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The Widening and Deepening of Innovation Policy:What Conditions Provide for Effective Governance?

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Keywords: : Innovation Policy, Innovation System, Governmental Activism, Governmental Experimentalism

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Abstract

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1.- Introduction: The new governmental activism and experimentalism in innovation policy

During the past few years, many countries have been widening and deepening their innovation policies in a remarkable way. Governments are becoming more pro-active in using deeper and new forms of policy intervention and in expanding their areas of involvement in order to accomplish large socio-economic goals. Confronted with enduring problems and challenges such as securing job creation, sustaining economic growth, reducing carbon fuel energy dependence, protecting natural environments, coping with ageing societies, improving health systems, or addressing the new security and defence issues in the age of terrorism, most developed governments are reverting to innovation policy as part of the solution. The same holds true for industrialised developing countries, also called late-comer economies, whose governments are widening and deepening innovation policies to tackle specific development-related problems such as reducing poverty, creating jobs in the formal economy, upgrading human resources, building institutional capabilities, or improving health conditions.

In many respects this widening and deepening of innovation policy can be seen as the result of a double process. Firstly, the ‘innovation system’ approach since the early 1990s (beyond the neo-classical lineal model) has emphasised the formal and informal institutional dimensions of the innovation process, has extended the notion ‘innovation’ encompassing not only product and process innovation, but also organisational innovation in the wider Schumpeterian sense (Fagerberg 2005), and has emphasised the complex and intrinsically social nature of knowledge production, exploitation and commercialisation. The gradual spread of this approach into policy-makers' circles and its subsequent reflection in policy-making has been behind the widening of innovation policy –

moving now beyond research-science and technology policies. Secondly, the introduction of new public management (NPM) techniques in the 1980s and 1990s has also affected innovation policy. Governments have been willing to experiment with the design of new forms of governmental action in the area of innovation policy, introducing for example decentralisation, contract-management, privatisation and public-private partnerships, and with the development and use of more sophisticated steering forms in programmes and schemes. New public management has invariably meant a deepening and a transformation of the forms of governmental action in innovation policy.

This is to say that the widening and deepening trends of innovation policy have generally entailed a true experimentalism in policy-making. Many of the new policy measures that widen and deepen governmental action are genuinely new or are a significant adaptation of previous measures in a novel more expanded context. This experimentalism is observable not only in European countries and in the US (Shapira, Klein et al. 2001) (Biegelbauer and Borrás 2003), but also in the late-comer economies in Latin America (Dutrénit and Katz 2005), Asia (Gu and Lundvall 2006) and Africa (OECD 2007).

Before proceeding, one cautious caveat is necessary at this stage. The notions 'widening' and 'deepening' are ideal types aiming to grasp analytically two interrelated trends that have been observable in recent developments of many (national, regional, international) innovation policies worldwide. Hence, these two ideal types are analytical constructs that serve the purpose of characterising this observable phenomenon, namely, the significant efforts in many countries to transform gradually the scope and form of public action fostering innovation processes. Readers therefore have to keep in mind the analytical purpose of using constructed ideal types. In this paper, the purpose is namely to ask about the effects of these transformations in the governance of the innovation system. It is also important to underline that this paper is far from assuming that the widening and deepening of innovation policy is a universal and a homogeneous phenomenon. There is in fact large variation across countries in terms of differences in style and approaches to innovation policy. And there is large variation in terms of the capacities and organisational features of the governments themselves.

Having said that, however, it is argued in this paper that some remarkable trends regarding innovation policy are indeed observable at a general level, both in a time-based and in a cross-country comparative basis. This is why the use of ideal types of 'widening' and 'deepening' are useful, namely, because they are able to capture these general observations in a manageable manner providing useful heuristic devices to approach the social phenomena under study. The next two sections present a series of examples as the most ready-to-hand evidence available to date about these recent transformations. Some of them are consolidated transformations, while others are still transformations on their way (recent initiatives and programmes).

The main argument of this paper is that the widening and deepening of innovation policies since the mid 1990s raises important analytical questions about the extent to which the new approach actually contributes to an effective governance of the innovation system. This is so because the increased governmental activism and experimentalism does not automatically imply an improvement in the governance of the institutional and organisational dimensions of the system conducing to innovation. The point here is that *the extent to which the widening and deepening of governmental intervention is in fact rendering the governance of the innovation system more effective (or not) is a matter of empirical investigation*.

On the face of it, the increased governmental activism and experimentalism concerns the following governance issues. The widening and deepening of governmental action puts pressure on ensuring the internal coherence and strategic dimension of public action, and in particular between the goals and the means, which have to be feasible and doable. Likewise, the virtual expansion of the number of policy instruments developed towards different dimensions of innovation policy renders the horizontal and vertical policy coordination an even more important matter than before because there are more topics, more initiatives and more goals to coordinate. Furthermore, and perhaps most importantly, in an expanded mode of policy intervention the question of how to strike the balance between (governmental) diversity creation and (market) selection in an innovation system becomes acute. When referring to the new, more complex forms of public action (the deepening), the new modes of public-private interaction might pose problems for defining clearly the risk-sharing and respective responsibility of partners in economic and in managerial terms. Likewise, issues of legitimacy and accountability in innovation policy-making might become more difficult to assign, let alone to enforce. Legitimacy and accountability is also an issue related to the increasing trends of functional delegation (to public agencies and other organisations) and territorial decentralisation (regionalisation, cluster initiatives) of innovation policy where issues of overall consistence and democratic control become crucial.

