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Regional Innovation Policy Bottom Up: The Roles of Proximity Networks and the Engaged Research

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Abstract

The paper departs form a scenario where regional innovation systems in Europe have problems of connectivity among different actors. It argues that some of these problems persist because policy learning processes have not been able to generate actionable knowledge. The consequence is that many of the scenarios, strategies and plans developed in public private cooperation have not been taken into action and potential connections related to them have not materialized. The authors propose an analytical framework to analyze policy processes and reflect on how actionable knowledge can be generated. Such framework is used to analyze the policy process in the case of EG, a network in the Basque Country where ad hoc tools to foster innovation capabilities of firms are being experimented.

1. Introduction

Competitiveness of regions is an issue not just of academic interest and debate, but also of increasing policy deliberation and action. There is no general consensus on what is meant by the term and how it can be measured (Martín et. al., 2006), but it is clear that the definition an explanation of regional competitiveness need to reach well beyond the concern on "hard" productivity, to consider several other –and softer –dimensions of the regional socio-economy (Storper, 1997; Boschma, 2006; Martín et. al., 2006). In the European context, competitiveness is assumed to be related to innovation, which focuses attention on how innovation policies can help develop the soft dimensions that the socio-economic context requires.

One of the approaches that helps understand what policy makers can do is the theory of constructed advantage (European Commission, 2006; Asheim et al., 2007), that pays attention to the role and impact of the public sector in the economy. It highlights policy support, preferably in public-private partnerships, by acknowledging to a greater extent the importance of institutional and economic complementarities in knowledge economies than do theories of comparative and competitive advantage. Instead of market failure, the rationale for policy intervention is the reduction of connectivity deficits. Such deficits are seen as the core problem of innovation in the EU and the cited Commission report presumes that true regional innovation system connectivity is not complete in most regions.

Policy makers themselves, on the other hand, have often focused on tools. They expect tool-kits, where they can choose the right tool from depending on the problem they are trying to solve. The main argument in this paper is that unless the right kind of policy learning processes are developed that give context to tools, the efficiency of tools is reduced. The departure point for such argument is very well described by Sotarauta (2004) when he reflects on strategic planning processes, to say "they have not turned out to be such an efficient producer of success as the handbooks and consultants indicated… scenarios have remained at too general

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a level, divorced from action… SWOT analysis have been augmented by many important matters without an awareness of what was to be done with them… strategic programs have frequently not progressed beyond the general level… intended strategies are everybody's and nobody's…they do not embed themselves in the actions of organizations… strategies easily remain floating, they are paper among more paper…and after all… when the time to make decisions comes, the strategy papers have been forgotten, the world has changed "and now is not the time to make strategies, now is the time to balance next year's budget"".

The argument is thus that only through an efficient policy learning process a region can achieve strategies, scenarios, plans that are not only on paper, but on the mental frameworks of the regional actors, so that when the time comes to make decisions, it is impossible to make them setting aside such strategies, scenarios and plans. Only by making these shared elements "real" can sustainable connections be created in the regional innovation system.

To develop this argument the paper is guided by the following research questions:

a) Why does the connectivity problem still persist in regions that have developed policies based on public-private partnership for decades?
b) How should policy learning be to help solve such connectivity problem?

Thus, the paper focuses on how different actors learn throughout the policy process. In order to contextualize the specific approach used, some aspects of our interpretation of learning processes need to be stated. On the one hand by policy learning we mean what the actors involved in the policy process learn in order to improve the policies they are contributing to define and develop. Sometimes learning processes are at the same time the object or goal of different policies. For instance, developing certain kind of technical knowledge by firms and technology centers can be the goal of a determined policy. How to foster public-private partnership that would enhance such learning processes would be part of policy learning. But the specific technical learning derived from such policy would not be considered as policy learning. On the other hand, we consider that learning happens all throughout the process and not only by the government, but by all actors involved in the process. Consequently, learning can happen in the stages of agenda setting, policy formulation, decision making, policy implementation and policy evaluation (Howlett and Ramesh, 2003). And policy learning is also social learning in communities or networks (Bennett and Howlett, 1992).

The discussion on learning processes can be abstract and specific examples can be useful to make the message clear. That is why the main arguments in the paper are later illustrated using as a case study, EG, a public private cooperation network in the Basque Country where local programs to support innovation processes of firms are defined and developed.

The structure of the paper is as follows. In Section 2 the paper presents the concepts related to the evolutionary perspective in which the paper is inspired and underlines four critical challenges that regional innovation policies face nowadays. Section 3 focuses on the learning process for such policies, underlining the role networks and social research can play in the process. Section 4 proposes an analytical framework that helps analyze policy processes focusing on its capacity to reach actionable knowledge. Such framework is used to develop a case study in section 5 and finally, in the concluding section, some lessons are discussed on the way policy could evolve to respond to the four challenges initially presented.

