PRIME International Conference 2008
Europe-Latin America Conference on Science and Innovation Policy
24-26 September, Mexico City

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

This is a draft version.
Comments are most welcomed.
11,193 words

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Abstract

In relation to the gradual and steady introduction of the systemic perspective and of new public management techniques in innovation policy-making during the past decade, many countries in the developed and developing world have been substantially widening and deepening their innovation policies. The introduction of new and more sophisticated policy instruments (deepening) has been accompanied by an expansion of the realm of action for innovation policy (widening). The main argument of this paper is that this remarkable governmental activism and experimentalism raises important analytical questions about the conditions under which innovation policy contributes to an effective governance of the innovation system. Hence, this paper has two main purposes. Firstly, it characterises in an unambiguous way these two recent trends in innovation policy, problematising their possible effects on governance. And, secondly, it develops an analytical toolbox based on a series of theoretical assumptions about the political conditions for effective governance.

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 like 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 terrorism age, 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 like 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 of the neo-classical lineal model) has emphasized 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 wide Schumpeterian sense (Fagerberg 2005), and has emphasized the complex and intrinsically social nature of knowledge production, exploitation and commercialisation. The gradual widespread 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 (Lundvall and Borrás 2005). 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, 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 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. This is to

say that, analysts 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, this paper argues 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 hand-ready 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 of the governance of institutional and organisational dimension of the system conducing to innovation. The point here is that the extent to which the widening and deepening of governmental intervention are 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 has to do with the following governance issues. The widening and deepening of governmental action puts pressure to ensure 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 of 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 series of specific analytical guidelines and criteria for the study of to what extent 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. Since 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 due 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 issues 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 instruments and initiatives related to this widening.

After more than one decade of scholarly attention to the sheer size of the service sector in developed and late-comer economies, and about 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 (Commission 2003; OECD 2005). The large diversity of the service sector, in terms of different types of services and in terms of the service-dimension of manufacturing sector, renders policy actions towards innovation in services a rather complex matter. Whereas most countries implicitly include the service sector in their innovation initiatives, it continues to be de facto excluded in manufacturing sector focused policy initiatives (den Hertog and Segers 2003). For that reason, it has been argued that there is a need to develop specific policy initiatives with a generic and horizontal nature addressing a wide variety of service-oriented firms (Rubalcaba 2006). Countries like Ireland, Norway, Sweden and Finland have recently launched such type of initiatives. The Finish 'Serve' programme offers an interesting case at stake because one of its four areas is devoted to the so-called knowledge intensive business services (KIBS), or expert firms that provide services and assistance to other firms, typically facilitating and stimulating

process and organisational innovation. Launched in 2006 by Tekes, the Finnish Funding Agency for Technology and Innovation, KIBS-related initiatives are proving to be particularly interesting to promote innovation in small firms located in remote regions, because traditionally these firms do not use KIBS (Toivonen 2007).

Something similar is happening with 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. User-producer relations take place in a very large spectrum of product innovation, meaning that a wide range of industrial sectors actively use these relations in innovation management. 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 bringing a new dimension to the involvement of lead users in innovation processes by strengthening the diffusion of user-driven innovation management methods. One of the most remarkable features of this programme is that it is directed towards private firms, as well as towards organisations in the public sector. Hence, this programme is also used to promote organisational and process innovation in the public sector.

Another new area of action for innovation policy is innovation in the creative and culture industries. Innovation and creativity are largely related to each other. What is interesting however is the policy-makers recent attention to the economic dimension of the later. Along with the scholarly debate about the importance of creativity and the creative class (Florida 2002), international organisations and national governments alike have devoted increasing interest on the economic and innovative capabilities of this traditionally disregarded sector (OECD 2000) (KEA 2006). The creative and culture industries include visual arts, performing arts, heritage, film, TV, 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 Singapore Ministry of Information, communication and the Arts launched the initiative 'Creative Community Singapore' in 2005, which is a quite open programme developed and run by a private-public consortium. The main aim of the Singapore programme is to foster entrepreneurship in the creative and cultural industries by bringing people together and providing specific forms of support. The UK 'Creative Economy Programme' is however far more ambitious. Launched in 2005 and revitalised in 2008 by the Brown government, this programme envisages a large variety of initiatives (DCMS 2008). Among others, the new strategy aims at stimulating apprenticeship in the sector, supporting research and development, stimulating entrepreneurship, supporting creative clusters by means of the Regional Development Agencies, and promoting the UK (London in particular) as a global hub for cultural and creative industry events.