The paper proceeds as follows. The next two sections are devoted to a careful characterisation of the widening and deepening trends respectively. Selected examples of policy initiatives serve to illustrate the different aspects and specific mechanisms through which innovation policies have been expanding their scope and transforming their approach. After that, the paper turns to the issue of defining effective governance in a manageable way (our dependent variable), and of identifying the possible set of independent variables that might affect it. Drawing from a series of theoretical assumptions from the rich literature on governance, the paper develops a specific set of guidelines, through testable assumptions and analytical criteria, for the study of the extent to which the widened and deepened policy approach is contributing to an effective governance of the innovation system.

2.- The Widening of Innovation Policy: Expanding the Scope of Public Action

As hinted before, the widening of innovation policy refers to the gradual extension of the scope and the realm of this policy area. Since the mid 1990s and particularly since the 2000s, many governments have launched a series of public actions towards topics and areas that were not covered previously by the more traditional understanding of this policy. From the post-World War era until the 1980s, most governments focused their sphere of action in the fields of science, research and industrial technology, primarily from a perspective of fostering knowledge production as such and product innovation in the manufacturing sectors. These historical policy paradigms where anchored in specific understandings of the innovation process and on the role of the government, as well as on its limits (Lundvall and Borrás 2005). Naturally, there have always been different national styles of policy-making in this field (Ergas 1987) (Laredo and Mustar 2001); however, some general paradigmatic shifts are identifiable through time in relation to changes in governmental cognitive backgrounds (Bozeman 2000). With the advent of the innovation system's perspective in the early 1990s, the 'innovation' policy paradigm has been gradually widespread, moving beyond (but also encompassing) science, research, technology and development policy approaches. As mentioned above, the new perspective is far broader than before due to its

institutional, evolutionary perspective, and also to its wider understanding of innovation as a social and economic phenomenon.

This new understanding of innovation ushers in the widening of innovation policy in the sense that it expands the role of governments by addressing new issues. The most conspicuous of these are innovation in the service sector, user-driven innovation processes, culture-creative industries and the creative society, innovation for defence and security in a broad sense (not only military defence), innovation for poverty reduction, or innovation in territorial clusters. The next paragraphs provide examples of policy initiatives related to this widening into new areas.

After more than one decade of scholarly attention to the sheer size of the service sector in developed and late-comer economies, and to the importance of innovation processes therein (Miles 2005), innovation policy-makers have recently come to grips with initiatives for fostering innovation in the service sector (OECD 2005). Whereas most countries implicitly include the service sector (den Hertog and Segers 2003), this sector continues to be de facto excluded in innovation policy initiatives. Specific policy initiatives with a generic and horizontal nature addressing a wide variety of service-oriented firms have been recently launched (Rubalcaba 2006). The Finnish 'Serve' programme offers an interesting case at stake because, among other things, it is devoted to promoting the use of knowledge intensive business services (KIBS), or expert firms that provide services and assistance to other firms, typically in organisational innovation. 'Serve' is promoting innovation in small firms located in remote regions, fostering the use of KIBS (Toivonen 2007).

Something similar is happening in the area of user-driven innovation. After several years of scholarly work on the importance of user-producer relations (Lundvall 1988) and of lead users (Von Hippel 1986) in the innovation process, policy-makers have recently started to pay attention to this. One of the most salient examples of user-driven innovation policy initiatives is the programme with this name launched by the Danish government in 2007. The programme aims at diffusing user-driven innovation management methods in firms and in the public sector.

Another new area of action for innovation policy is innovation in the creative and culture industries. Along with the scholarly debate about the importance of creativity and the creative class (Florida 2002), national governments have devoted increasing interest to the economic and innovative capabilities of this sector (KEA 2006). The creative and culture industries include visual arts, performing arts, heritage, film, radio, music, books, architecture and design sectors; however this definition tends to vary across countries. Two of the most advanced programmes for innovation in these industries have been put forward in Singapore and in the UK. The main aim of the 'Creative Community Singapore' is to foster entrepreneurship in the creative and cultural industries by bringing people together and providing specific forms of support. The UK's 'Creative Economy Programme' goes beyond that, envisaging a larger variety of initiatives (DCMS 2008).

Using innovation policy for poverty reduction has become another new theme addressed by late-comer and developing countries, particularly in relation to the UN millennium goals relating to innovation policies (Juma and Yee-Cheong 2005), and the recent debates about equality and innovation (Cozzens 2007). Naturally, developing countries have always related innovation policies to their development targets, typically by promoting innovation in agriculture and health. However, the direct link between innovation and poverty reduction is a relatively new phenomenon. One interesting example of this is the Technology and Innovation for Poverty Reduction Programme,

put forward by the South African government in its innovation strategy of 2002. This was not implemented, but the topic came up again in the recent ten-year plan for innovation (DST 2008).