2. Theoretical framework: evolutionary economics and challenges of regional competitiveness and innovation policies

This section aims at presenting some challenges of regional innovation policies for the construction of regional advantage. To do so, the main concepts that have inspired such discussion are first presented.

System failure and behavioral additionality

The relevance of a softer dimension in regional competitiveness is a consequence of evolutionary economics pioneered by Nelson and Winter (1982). In this approach firms, with their strategic behavior and capabilities are the key players, but institutional frameworks also play an important role, affecting the performance of firms and the economy as a whole.

Two significant contributions of evolutionary economics are central to the arguments presented in the paper. First, the consideration of innovation (the result of a complex and interactive learning processes through which firms and other agents obtain new knowledge from other organizations and institutions) as the key driver of economic growth. Second, the differentiation between codified and tacit knowledge, with a consideration that innovations have an important content of tacit knowledge, which can be transferred only in face to face interactions. This implies the importance of "local" in a "global" era, the relevance of trust as a key element for the development of knowledge flows, the crucial role of human capital and the consideration that knowledge is created through evolutionary learning processes in all firms and systems (Navarro, 2003).

The evolutionary perspective of regional competitiveness brings the need to change also regional innovation policies. While in the neoclassical approach innovation policy responds to market failure, in the evolutionary approach it has to respond to system failures (Laranja et al., 2009). The former is based on the assumption that only imperfect market competition justifies a public action to re-establish equilibrium[2]. In the evolutionary approach, government intervention is justified by wider system failures. In this case, the market is only one element of the system, which also includes institutions and networks. The paper focuses in the following classification of system failures (Laranja et. al., 2009; Smith, 2000): network failure, institutional failure and lock-in failure. In network failure innovation is an asset based on knowledge, which has tacit (inherent to human/personal relationships) and explicit knowledge components. Networks play an important role in innovation systems as they help transferring and absorbing both types of knowledge needed to innovate. Network failure appears when effective knowledge flows fail because firms are not well connected in the network or because the members' absorptive capacity is not adequate. Institutional failure occurs when the legal, social and normative institutions do not promote the innovation process. Lock-in failure refers to systems that remain isolated, thus adjusting too slowly to new innovation paradigms. In the systemic failure approach, these three types of failure justify government policy as a means to build up systemic capabilities that are necessary to move to higher innovation levels in firms and local economies.

The concept of 'additionality' reflects one of the key responses to these different kinds of failure. This principle refers to the subsidiary role of the state that can intervene only if its action originates a complementary effect, which would not have taken place without any public sector effort (Georghiou, 2002; Bach and Matt, 2002). Geourghiou (2002) talks about three types of additionality: input additionality, output additionality and behavioral additionality. When looking for 'input additionality' the government adds resources to those invested by the beneficiaries in order to increase the scope and impact of their innovation

[2] Within this approach, innovation is seen as a knowledge output that is influenced by three factors: uncertainty of the innovation process, lack of appropiability of knowledge (when this good is 'public'), and indivisibilities, which bring in market failures when firms do not want to invest in non-excludable goods; these justify government intervention.

process, which would not develop in absence of such intervention. Output additionality captures the effects of policy support in the output of the innovation process. Behavioral additionality refers to the effects produced in routines and processes within firms as a consequence of public support, such as for instance, changes in business attitudes. Bach and Matt (2002) recognize also the 'cognitive additionality', which refers to the impact of policy in the capacity of the agents to absorb and generate new knowledge. The identification of these different types of additionality seems relevant to design and implement effective innovation policies; it may indeed be hypothesized that policies generating input and output additionality may respond effectively to market failures, whereas policies focusing on behavioral and cognitive additionality are critical to solve system failure.

Challenges of regional innovation policy

The adaptation of the policy process to respond to the connectivity problem of regional innovation systems must consider a series of challenges that are interconnected and should be faced in the process.

One of such challenges consists on their lineal approach and focus in input or output additionality. The evolutionary approach asks for more intensive focus on system failure and as a response to it, on generating behavioral and cognitive additionality. Innovation policies should not only be oriented to improve the elements of the system (e.g. firms, universities, technology centers) but also to upgrade the interactions among these elements (i.e. network failures) and the interactions with other systems (i.e. lock-in failures) (Parrilli et.al., 2010). Nauwelaers and Wintges (2002) conclude that there is a need to transit towards more system oriented and behavioral value added oriented innovation policies.