Using innovation policy for poverty reduction has become another new theme addressed by late-comer and developing countries when dealing with their innovation policies. This probably has to do with the political debate around the UN millennium goals related to innovation policies (Juma and Yee-Cheong 2005), and the recent scholarly debates in the innovation policy literature about equality and socio-distributional issues (Cozzens 2007). Naturally, developing countries have always related innovation policies to their development targets. Traditionally, this has been done by promoting innovation in crucial sectors like agriculture and health. However, the direct link between innovation and poverty reduction is a relatively new phenomenon, indicating once more the gradual widening of the scope of innovation policy. 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 a rather small programme, which has not

been fully implemented (OECD 2007). Nevertheless, poverty reduction has come up again as a specific goal in the recent ten-year plan for innovation, which has envisaged some horizontal activities like the advance of social-sciences research on the topic, and more actively promoting knowledge application into poverty-related issues (DST 2008).

Military defence has always been a central component of innovation policy in most countries. The novelty during the past few years is that the 'anti-terrorism era' has expanded significantly the way in which 'defence' and 'security' are being understood (James 2006). As a result, governments are currently expanding the reach of traditional military and defence R&D programmes to include more sophisticated knowledge, intelligence and 'soft' security know-how. One notable example of this is the KIRAS programme in Austria (2005-2013). In its general statement, the KIRAS programme states, 'Security research has to be comprehended from national sight in terms of multidimensional, long reaching, multidisciplinary and integrative. Comprehensive security means the durable guarantee of a high level of life basis and possibilities of evolvement for all members of society'. Managed by the Austrian Research Promotion Agency (FFG) KIRAS focuses on four support instruments, two of them rather conventional (R&D cooperative projects, and support of feasibility studies and demonstration projects), and two rather novel, namely, networking among national security research resources, and supporting accompanying measures linking the networks (above) with feasibility-demonstration projects. In other words, KIRAS aims at advancing a wider and more complex information and know-how exchange while linking it to conventional military research.

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 with the advance of innovation-related paradigm and the subsequent rapprochement between science, technology and innovation policy, and with the recognition that knowledge and innovation are crucial elements for territorial economic development; most developed countries have increasingly regionalised their innovation policy. The regionalisation has assumed different forms depending on whether regions have developed and financed actively their own initiatives or they are passive in terms of implementing national initiatives through territorially decentralised national agencies (Perry and May 2007). Different examples of this are federal or quasi-federal systems like Germany (Edler and Kuhlmann 2008) and the EU (Edler, Kuhlman et al. 2003) (Borrás 2003), as it is increasingly so for unitary political systems like the UK (Lyall 2007) and Japan (Kitagawa 2007).

The regional dimension of innovation policy has followed different forms of multi-level governance in cooperative federal systems like Canada and Germany (Salazar and Holbrook 2007). What is perhaps interesting is that innovation-related policies towards clusters, the top-down and bottom-up dimensions are becoming more visible (Borrás and Tsagdis forthcoming 2008). Examples of countries with territorially decentralised innovation-related governmental initiatives are the Netherlands, Germany, Denmark and Slovenia cluster policies (Boekholt and Thuriaux 1999). A good example of this is the recently launched '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 few cluster proposals (max. five). Clusters are constituted groups of 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 top-down strong competition framework designed and funded by the German federal government matches with (the selected) bottom-up clusters' own initiatives put forward by these self-constituted networks of innovation-oriented organisations.