Defence has always been a central component of innovation policy. The novelty during the past decade has been that the 'terrorism era' has expanded the meaning of 'security' (James 2006), and governments are concurrently expanding the reach of defence R&D programmes to include more sophisticated knowledge and 'soft' security know-how. One notable example is the KIRAS programme in Austria (2005-2013), and its focus on networking among national security research resources, and supporting the linking of the networks with feasibility-demonstration projects.

Last but not least, the widening of innovation policy can be seen to relate to the increasing attention to territorial-related innovation processes. Admittedly, this has taken place gradually since the 1980s, but has been boosted with the innovation-related paradigm in the 1990s. The regionalisation has assumed different forms depending on whether regions have actively developed and financed their own initiatives or have been passive in terms of implementing national initiatives through territorially decentralised national agencies (Perry and May 2007). This is the case for federal or quasi-federal systems like Canada, Germany and the EU (Salazar and Holbrook 2007) (Edler and Kuhlmann 2008) (Edler, Kuhlman et al. 2003) (Borrás 2003), and it is increasingly so for unitary political systems like the UK (Lyall 2007) and Japan (Kitagawa 2007). The cluster approach has also gained increased attention (Boekholt and Thuriaux 1999), a good example of which is the 'Top cluster competition' initiative in Germany (2007-2011). In every round, this programme grants a large amount of resources (max. €200 million for five years) to a few cluster proposals (max. five) formed by firms, research organisations, government authorities, NGOs, and the like aiming to promote the cluster by supporting skill development, research strategies, demonstration projects, and entrepreneurship.

The above tells us that the widening of innovation policy concerns the expansion of the notion of innovation, as much as with the expansion of the activism of different levels of government in this field of innovation (other than the traditional areas of science, research and technology policy).

3.- The Deepening of Innovation Policy: New Forms of Public Action through Policy Instruments

The deepening of innovation policy refers to the use of new and more sophisticated forms of public intervention in this policy domain. Many governments have made a considerable effort during the past few years to develop new policy instruments and to improve existing ones. Entirely new initiatives, programmes, and schemes have been introduced in what seems to be a truly experimental mood in innovation policy instruments. Likewise, existing policy instruments have been revamped, transformed or renewed in important ways to fit new governmental goals and improve their expected impact. Furthermore, the deepening of innovation policy is largely related to the fact that since the early 1990s, the forms of public action in developed countries have been changing in important ways along with New Public Management, which has re-organised the modes of public administration, reinterpreted the relation between the public and the private sectors, and introduced a series of novel forms of public action.

Generally speaking, there are *three large types of instruments* used in public policy. These are regulatory instruments, economic and financial instruments, and soft instruments. This three-fold typology of policy instruments is what has popularly been identified as the 'sticks', the 'carrots' and the 'sermons' of public policy instruments (Bemelmans-Videc, Rist et al. 2003). Admittedly, there are alternative classifications of policy instruments (Linder and Peters 1998) (Hood and Margetts 2007). However, the three-fold division used here remains the most accepted in the literature and continues to be the most widely used in practical contexts (Salamon 2002). In the field of innovation there is *a fourth type of policy instruments*, namely, the meta-instruments. They are 'meta-' because they are not intended to modify some trends in the society and economy, but are used to provide intelligence to innovation policy design.

Regulatory instruments using law and binding regulations have always been an important instrument in the field of innovation policy. This primarily concerns several areas, like the regulation of intellectual property rights; the regulation of universities and public research organisations (most importantly the statutory nature of the organisations, and researchers' employment regulations); competition (anti-trust) policy regulations concerning R&D and innovative activities by firms in the market; bioethics and other ethical regulations. Some crucial regulatory instruments in innovation policy have been recently transformed in several countries in what seems to be a new understanding of how these 'rules of the game' affect the innovation process, or can be used more strategically to foster it. A clear example of this is the reform of the EU law clauses granting exemptions on competition policy regulations concerning R&D agreements. With the new rules of 2000, the EU is said to have moved away from a legalistic approach on competition law towards an economic approach based on analysis of market impact of these types of agreements and the potential market dominance of large R&D alliances. Another interesting example of changes in regulatory instruments is the important transformation in patent regulations during the past few years. Willing to foster 'entrepreneurial universities', some countries have followed the example of the US and eased the regulatory ways for universities to appropriate and exploit their knowledge production through university-owned patents. This has meant the withdrawal of the so-called 'professor privilege' clauses (by which professors could own these patents), such as for example in Germany, Denmark and Norway. Still being a contested measure in terms of its real effects (Iversen, Gulbrandsen et al. 2007), the case at point here is that regulatory innovation policy instruments are being transformed in significant ways.

Science, technology and innovation policy has traditionally made extensive use of the second type of instruments, namely economic instruments (Smits and Kuhlmann 2004). Some fundamental instruments using economic incentives are 'en bloc' support to universities and public research organisations (PROs), competitive research funding (industrial or basic research), tax incentives for firms' R&D, support for technology transfer, and support to venture and seed capital. The general novelty since the mid 1990s is that these instruments have become more diversified, more sophisticated, have introduced elements of conditionality and market-driven principles, and have promoted new forms of public-private interaction. Starting with the first two remarks, the diversification and sophistication of economic instruments in innovation policy is almost visible everywhere. An important novelty regarding economic instruments is the conditionality of support to public research. The 'en bloc' endowments have been recently diminished in order to encourage universities and PROs to earn an increasing part of their budget from external sources (Krishna 2007) (Lepori, van den Besselaar et al. 2007). Likewise, an interesting case of sophisticated economic instrument is the French 'mutual funds for innovation' initiative (FCPI), which combines fiscal incentives and risk sharing for innovative activities. People can make an important income tax

reduction when buying shares in these funds. The Funds must invest at least 60% of their capital in innovative SMEs that are not listed in the stock exchange.