A second important limitation of actual innovation policies is that they are mainly offer oriented, which generates the challenge to be more demand oriented, not only attending the existing demand but generating the demand (by generating absorptive capacity). Edquist (2008) underlines as relevant demand-side activities the formation of new product markets and the articulation of quality requirements. The demand orientation of policies asks for more horizontal and transversal policies.

Though there is still a long way to go in these fields, steps have been taken to define policies that are sensitive to these issues. But there are other two challenges that we consider critical and are hardly being faced in innovation policy, though they are present in the policy discourse.

One mportant limitation of regional innovation policies nowadays is the 'universalism' of many of them, as if the same innovation drivers were equally important everywhere. A first critical challenge of regional innovation policies is that they need to be 'contextualized' as innovation processes are specific to the context in regions, localities, countries or sectors (Nauwelaers and Wintjes, 2008). Following Tödling and Trippl (2004), 'one-size-fits-all' approaches should be discarded.

Finally innovation policies are mainly defined from a top down approach, while local/regional differences in innovation capabilities call for a tailored portfolio of policy instruments that should consequently be designed and implemented in contexts of public-private cooperation and exchange. As Sotarauta and Viljamaa (2002) highlight, leadership in regional development is more or less a collaborative process, as no one can lead the development of regional innovation environments alone since it is not possible to control the activities of the other actors. This challenge requires reaching an equilibrium among top down and bottom up approaches and developing mechanisms that create, expand and use all types of knowledge

and generate collective learning and new capabilities. So, policy making has to be an interactive process among different agents in the system (policy makers, firms, innovation agents). Nauwelaers and Wintges (2002) used the term "interactive mode of policy learning" to refer to it. According to them, an interactive mode of policy formulation and implementation would involve design and delivery in cooperation with the beneficiaries, whereas policy implementers are also partners in action so that learning happens in both policy implementers and firms.

Though the four challenges are interlinked, the paper mainly focuses in the third and fourth ones. Such challenges are permeating the policy discourse, but the question now is how they can be faced knowing that there will be no recipes.

Figure 1. Limitations and challenges of innovation policy

Limitations of regional innovation policies	Challenges
Linearity and focus on input and output additionalities	Upgraiding of the relationships among the elements of the system
Offer oriented	Demand oriented –generating demand-
Universalism	Contextualization
Top down approach	Taylored portfolio in public-private cooperation

3. Improving policy learning: the role of networks and social researchers

As Lundvall (1992) highlights, 'knowledge' is the most important resource, 'learning' is the key process, and 'cooperation' is a relevant strategy for innovation. All of the challenges underlined in the previous section have in common that they require participation of policy makers in learning processes with other actors in the innovation process, mainly in their regional innovation system, but even outside.

Connections in the innovation system are not static. They develop as the result of shared learning that conducts to action and further reflection on the action. Claryse et. al. (2009), find behavioral additionality is related to changes in the learning process. Thus connectivity is not only related to the object of policy, but also to the policy process. The paper focuses on the behavioral additionality that can be generated in such process creating connections in the regional innovation system that can be sustainable.

The framework we propose to analyze policy learning processes will be later presented. In this section we present two elements that we consider can play a role in facilitating policy learning: the network approach and the role of social researchers.

Networks for policy learning

One of the elements that can facilitate policy learning in a region is the existence of mechanisms through which as many firms in the region as possible can easily integrate in policy learning networks. Smitt and Kuhlman (2004) describe the shift of policy from top down to network steering as part of the implications that the rise of the systems approach has for policy makers.

We define such policy learning networks as stable spaces for public private cooperation where policy makers, firms and innovation agents (such as university and technology centers) interact in reflective and learning processes related to innovation and competitiveness. Some of them

are at the same time spaces for action, in the sense that they have the resources to take into action the knowledge developed. Some others consider that it is the responsibility of the actors involved in the learning process to later develop the action in their respective areas of influence.

The case study in Section 5 is based in a networking process in the Basque Country. It is an example of what Smitt and Kuhlmann (2004) describe as the two ways that policy making can basically support the learning processes necessary to cope with uncertainty: providing actors with the information they need to develop and implement their strategies and providing them with the instruments, facilities and environments for experimenting and learning.

In order to be able to play their role as policy learning contexts that are different from the traditional top down tool-kit view, it is critical that such networks are constantly defined and redefined by participants themselves. Networks that generate efficient learning processes get obsolete in their goals and processes as participants learn. It is the capacity to renew goals and processes that gives meaning to these networks.

