can public innovation incentives make a difference? Six Countries Programme on Innovation, Brussels.
- Howlett, M., 2005. What is a policy instrument? Policy tools, policy mixes, and policy-implementation styles. In: Eliadis, P., Hill, M., Howlett, M. (Eds.), *Designing Government: From Instruments to Governance*. McGill-Queens University Press, Montreal.
- Imam, I., LaGoy, A., Williams, B., 2007. Introduction. In: Williams, B., Imam, I. (Eds.), *Systems Concepts in Evaluation: An Expert Anthology*. EdgePress, Point Reyes, CA.
- Koschatzky, K., Kroll, H., 2007. Which side of the coin? The regional governance of science and innovation. *Regional Studies* 48, 1115–1127.
- Koschatzky, K., Stahlecker, T., 2010. A new challenge for regional policy-making in Europe? Chances and risks of the merger between cohesion and innovation policy. *European Planning Studies* 18 (1), 7–26.
- Kuhlmann, S., 2001. Future governance of innovation policy in Europe—three scenarios. *Research Policy* 30, 953–976.
- Kuhlmann, S., 2003. Evaluation as a source of strategic intelligence. In: Shapira, P., Kuhlmann, S. (Eds.), *Learning from Science and Technology Policy Evaluation: Experiences from the United States and Europe*. Edward Elgar, Cheltenham.
- Laranja, M., Uyarra, E., Flanagan, K., 2008. Policies for science, technology and innovation: translating rationales into regional policies in a multi-level setting. *Research Policy* 37 (5), 823–835.
- Lundvall, B.A., Borrás, S., 1997. *The Globalizing Learning Economy: Implications for Innovation Policy*. DG XII, Commission of the European Union, Brussels.
- Lundvall, B.A., Borrás, S., 2005. Science, technology, innovation and knowledge policy. In: Fagerberg, J., Mowery, D., Nelson, R. (Eds.), *The Oxford Handbook of Innovation*. Oxford University Press, Oxford.
- Magro, E., 2012. Evaluation in a systemic world: the role of regional science and technology policy. PhD thesis, University of Deusto. Published at www.orkestra.deusto.es
- Malerba, F., 2010. Increase learning, break knowledge, lock-ins and foster dynamic complementarities: evolutionary and system perspectives on technology policy in industrial dynamics. In: Foray, D. (Ed.), *The New Economics of Technology Policy*. Edward Elgar Publishing, Cheltenham.
- Metcalfe, J.S., 1995. Technology systems and technology policy in an evolutionary framework. *Cambridge Journal of Economics* 19 (1), 25–46.
- Molas-Gallart, J., Davies, A., 2006. Toward theory-led evaluation: the experience of European science, technology and innovation policies. *American Journal of Evaluation* 27 (1), 64–82.
- Morgan, K., 2004. The exaggerated death of geography: learning, proximity and territorial innovation systems. *Journal of Economic Geography* 4, 3–21.
- Mundell, R., 1962. The appropriate use of monetary and fiscal policy for internal and external stability. IMF Staff Papers, March, 70–77.
- Nauwelaers, C., Wintjes, R., 2003. Towards a new paradigm for innovation policies? In: Asheim, B., Isaksen, A., Nauwelaers, C., Totdling, F. (Eds.), *Regional Innovation Policy for Small–Medium Enterprises*. Edward Elgar, Cheltenham.
- Nauwelaers, C., Wintjes, R., 2008. Innovation policy, innovation in policy: policy learning within and across systems and clusters. In: Nauwelaers, C., Wintjes, R. (Eds.), *Innovation Policy in Europe: Measurement and Strategy*. Edward Elgar, Cheltenham.
- Nauwelaers, C., Boekholt, P., Mostert, B., Cunningham, P., Guy, K., Hofer, R., Rammer, K., 2009. *Policy Mixes for R&D Europe*. E.C.–Directorate-General, UNU-Merit.
- Navarro, M., 2009. El sistema de innovación de la CAPV a través de las estadísticas de I+D Orkestra. Universidad de Deusto.
- Navarro, M., 2010. Reflexiones sobre el sistema y las políticas de innovación del País Vasco. Orkestra Working Paper Series in Territorial Competitiveness Number 2010-R04 (CAS). Basque Institute of Competitiveness, San Sebastian.
- OECD, 2010. *OECD Science, Technology and Industry Outlook 2010*. OECD Publishing, Paris.
- OECD, 2011. *OECD Reviews of Regional Innovation: Basque Country, Spain*. OECD, Paris.
- Pitelis, C., Sugden, R., Wilson, J.R., 2006. Clusters and Globalisation: The Development of Urban and Regional Economies. Edward Elgar, Cheltenham.
- Scholte Jan, A., 2000. *Globalization: A Critical Introduction*. Palgrave, Basingstoke.
- Scott Allen, J., 1998. *Regions and the World economy: The Coming Shape of Global Production, Competition and Political Order*. Oxford University Press, Oxford.
- Smith, K., 2000. Innovation as a systemic phenomenon: Rethinking the role of policy. *Enterprise and Innovation Management Studies* 1 (1), 73–102.
- Smits, R., Kuhlmann, S., 2004. The rise of systemic instruments in innovation policy. *International Journal of Foresight and Innovation* 1 (1/2), 4–32.
- Sonnichsen, R.C., 1999. Building evaluation capacity within organizations. In: Boyle, R., Lemaire, D. (Eds.), *Building Effective Evaluation Capacity: Lessons from Practice*. Transaction, New Brunswick, NJ.
- Storper, M., 1997. *The Regional World: Territorial Development in a Global Economy*. London, Guildford Press.
- Tödling, F., Kaufmann, A., 1999. Innovation systems in regions of Europe: a comparative perspective. *European Planning Studies* 7 (6), 699–771.
- Tödling, F., Trippel, M., 2005. One size fits all? Towards a differentiated regional policy approach. *Research Policy* 34 (8), 1203–1219.
- Uyarra, E., Flanagan, K., 2010. From regional systems of innovation to regions as innovation policy spaces. *Environment and Planning C: Government and Policy* 28, 681–695.
- Walendowski, J., Kroll, H., Stahlecker, T., Bayer, E., Wintjes, R., Hollanders, H., 2011. *Regional Innovation Monitor Innovation Patterns and Innovation Policy in European Regions: Trends, Challenges and Perspectives, 2010 Annual Report*. Project 0932 for the European Commission.