3. 'Soft instruments' are our third grand type of instruments. They are characterised by being voluntary and non-coercive. This means that soft instruments do not use obligatory measures, sanctions or direct incentives or disincentives from the government. Instead, the soft instruments provide information and recommendations, make normative appeals, or offer voluntary or contractual agreements. The most widely used in the field of innovation policy are standards at the national or international level, codes of conduct for firms, universities or public research organisations, management contracts with public research organisations, public-private partnerships sharing costs, benefits and risks in the provision of specific public goods, or campaigns and public communication. Because innovation is a very complex phenomenon, the new instruments might be able to address different aspects of the innovation process and of the innovation system that the previous regulatory and economic instruments could not reach properly

Soft instruments are the third type of innovation policy instruments, and they are 'soft' because they do not use coercion or economic incentives. Instead, they use voluntary means, advocating certain norms and exhorting to some specific form of action. These instruments are increasingly used in innovation policy. In the UK, Freitas has identified no less than 81 different programmes aiming at fostering standards, best practices, managerial practices and other soft measures for improving the firms' own innovation management capabilities, a great part of them being launched after the second half of the 1990s (Freitas 2007). Some of the most notable examples of soft instruments are those fostering the creation of innovation networks. These instruments became rather popular in some countries during the 1990s. The newer versions of networking programmes are more focused thematically than before, and more aware of the need of solid managerial capacities for their success. The Business Angels' Network is a programme launched by the Flemish government in Belgium in 2004. It provides support to a network of business angels, by informing, training and preparing them by informing and encouraging entrepreneurs, and by bringing those groups closer together. The biotech sector network initiative in Thailand is another case of targeted networking soft-instrument, combining economic incentives too (Dodgson, Mathews et al. 2008).

Last but not least, meta-instruments are those providing intelligence to policy design. Innovation indicators, policy benchmarks and technology foresight are the three most prominent examples of meta-instruments in this field. The Open Method of Coordination in the EU context, seeking to promote mutual learning and voluntary coordination through common benchmarks among Member States, is another prominent example (Kaiser and Prange 2004). During the past few years there has been a veritable surge in the use of meta-instruments. A new range of innovation indicators have been developed not only on an international cross-country comparative basis (Bloch 2007), but also on a more local basis (Nauwelaers and Wintjes 2008). Likewise, the improvement of foresight and technological forecasting techniques have followed from a more intensive use of this meta-instrument in the strategic design of innovation policies in many countries (Harper, Cuhls et al. 2008). The large Prospectar foresight programme in Brazil is a good case at hand. Launched in 2001, the programme collected a vast amount of data for the purpose of help in identifying policy priorities (Zackiewicz, Albuquerque et al. 2005). In a sense, the extensive use of these meta-instruments can be associated to patterns of mutual learning across countries, particularly in relation to benchmarks (Paasi 2005).

4.- Widening and Deepening innovation policy: What impact on governance?

The widening and deepening trends characterised above tend to illustrate an increased activism and experimentalism on the part of governments and a more assertive stance on innovation policy-making. The main argument of this paper is that these two significant policy trends might be putting some pressure on the effective governance of the innovation system. This is related to what the MONIT project identified as the risk of fragmentation and lack of coherence (OECD 2005). Along with that, it is argued in this paper that, while expanding and deepening its sphere and form of intervention, governments are putting forward new and more complex and diversified institutional frameworks for their innovation systems in their willingness to stimulate in novel ways innovation processes in their countries. Likewise, the expansion of governmental action is also typically accompanied by important organisational novelties, in most cases creating new organisations for the practical management of expanded governmental initiatives. These new widened and deepened innovation policy initiatives typically entail more complex and more diversified organisational set-ups.

Complexity and diversity are not understood here in a negative sense; nor are they understood in a positive sense either. Rather, the extent to which the increased complexity and diversity of the institutional frameworks and of the organisational set-ups deriving from a more pro-active and experimental governmental intervention towards fostering innovation is in fact rendering the governance of the system more effective (or not) is a matter of empirical investigation. This is to say that the governmental activism does not automatically mean a better or a worse governance of the system. It is an observable phenomenon, the effects of which need to be analysed. And in order to examine these effects on the governance of the system, it is argued here that it is necessary to look at the overall political conditions under which innovation policy is designed and executed.

There is today a large literature dealing with innovation policy both in a direct and in an indirect way. Whereas the former approach takes innovation policy as its main object of study, the latter deals with policy in an indirect way when it discusses some general 'policy implications' stemming from studies about innovation processes. To be sure, these direct and indirect approaches in the literature have contributed in important ways to defining crucial normative issues for policy-makers. However, it is the literature directly dealing with innovation policy as such that has made the clearest analytical attempt to deal with the question of effectiveness. Three streams of this literature are worth referring to.