This need of renewal is what gives the context for the arguments related to the second critical element, the role of the social researcher in innovation policy.

The role of social research

When analyzing regional innovation systems, researchers in technological fields have often be studied as part of the regional innovation system that involves in the innovation process. Social researchers, on the other hand, have been usually seen as outsiders that observe and analyze the system, hardly intervening in the critical processes. In this paper we argue the role of the social researcher as a participant in the policy learning process that can bring knowledge about the learning process itself besides knowledge about policy and innovation. We argue that integrating the social researchers' knowledge with the knowledge of the rest of the agents can accelerate the redefinition processes of policy learning networks. But to do so, researchers must also be part of such networks.

Smits and Kuhlmann (2004) speak of the triple helix of the innovation process, intervention and theory. In this context, they argue that actors involved in innovation processes learn from innovation researchers by studying their articles, by using basic concepts and by interacting with researchers, for instance by participating in tri partite (users, policy makers, researchers) networks acting as a forum for discussion on new developments in innovation theory, practice and policy. We consider that such interaction is necessary, still has often been developed in a linear way. That is, researchers generate their knowledge about the system mainly from theory and discussion with peers, sometimes use the regional actors as data source and finally contribute to the regional discussion trying to transfer their knowledge. But they don't develop such knowledge in the interaction with regional actors. These patterns of interaction have often given cooptation as a result. That is, new concepts developed by researchers are incorporated in the policy discourse but not in real change processes. This has often happened with concepts such as RIS or clusters.

That is why, following Levin and Ravn (2007) we use the engaged research concept as research praxis where researchers actively engage in the field in a pursuit of solving pertinent and practical problems. These authors present three ways how engagement in the field can be developed: contextualized and practical problem solving, intersubjective or dialogical involvement with the participants and participation in knowledge generation. They underline such dimensions are not independent. The approach in this paper is based on the role of engaged social researchers that focus mainly on knowledge generation. Following Saether

(2007) when he proposes to integrate action research and economic geography, we consider there is an interesting field in the intersection of engaged research and innovation policy.

4. An analytical framework to study policy learning processes

The main argument in this section is that unless actionable knowledge is generated in the policy process, no sustainable connections are developed in the system that might improve its efficiency. Actionable knowledge is the knowledge that is directly integrated in change processes related to innovation policy by policy makers, firms or other innovation agents such as university or technology centers (Karlsen et al., 2010).

Because of the way it integrates the role of research, the framework is inspired in the knowledge cogeneration process of Greenwood and Levin (2007). Such cogeneration process is a cyclical process with the following stages: problem definition, communicative action in arenas and mutual reflection and learning, solving problem though acting and creation of opportunities for learning and reflection in and on actions. After this last stage, researchers and practitioners will reflect on their own and again contribute to a new cogeneration process by interacting in new problem definition.

The key issue in Greenwood and Levin's model is that the process of new knowledge generation is a co-generative process, where mutual sense making is developed, where all participants influence the process with their mental frameworks, but have their frameworks influenced by the process. We consider that this is the way to generate behavioral additionality that will contribute to solving system failure.

Anyway, the framework reflects that this is not the only way that learning is understood in the policy process. Learning is often interpreted as a linear process, where knowledge brought to the process by the different participants is analyzed by an "expert" (usually researcher or consultant) that takes the responsibility for the sense making. The result of such sense making is again transferred to the participants in a linear way. This pattern generates little behavioral additionality. In terms of results, the output of linear learning is often reflected on written documents with plans and strategies that barely affect actions of regional actors beyond discourse. Compared to this linear pattern, the output of knowledge cogeneration is not mainly reflected in documents, that are also generated, but in the mental frameworks of participants in the process. These shared frameworks influence action, either collective or individual of these agents.

In terms of Nonaka and Takeuchi's (1995) SECI model, in a linear process there is only a very small part of the system, mainly the one catalogued as the "expert" that goes through all the stages of the learning process (socialization, externalization, combination and internalization). Most of the agents in the system externalize their knowledge, but very few of them participate in the rest of the stages. But when the time for making decisions comes, the "expert" seldom has any responsibility in action, which creates a divide between the learning process and action. Following Sotarauta (2004), "now is not the time to make strategies, now is the time to balance next year's budget".

Real processes combine lineal and cogenerated learning in an intricate way, difficult to reflect in a simple framework. Anyway, the assumption in the framework is that behavioral additionality is related to actionable knowledge because it is only through action that a change in behavior can happen. If there is no action related to the learning process, we could change an attitude, but this will never materialize into behavior until there is action. Actionable knowledge generates mainly in cogenerative processes and hardly in linear ones (Greenwood and Levin, 2007). Anyway, linear processes can play a useful role in creating the "expert"

knowledge that will later be integrated in the cogeneration process. That is why, the relationship between linear and cogenerated knowledge is not assumed as a dichotomy in the process, the critical issue is to understand how they interact to generate the needed actionable knowledge.