The first is the stream of literature devoted to assessing the impact and evaluating the effectiveness of innovation policy programmes. There is today a veritably refined analytical toolbox and extended practices about innovation programmes' evaluation, both for ex-post assessment (Shapira and Kuhlmann 2003) (Feller 2007) and increasingly so for ex-ante assessment (Delanghe and Muldur 2007). This literature typically focuses on evaluating the impact (or the expected impact) of individual instruments, specific governmental programmes or schemes. These evaluation exercises bring about important lessons about the real effects of particular instruments of governmental action, providing crucial evidence-based information to policy makers.

The second large stream of innovation policy literature deals with the identification of the areas that require governmental intervention. It is commonly accepted that when dealing with innovation processes, there are no ready-made nor 'one size fits all' policy solutions (Tödtling and Trippl

2005). This means that each individual innovation policy shall be defined so as to find ways of solving the concrete problems faced by its particular innovation system. There are multiple ways of conducting a proper 'diagnosis' of an innovation system in terms of identifying bottlenecks and problems. Perhaps the most widespread is the 'system failure' approach, which goes beyond the theoretically inspired 'market failures' from the neo-classical economic paradigm. Initially identifying three possible systemic failures (organisational, institutional and interactions) (Edquist 2001), the list has been gradually expanded to include further ones such as infrastructure and capabilities failures (Woolthius and Lankhuizen 2005) and specific functions (Bergek, Jacobsson et al. 2008).

The third stream of innovation policy literature directs its attention to the innovative capabilities at the company level and the way in which public action (shall) enhances these. Teece's suggestion that firms are able to profit from innovation if they have access to specialised and complementary assets implies that innovation policy should focus on maintaining those complementary assets in the manufacturing sector, particularly the protection of intellectual property (Teece 1986). Recent work along these lines emphasises venture capital and technology-transfer as other important complementary assets (Chesbrough, Birkinshaw et al. 2006). Following this firm-based perspective, Dodgson and Bessant observe that most innovation policies in developed countries are focused on companies' resources (meaning the static tangible/intangible assets of a firm) rather than on their innovative capabilities (such as the dynamic organisational abilities of a firm) (Dodgson and Beaant 1996). Since innovative capabilities in firms are the triggering factors in the innovation process, the core purpose of innovation policy shall be on building innovative capabilities within them. The authors go further along that path by suggesting that policy initiatives creating different 'innovation agents' (mediating and facilitating such innovative capabilities) are the key to successful innovation policy.

The literature mentioned above provides suggestive approaches about the effectiveness of innovation policy. Their focus on policy instruments' impact assessment, identification of systemic failures and firm-based access to complementary assets/innovative capabilities offers interesting analytical frameworks and insights that are highly valuable for policy-makers. However, to the extent that the current trends of widening and deepening are incrementally and steadily redefining the scope and form of action of innovation policy, these approaches seem to be poorly equipped to *examine the political conditions under which innovation policy can actually contribute to an effective governance of the innovation system*. For that to be the case, we need a single analytical framework capable of studying these political conditions, and of examining the extent to which the recent governmental activism and experimentalism in innovation policy contributes to an effective governance of the system.

5.- Governance, institutions and innovation policy

The central tenet of the governance approach is that state-society relations are changing and becoming more complex and interrelated (Pierre and Peters 2000). The understanding is that the backbone of governance is the set of formal and informal institutions, defining the different types of interactions between the state and the society (hierarchical or more market-based). In a sense, institutions are perceived as the 'atoms' of the different modes of governance. Formal institutions refer typically to regulations, prescribed patterns of interaction, and explicitly (and typically also

exogenously) defined 'rules of the game' (Bevir 2007). Informal institutions are those routines, habits and practices that reflect implicit (and also typically endogenously) defined 'rules of the game'. Together, formal and informal institutions form the institutional framework where actors (individuals and organisations) operate. In a sense, formal institutions can be seen as the fruit of purposive public action in the attempt to shape the behaviour of socio-economic actors. But these can be seen as well (at least in democratic political systems) as the result of formalising norms, principles and values contained in informal institutions. Hence, the institutional framework is at the same time shaping and expressing the way in which actors and organisations interact with each other. And most importantly perhaps from our current analytical interest is that the institutional framework constrains and enables actors in a specific way. This enabling and constraining is of fundamental importance when dealing with innovation trajectories and performance. Therefore, the key focus of this perspective is on the specific features of the institutional framework, its adaptation through time and its ultimate role in socio-economic performance.

There is a widespread understanding in political economy as well as in institutional/evolutionary economics that socio-economic performance is highly related to institutional performance (institutional features and adaptation). This has been related to the notion of 'institutional competitiveness', which refers to a nation's capacity to achieve high levels of socioeconomic performance through its specific national institutional configurations and the adaptability of those to changing circumstances. Therefore, institutional competitiveness stems from the balance of costs and benefits that firms derive from operating within a particular framework of institutions that foster the development of national economic and human capital (Campbell and Pedersen 2007).

In the field of innovation studies, the innovation system approach is based in the understanding that innovation and innovative activities take place in specific (national, regional, technical) institutional contexts, and that the innovative performance (of a country, region, technical sector) is associated to the performance of its innovation-related institutional set up (Edquist 1997).

The question about governance is one about how governmental action is creating the conditions for the change and adaptation of the institutional framework related to innovative activities. And the question about effective governance deals about the extent to which governmental action is truly managing to induce those changes and adaptation of the institutional framework in the right direction, namely, towards improving innovation performance. Hence, *the dependent variable of this study, namely effective governance, can be defined as the successful governmental action conducive to changing and adapting the institutional framework in the innovation system in a way that enhances innovation performance in the economy and society.*

A conceptual clarification is necessary at this stage: whereas governance refers to state-society-economy relations and the role of government in these general terms, innovation policy refers to the set of concrete policy instruments designed and implemented in specific innovation areas, and which have effects on the institutional framework directly concerned with the innovation system. From both angles (general or more specific), the starting point is the relevance of purposeful action towards institutional change, as the means with which to induce improved socio-economic and innovation performance.

The most conspicuous elements of effective governance concern the ability of governmental purposeful actions to coordinate expectations and actors in the system, with the suitability of governmental action, and with its reflexivity.

Coordination is a key aspect of effective governance because the governance of the innovation system concerns the alignment of the different actors (individuals, firms, organisations) and their expectations in the system. The governmental action of innovation policy is of paramount importance in ensuring what form this alignment shall take. Hence, effective governance in terms of coordination refers to the ability of governmental action (in a general sense or in specific innovation policy actions) to transform the institutional framework in such a way that it brings together and organises coherently the interactions of the actors in the system so that innovation performance improves.

The suitability of governmental action is another key aspect of effective governance, referring naturally to the way in which governments deal with the overall contents of their intervention. This refers not only to the appropriateness and complementarity of the individual institutions in the system, but also to the overall style of governmental action towards those institutions and its ultimate degree of aptness to the innovation system's problems. Hence, effective governance in terms of suitability refers to the extent to which governmental action in general - and innovation policy in particular - is actually addressing adequately the problems associated with the institutional framework of the innovation system.

Last but not least, the third key aspect of effective governance is reflexivity. This concerns the social nature of the innovation process, and the ultimate political choices related to the forms of innovation policy according to the specific desired innovative dynamics in the economy. Hence, effective governance in terms of reflexivity refers to the degree to which governmental action and innovation policy are actually articulating and expressing the collective aim of the actors in the innovation system.

Having defined the three basic aspects of 'effective governance', the next section elaborates an analytical framework based on a series of conditions that might affect that.

6.- The conditions for effective governance: An analytical tool box

On the basis of the above, the effective governance of a system of innovation is characterised by the effective coordination, suitability and reflexivity of governmental action towards the institutional setup. Thus, the question that arises at this stage is, what conditions provide for effective governance? Or more specifically, what are the possible independent variables (conditions) associated to the successful (or unsuccessful) governance, understood as coordination, suitability and reflexivity? In the following, six political conditions are identified as possible relevant independent variables explaining effective governance of the innovation system (or the lack thereof). These are: a strategic innovation policy, a positive administrative coordination of innovation policy at the middle-level of executive departments, a balanced diversity creation and market selection, a clear distribution of roles between public and private actors, policy learning, and public legitimacy and accountability. These conditions are put forward as a specific set of independent variables expected to be able to explain successful or unsuccessful governance. Each of these conditions is unfolded into a set of theoretically-based assumptions as to how are they expected to relate to governance. These assumptions are amenable for parsimonious empirical testing, and clear analytical criteria are provided in this regard. Table 3 summarizes the conditions, the assumptions and their analytical criteria.

The first condition for effective governance of the innovation system is the existence of *a strategic innovation policy*, understood here as a crucial tool for aligning actors' expectations in the system. There is today a general understanding that governmental action towards innovation needs to be strategic. This is so because a strategic innovation policy provides a political vision about goals and the specific directions for the system, but also, and perhaps most importantly, because it allows the alignment of actors' expectations on the basis of priority-setting of governmental action. The assumption is that, to be effective, these two elements, namely, political vision and priority setting, are anchored at least in one approach to the system's diagnosis (systemic failures; firms' access to complementary assets; or firms' innovative capabilities). Yet, the analytical criterion is not only *how clearly visions and priorities are defined, but also how these two elements are in fact reflected in the actual definition and implementation of the policy instruments*. One might find situations where a political vision has been put forward by a series of official political documents setting direction and defining priorities, but that this is not reflected in the actual design and implementation of the innovation policy instruments. In such a situation the political vision and priority setting runs the risk of becoming a symbolic signalling device rather than a policy tool. The recent governmental activism and experimentalism expressed in the incremental widening and deepening of innovation policy during the past few years is not automatically generating an overall sense of direction for the innovation system or securing a strategic choice, design and implementation of innovation policy instruments. Hence, an explicit political vision and priority-setting, together with its transposition in the actual work of policy instruments are two criteria for testing the extent to which the strategic plan is providing conditions for an effective governance of the innovation system.