Generating actionable knowledge in the regional innovation system doesn't mean that all action derived from such learning process must be collective action directly related to the specific cogeneration process. This is one of the possibilities, very much expected in policies such as the cluster policy or other kind of cooperation oriented policies. But some other times, participants in the cogeneration process adapt what they have learnt to their specific policy related challenges and use it to make their individual decisions. For instance policy makers can implement programs that are not directly related to the cogeneration process, but will be more context sensitive. Sometimes there can be collective action developed by some of the participants in the learning process. For instance, firms and technology centers can find new and more efficient ways to cooperate thanks to shared frameworks developed in the policy process.

These arguments can be reflected in the following figure that will be used as analytical framework for the case study. Following the concepts of regional innovation systems ((Cook et. al.,1997 and Asheim and Isaksen,1997) and the triple helix (Etzkowitz and Leydesdorff, 1995) the analytical model focuses on the roles of policy makers, firms, and innovation agents among which the university is included. Besides those -following the arguments presented on the role of social researchers and the cogenerative model proposed by Greenwood and Levin (2007)- social researchers are specifically considered.

To keep the model simple no different types of knowledge have been distinguished such as, tacit and explicit knowledge (Polanyi, 1966) or know-what, know-why, know-how and know-who (Lundvall and Johnson, 1994). We consider that experience based knowledge is critical in policy learning, but as the case study will later show, theoretical knowledge can make a relevant contribution too. The actors have different kinds of experiences and knowledge and when participating in the process they can contribute with all of them.

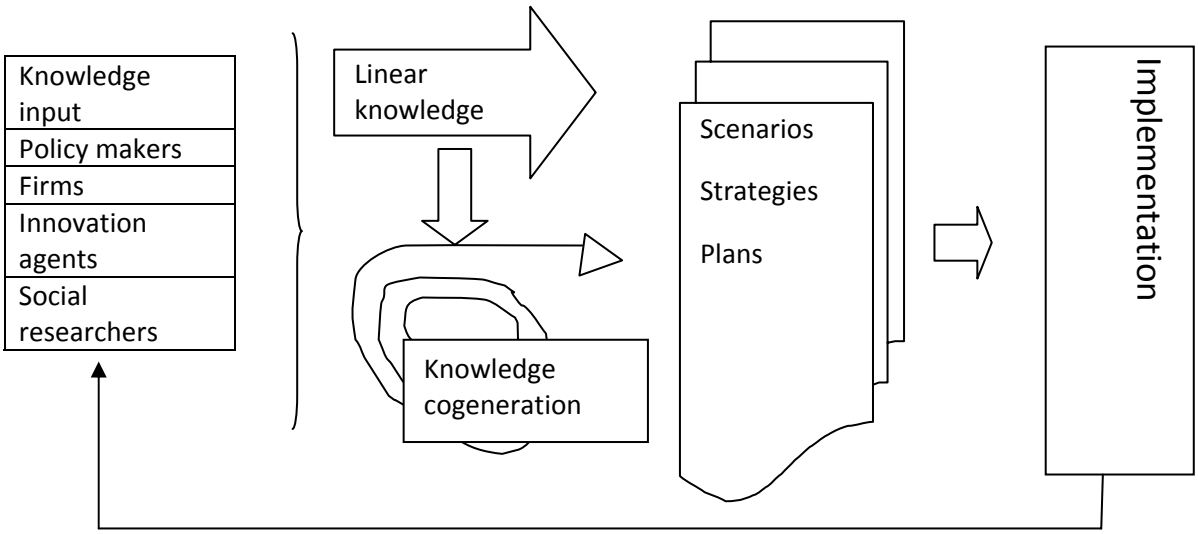
Anyway, there are specific inputs that are difficult to generate unless the actors playing a specific role do. The following are critical elements that should be contributed to the process by the different actors:

a) Policy makers: should be able to contribute with knowledge about political goals related to innovation, resources and political agenda
b) Firms: should be able to contribute with their knowledge on the innovation processes in firms and their real needs
c) Innovation agents (university, technology centers etc.): should be able to contribute with knowledge about what the relevant knowledge is, who's got it is and how firms can reach it
d) Social researchers: should be able to contribute with knowledge on policy and policy learning processes

The framework underlines that there are different ways to reach the visible materialization of strategies, scenarios and plans which are the documents that support them. Though the difference at first sight between the documents that are constructed through linear and cogenerated processes might not be clear, the paper develops the argument that when such documents have been cogenerated, the probability of change in the attitudes of the participating agents is higher. This way, when time for implementation comes, the policy generates behavioral additionality. Such additionality is visible in a higher level of

implementation of the decisions taken and more than that, in a multi-actor implementation, where the policy maker is not seen as the only actor responsible for the implementation of the policy. This is directly related to the connectivity problem presented in the introduction. The process is cyclical and the result of one policy learning process is integrated in the next through the participation of regional actors.

Figure 2. Analytical framework for the generation of actionable policy learning



In the next section the case study is used to discuss how linear and cogenerative processes interact creating actionable knowledge.

5. Systemic policy learning in practice: the case of Ezagutza Gunea in the Basque Country

Ezagutza Gunea as policy learning network

Ezagutza Gunea (EG) is a network for the management of knowledge and training that has been promoted by the local development agency, *Iraurgi Lantzen* in the Middle Urola Valley. This network is composed by the two municipal councils in the county, the local development agency, all training centers in the area, 15 'large firms' with between 50 to 350 employees (representing around 90% of this size of manufacturing firms in the area) and 12 'small firms' with between 10 and 50 employees (representing 11% of this size of manufacturing firms in the area); all of them are represented in the administration board. Among others, the network has targeted as a key area the implementation of strategies to generate an innovative atmosphere.

It is one of the pioneering processes in the Basque Country that allows studying bottom up approaches to new modes of governance for development and new innovation policies. Anyway, it is not an isolated phenomena, similar self organizing networks are a clear trend, especially in Gipuzkoa, one of the three provinces of the Basque Country. If such networks are able to face the challenge of scope (Gustavsen et al., 2007) they can develop a new approach

to governance that could make an important contribution to face the challenges of innovation policy in terms of facilitating coordination among top down and bottom up initiatives.

Goal of the project used as case study

The goal of the project was to diagnose how different firms in the network were innovating and foster collective learning processes that would improve innovation capabilities of firms in the area.

Methodology used for the project

The project had two main methodological approaches. Action research frameworks inspired the cogeneration process that will later be described.

On the other hand, to be able to incorporate firms' knowledge at a first stage a qualitative survey was used. A questionnaire was developed that focused on the following issues related to the innovative capacity of firms : 1) Clients and markets (including questions on actual markets, new products and services, new markets, trends and socioeconomic environment); 2) Suppliers and technology sources (on cooperation with suppliers in R&D+I and knowledge management); 3) Persons and change (on internal/external communication, training, professional development); 4) Firm structure (on business strategy, and organizational forms).

For each issue several factors where defined thoroughly describing five scenarios of development of such factor in the firm. The firms were measured on a scale including five stages going from the lowest grade (i.e. 'this factor is neither being applied nor assessed'; to the highest: 'the firm applies this factor thoroughly and assesses its impact'). Criteria of coherence and consistence were established to interpret what these levels meant in each question. The questionnaire was responded by the CEOs, occasionally accompanied by production or human resource managers, in long interviews held from November 2008 to February 2009.

Participants in the learning process and knowledge input

Following the analytical framework proposed, these are the participants in the process and their main knowledge input.

a) Policy makers

Elected politicians and networkers at the local development agency (that belonged to the two town councils) participated in the process. Elected politicians brought to the process knowledge about priorities of town councils and what kind of measures could and could not get support from councils. Networkers had a deep knowledge of the network and the collective learning processes developed in the past and developing at that moment in EG.

b) Firms

The 27 firms in the network were invited to participate in the project and 25 of them did. The knowledge they had to contribute to the process was the knowledge that they had about how they were innovating in the firm.

c) Agents in the innovation system

I3B (Ibermatica) is a research institute related to an ICT and consultancy firm in the Basque Country. They contributed to the process with their knowledge about innovation measurement and diagnoses in firms.

d) Social researchers

Social researchers from Orkestra contributed to the project with knowledge about how to make a participatory process and with theoretical knowledge related to policy, innovation, learning and networks.

An example of linear learning process

Though it is not easy to separate linear and cogenerated processes in real cases, we present two phases of the learning process where each of the modes was prevalent.

An example of the tangible result of a linear process can be the report that presented the results of the survey. It was the result of combining the knowledge of firms about their innovation processes, the knowledge of policy makers about the goals of the public private cooperation network, the knowledge of I3B about innovation diagnoses and the knowledge of researchers from Orkestra about the role of local networks related to innovation processes.