The second condition for effective governance is the existence of *a positive administrative policy coordination at the middle level of executive departments*. Following the MONIT project about governance and coordination (OECD 2005), administrative policy coordination can be understood mainly as the complementarity of different governmental actions reducing redundancy and generating synergetic effects among these governmental actions. This refers mainly to how the administrative and organisational interactions across different sectoral ministries (horizontal coordination) and different levels of government (vertical coordination) are designed and enforced. Since innovation policy (now more than ever) expands over traditional sectoral boundaries of different ministries (education, research, industry/economy, health, defence, environment, and all the examples of widening mentioned above), and since more and more levels of government are involved in a wide array of innovation policy-related initiatives, it is not far-fetched to assume that horizontal and vertical administrative coordination is a necessary condition for effective governance. As Braun mentions, the coordination can take the form of negative coordination (namely, a non-cooperative form of relatively spontaneous coordination among administration units) and a form of positive coordination (namely, an explicit cooperative form of coordination among administration units) (Braun 2008). Since the widening of innovation policy renders the boundaries of this governmental interaction blurred and potentially exposed to redundancies and lack of synergetic effects, it is expected that effective governance is linked to the existence of positive coordination (explicit and co-operative form of coordination). The criteria for investigating this will be to examine two issues, namely, the existence of explicit mechanisms of coordination and the existence of patterns of actors' interactions explicitly conducive to reduce redundancies and enhance complementarity and synergy of governmental actions.

The third condition for effective governance concerns the balance *between diversity creation (typically enhanced by governmental action) and market selection in the innovation system.* This is crucial for the suitability of innovation policy in the innovation system. Evolutionary economists have underlined repeatedly that the innovation process is the creation of knowledge diversity followed by the selection of that knowledge carried on by market dynamics (Nelson 1995). As Metcalfe wisely points out, the aim of policy is to raise the incentives for innovation by facilitating connections to a suitably rich knowledge ecology, whereas the market makes the selection process (Metcalfe 2007). The recent widening and deepening innovation policy means a rather pro-active governmental stance on knowledge production and diffusion because governments are providing an increasing number of incentives (direct and indirect) to create more diversity in the innovation system (more knowledge production, more diffusion of this knowledge, etc). The question is the extent to which market mechanisms are left to perform the necessary selection process that shall follow on from that increased diversity. From this perspective, effective governance concerns striking a balance between both dimensions, namely diversity and selection. In less developed countries, governmental activism might be more necessary in terms of securing the creation of that knowledge diversity than in developed countries, where such diversity already exists. Nonetheless, in both cases they have to keep a balance between both, which essentially implies two issues. The first is that governmental action does not generate more diversity than the innovation system can deal with. This concerns not only the principle of additionality (public incentives shall not substitute private investment), but also with the fact that too many incentives in too many directions might not be able to generate the necessary kind of diversity, let alone an eventual selection process. Hence the assumption is that an effective governance of the system is associated with an enforcement of the principle of additionality by a prudent diversity creation. The second issue concerns the governmental action in securing incentives for market selection process. This naturally comes from the premise that the market selection process ensures a dynamic and efficient allocation of resources in the economy and in the innovation process.

The fourth condition for effective governance concerns the suitability of the actors' role in the system. In a context of increased governmental activism and experimentalism in terms of new forms of public-private interaction, the point at stake is how *the roles and distribution of risks between public and private actors in complex public-private interactions* are defined. Innovation is an activity with a high level of uncertainty and risk. The serendipity in knowledge production and its commercial exploitation together with its public good nature have the tendency to reduce the incentives to conduct innovation. This is the reason why the actions of governments have traditionally been aimed at enhancing these incentives to conduct innovation, by stimulating the framework conditions and by actively supporting processes of knowledge creation (see above). During the past few years, along with the advent of network-like modes of governance, many governmental actors have developed new forms of interaction with private actors. Many of these new public-private forms of interaction are in the 'grey zone' between the two positions in a continuum of state-led or market-led innovative activities. The way in which risk is distributed in this 'grey zone' is paramount for an effective governance of this increased governmental activism. Effective governance is related to at least two issues. Firstly, it is related to the formalised contractual agreement between the public and private partners attributing a clear distribution of risks. The assumption is that the clearer the terms of this distribution, the fewer the potential conflicts between the partners and the more effective governance. Note that public actors might well assume high levels of risk. The point is that the distribution of that risk is foreseen and explicitly negotiated between the partners beforehand. The second issue refers to the degree of conditionality of public involvement and its economic contribution. The assumption is that the

higher the degree of conditionality of public contribution, the clearer the targets of the public actor and the more stringent governance of the public-private interaction in innovation-related institutional frameworks and activities.

The fifth condition for effective governance concerns *policy learning*. Learning is crucial for the effectiveness of innovation policy because it deals with the reflexive dimension of governance. Policy learning refers here to the reflexive process through which public actors take stock of past initiatives and elaborate on future activities in a way that they are ready to adapt constantly the policy initiatives and activities to the ever changing needs of firms and other innovators in the innovation system. From the point of view of our current ambition of providing a set of analytical tools to study the effectiveness of governance, policy learning becomes a central topic to study. Learning is indeed a central topic to study given the recent trends of widening and deepening innovation policy. The increased number of policy instruments and the expansion of the areas covered by innovation policy require an explicit adaptive capability of policy-making. This relates to two essential features of innovation policy-making. Firstly, it relates to policy-makers' active development and use of meta-instruments. As mentioned above, meta-instruments are instruments designed to provide specific reflexive tools for innovation policy making, in terms of assessing previous initiatives and providing advanced intelligence for policy-making. The assumption is that the use of these meta-instruments provides essential insights into adaptive policy-making. Secondly, learning relates to the explicit openness of policy-makers to 'take on board the lessons' from the successes and failures of both their own policy experiences and those of others. This openness relates not only to the general attitude of policy-makers, but most importantly to an active participation in existing (national and or international) learning platforms (Malik and Cunningham 2006). The assumption is that true learning processes take place when policy-makers are seriously following up and actively engaging in these experience exchange activities.