Although the definition of the survey was a cogeneration process among both types of researchers and policy makers, it was linear for firms as they participated in an in depth interview and later got a report with their results. In the report they could compare their innovation profile with the local average and read some recommendations on how EG could develop learning processes among firms in the county. Recommendations were meant for the network but mainly the networker policy makers were the only ones that felt involved in the process of working on them.

This was not actionable knowledge in the network, change in action at network level could not directly be fostered. Something was missing at this stage in order to take the knowledge generated into action in the network.

Many policy learning processes, that are developed with considerable investment in terms of money and time of participants stop at this stage. Participants are delivered a report, frequently with recommendations or even specific plans. There is often an implicit understanding that it is policy makers who are supposed to develop them. One of the arguments in the case study is that such reports can be very valuable if integrated in a mutual sense making process with the actors of the innovation system, so that the knowledge generated can be made more actionable.

Actionable knowledge in EG

One of the goals about the project was that the result should directly be linked to action in terms of learning processes that would help firms in EG innovate. After they had the results from the survey, networker policy makers and social researchers looked for a way to start a process of sense making among all different actors in EG. They decided to look for concepts, beyond the specific innovation factors in the survey, that would help in such sense making. Researchers contributed with the concepts of analytic, synthetic and symbolic knowledge bases (Asheim eta Gertler, 2005, Asheim et al., 2007) and STI (Science, Technology, Innovation) and DUI (Doing-Using-Interacting) modes (Jensen et al., 2007).

These concepts were new for practitioners (both policy makers and firm representatives) and provoked a discussion that led to the grouping of some of the items in the report that represented the development in the firm of formalized structures and norms which were considered necessary to develop an STI approach. On the other hand, items that directly reflected interaction inside and outside the firm that could facilitate DUI approaches where selected. Following their answers in the survey firms in EG were grouped as follows:

- Group 1: Informally structured firms. Firms with low level of formalization of structures and procedures for innovation and high informal interaction.
- Group 2. Hierarchically structured firms. Small and big firms with few formally structured processes and no participation articulated for them.
- Group 3. Incipient participatory firms. Big firms with incipient interaction on their formal structures.
- Group 4. Standardized and participatory firms. Big firms with formalized structures and systematic participation inside the firm.

Figure 3. Grouping of firms of EG in the categories defined in the cogeneration process

Group 1. Informally structured	Group 2: Hierarchically structured	Group 3: Incipiently participatory	Group 4: Standardized and participatory
5 small 0 large	6 small 6 large	0 small 6 large	0 small 2 large

Another critical element in the discussion was that learning processes could foster the transition of firms from one of the groups to the others making firms evolve from left to right in Figure 3. With this hypothesis in mind, researchers and practitioners reflected on the previous learning processes developed in EG and agreed that learning processes developed up to that moment in the network could be easily identified as efforts to help firms transit from one to another stage, which clearly contributed to sense making for firms.

The cogeneration process described – mainly the fact that they were not given a diagnose of the situation, but they participated in making it- made a difference in the attitudes of network managers and CEOs, Production Managers and Human Resource Managers of firms regarding the role that EG might play to enhance innovation capacity of firms. Before the process they were told by policy makers that EG could make a difference for them to innovate. In the process, they reached that conclusion themselves. This made them feel part of the policy process. This feeling, very related to the compromise of the agents in the system, is critical to generate behavioral additionality.

The cogeneration process continued for months. The typology of firms was used in the next strategic planning process where the goal of EG for the following 3 years was stated in terms of helping firms evolve from one stage to another. It was a decision shared by representatives of local policy makers, firms, training centers and the local development agency.

Action in EG

Actionabe knowledge is an ex post concept, in the sense that we know whether knowledge was actionable when we see whether action derived from it. The linear learning process in EG was later integrated in a cogeneration process. So it is not possible to know what action would have derived from the linear process to compare it with the results of cogeneration.

After the cogeneration process, various firm workshops were created to address different issues that were considered relevant for firms to evolve from one stage to another. These workshops supported by policy makers were the policy instrument used to make firms evolve. In 2010 the following workshops have been held in the main groups in EG:

Figure 4. Action in EG: firm workshops as a tool for innovation policy

Firm representatives	Workshops

Human Resource Managers of firms with more than 50 employees	- Development of tools to foster compromise, participation and implication of persons in the firms - How to improve internal communication
Production Managers of firms with more than 50 employees	- How to systematize innovation in the production process - How to generate motivation in teams
Team leaders of firms with more than 50 employees	- Conflict management - Assertiveness - Self -control
Managers of firms with under 50 employees	- How to develop strategic plans - How to develop cost management systems

There is no way to know whether it would have been possible to gather all these people without a cogeneration process that made them see the potential of this policy. The only evidence is that many diagnoses had been made before the creation of EG and they had not managed to mobilize such an amount of people until these cogeneration processes started.