Last, but not least, the sixth condition for effective governance concerns *the public legitimacy* of innovation policy. The allegedly 'technocratic' nature of innovation policy has been challenged during the past decades by social and political unease on topics such as stem cell research, software patent regulations, or the risks associated with the release of genetically modified organisms (GMOs). The innovation process is a complex social and economic process. This means that the social sustainability of that innovation process is inevitably associated with the ways in which popular criticism and concerns about innovation-related phenomena are politically dealt with (Van Asselt and Vos 2008). *Hence it can be assumed that the effective governance of the innovation system depends on the way in which the actual innovation policy-making is legitimate.* This in turn depends on how social concerns and considerations about innovation-related matters are channelled in the political system, and the extent to which these are subject to political accountability. Hence, the analytical criteria are essentially two. Firstly, the existence of mechanisms for popular participation in innovation-related policy-making. Such mechanisms shall be well endowed in terms of organisational assets, but also in terms of independent scientific information. These participatory mechanisms are not substituting conventional democratic representative channels. Rather, they are complementing and supporting them. Secondly, there has to be evidence of a high level of political accountability related to innovation issues, in the sense of an explicit political responsiveness and responsibility to these sensitive matters.

Table 3: The conditions for effective governance and their analytical criteria

Conditions for effective governance	Analytical criteria
A strategic innovation policy	• The existence of an explicit political vision and priority-setting • Evidence that the vision and priorities are transposed to the choice, design and implementation of innovation policy instruments
A positive administrative coordination of innovation policy at the middle level of executive departments	• The existence of explicit and co-operative mechanisms of vertical and horizontal coordination • Evidence of clear patterns of actor's interactions explicitly conducive to reduce redundancies and enhance complementarity and synergy of governmental actions
A rapid adaptation of the formal institutional framework in the innovation system	• Evidence that the formal institutional framework is adapting rapidly • Evidence that recent adaptations in the formal institutional framework have been conducive to the desired levels and patterns of innovative performance
A balanced diversity creation and market selection	• The enforcement of the principle of additionality by prudent diversity creation. • Evidence that governmental action secures incentives for market selection process
A clear distribution of roles between public and private actors	• Extended formalised contractual agreement between partners in complex and 'grey' zone of public-private partnerships • Evidence of conditionality of public involvement in these types of public-private interactions
Policy learning	• Policy-makers' active development and use of meta-instruments • Policy-makers' active participation in learning platforms
Public legitimacy and accountability	• Existence of well-endowed participatory frameworks in the innovation policy-making process complementing formal democratic channels • Evidence of political accountability in innovation-related matters

7.- Concluding remarks

The objective of this paper is to characterise the trends towards the widening and deepening of innovation policies during the past 10 years, and to identify a series of theory-based testable assumptions about the conditions under which effective governance of the innovation system might take place. The core idea is the understanding that the expansion and experimental nature of policy action during the past decade shall not be automatically associated to better governance or to better solutions to the problems of specific innovation systems. Although policy action naturally aims at solving specific problems, the development of many different policy initiatives in different directions and with a wide variety of purposes does not necessarily always mean that these solutions are effective or well tuned to the needs of the system. The first important step in defining the political conditions under which the widening and deepening of innovation policy is able to contribute positively to effective governance of the system is precisely to define what 'effective governance' is. By focusing on effective governance, this paper does not make use of the comparative ideal types approach such as the one suggested by the previous literature (Cooke 2004) (Whitley 2006). However interesting in terms of classificatory efforts, these ideal type approaches tell us little in comparative terms (or even in theoretical terms) about effective governance and the best likely political conditions conducing to it. With a set of clear theoretical assumptions, this paper aims at providing a useful analytical and theory-based toolkit to undertake just that type of analysis.

The proposed analytical framework can help unravel which specific combinations and forms of political conditions are most related to the effective governance of innovation systems. By using the notion 'governance' in analytical/empirical terms rather than normative terms, this parsimonious analytical approach can yield useful insights in terms of overall problematic types of lock-in situations associated to political processes, other than purely technological or economic processes. Since the formal and informal institutions that form an innovation system are intrinsically embedded in political and social forms of organisation, the study of political conditions as a distinct and crucial element in the governance and development of innovation systems becomes fundamental. Last, but not least, this approach allows for a more sophisticated form of cross-country comparison, which is no longer based only on a single country-to-country or model to model comparison (for example, comparing the French and US styles of governance of innovation systems), but also the identification of very specific political conditions that are bolstering effective governance, as opposed to those which are not. Solid empirical evidence of positive and negative political conditions would allow us to take more assertive stances about policy implications with systemic design effects, and hopefully place more emphasis on the overall socio-political dynamics of the ever-changing systems of innovation.

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