6. Conclusions

The starting point for the paper was the connectivity problem diagnosed in European regional innovation systems. Four critical challenges of innovation policies have been presented that relate to such connectivity problem in terms of upgrading of the relationships among the elements in the system, demand oriented approaches, contextualization of the policies and tailored portfolios in public-private cooperation.

In this context, the first research question was why there are regions that –despite having long developed innovation policies based on sustained public-private partnership- have not been able to create effective connections among the different actors in the regional innovation system. The paper argues that one of the factors that prevented such connections from developing is the quality of the policy learning processes. Many of such processes have been developed in linear ways, where knowledge inputs of the regional actors have been combined by researchers or consultants to develop strategies, scenarios or plans. Policy makers and other regional actors have often received such strategies, scenarios and plans as finished products, and they have not internalized them. Thus, they have had little influence in practical decisions in the implementation of programs. This way, a divide has been generated between such reflection processes and the learning in and on action. The disconnection between the policy discourse and action has brought as a consequence that terms such as innovation system, cluster, cooperation, public-private partnership, shared leadership that have been assimilated in the policy discourse, have not materialized in sustainable connections. Consequently the credibility of policy makers and policy itself have declined among some regional actors.

The second research question was how should policy learning be to help solve the connectivity problem. The proposal in the paper is to enhance knowledge cogeneration processes using public private networks as the context for learning and social researchers as facilitators that can contribute to the sustainable development of such networks. The case study helps reflect on this kind of processes and in the following paragraph we extract some conclusions on how they relate to the main challenges of innovation policies.

Cogeneration processes in networks help define *context specific policies* as they contribute to opening the black box of how firms and the rest of the agents in a specific context learn. The definition of the firm typology in the case study does not have as an aim to become a general categorization of firms. Its goal is to create a tool that can help policy makers to define support programs that are related to the specific absorptive capacity of each of the groups. *Connections among local policy makers and firms* are this way developed in a more sustainable way, as measures to support innovation are more easily taken into action by firms, avoiding the break between the reflection process and action generated as a result. The transformation towards more *demand oriented* policies is difficult to appreciate in the short run, still, there are reflections that can be made on the case study. The discussion on the factors that facilitate STI innovation has created among networker policy makers awareness of having a regional innovation system that they could be getting support from. Questions have risen about the role of local networks related to the science and technology infrastructure in the territory and decisions have been made to contact technology centers and see how knowledge can be transferred from these to firms using local networks as facilitators of the process. All this is generating absorptive capacity at network level that can generate more sophisiticated demand for technology centers and university. Finally, the whole learning process described in the case study is an example of how innovation policy can be built bottom up, developing *tailored portfolios in public-private cooperation*. The case of the EG illustrates how local municipal policy makers can contribute to innovation policies that are not formally among their competences, helping balance more top down approaches of provincial councils and Basque and Spanish governments.

As policy implications, on the one hand, we highlight the relevance of cooperative networks in public-private partnership as crucial spaces for knowledge cogeneration that can help face the mentioned challenges of innovation policy and generate behavioral additionality. On the other hand, engaged researchers' can foster policy learning. These two elements can help in the shift of policy from top down to network steering and to learning processes necessary to cope with uncertainty, as proposed by Smitt and Kuhlman (2004), or to the generation of what Nauwelauer and Wintges (2008) call 'interactive policy learning'.

The case study also highlights some more specific issues that should be addressed. On the one hand, knowledge cogeneration is a complex process that requires specific know how. Social researchers can play a relevant role in this field, but they often lack the capabilities to play it. Investing in the generation of such capabilities is necessary to be able to foster processes of knowledge cogeneration. The contributions made in the last decades in the field of action research can play a relevant role in regional policy processes.

Another critical issue is to reflect on the role that researchers and consultants play in the policy process. Policy makers should clearly define those phases in the learning process where their participation and interaction with regional actors cannot be outsourced in order to make cogeneration feasible. Initially such processes seem time consuming and not compatible with their agendas. But once a basic shared knowledge is created among policy makers and other regional actors, decision making becomes much less time consuming that would otherwise be.

Finally, the case study shows how a process developed at local level is influenced and at the same time can influence other systems that are conceived at regional level, such as the science and technology system. In order to make policy learning networks efficient, it is necessary to understand them form a multilevel perspective, clarifying the role they play in each of the levels and coordinating the processes developed in each of them.

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