Cities and local governments have also become increasingly pro-active actors in innovation and economic development strategies. This is currently combined with urban planning and city renovation strategies. Municipal areas (particularly cosmopolitan cities) are increasingly using their innovative environments as a strategic branding for attracting human and financial capital. A case at stake is the '22@Barcelona' initiative, operating since 2005. This initiative aims at profiling Barcelona as an innovative hub and as the future 'California' of Europe.

The above tells us that the widening of innovation policy has to do with 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).

Table 1: Examples of newly widened initiatives in innovation policy

Examples of newly widened policy initiatives	***Country of example***
Innovation in the service sector	Finland
User-driven innovation	Denmark
Creative and culture industries	Singapore, UK
Poverty reduction	South Africa
Expanded defence and security	Austria
New decentralised and territorial-related innovation initiatives	Several examples

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. As mentioned in the introduction, to a very large extent these significant efforts are related to an increasing focus on the effects and forms of policy instruments from the part of governments. However, the deepening of innovation policy is also 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. Governments have 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. Naturally, this has also affected innovation policy, not least by deepening its form of 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). Regulatory instruments using law and binding regulations are an important instrument in the field of innovation policy. This has to do primarily with several areas, like the regulation of intellectual property rights (in particular, but not only, patent regulations); 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 related to innovative activities; and last but not least, some specific industrial sector regulations with effects on innovative activities. In innovation policy, regulatory instruments are those affecting some fundamental 'rules of the game' for knowledge and innovation processes. Because regulations are obligatory, these rules of the game are compulsory and constitute an important dimension of the formal institutional set-up of a system of innovation.

Regarding the second type of instruments, the economic instruments, science, technology and innovation policy has traditionally made an extensive use of these (Smits and Kuhlmann 2004). This is particularly the case for instruments stimulating positive incentives in cash and in kind. One of the most widely used instruments is 'en bloc' public support to research organisations, primarily universities and public research organisations. Other fundamental instruments using economic incentives are competitive research funding (industrial or basic research), tax incentives for R&D performed at firm level, support to technology transfer, and support to venture and seed capital.

'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 shearing 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

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 as such, as the three previous types of instruments do. Instead, meta-instruments are designed and used with the purpose of providing intelligence to the process of formulating innovation policy itself. 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).

It is not adventurous to state that there have been significant advancements and transformations in the four types of instruments during the past few years. This has to do with a new understanding of the role of public action and the interaction between public and private actors in the provision of common goods, but also to the advancement of more detailed knowledge and analytical tools from the part of policy-makers.

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. In a nutshell, the new rules give a clear time limit to the cooperation between two or more firms for the joint research and development of a product, and they establish that the parties shall have a market share of less than 25 per cent. The most interesting aspect of the new rules is precisely their economic concern with the potential market dominance and lasting durability of large R&D alliances and their possible negative impact on innovation at large. This contrasts with the rules of the early 1980s, which were only focused on creating a legal space in anti-trust law for any kind of R&D agreements, and did not assume any possible negative effects in the innovation process (Borrás 2003). Another interesting example of changes in regulatory instruments is the important transformations 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 regulation of university patents has in most cases meant the withdrawal of the so-called 'professor privilege' clauses (by which professors could own these patents), like 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 innovation policy instruments are being transformed in significant ways.

Economic instruments, for their part, continue to be the most widely used type of instruments in innovation policy. 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. Traditional direct support measures have given way to new indirect support measures. One such indirect measure is, for example, public funds providing loans with interest rates below market prices to private venture capital firms, with the purpose of enhancing the availability of risk-willing capital, an essential factor for innovation. Likewise, more sophisticated policy instruments have been recently created. An interesting case is the French 'mutual funds for innovation' initiative (FCPI) created in 1997. This is an instrument that combines fiscal incentives and promotes risk sharing for innovative activities. Physical persons can make an important income tax reduction when buying shares of these funds. The Funds must invest at least 60% of their capital in innovative SMEs that are not listed in the stock exchange.

As mentioned above, economic instruments of innovation policy have introduced elements of conditionality and market-driven principles. This is the most evident on the economic instruments traditionally used to support public research. The 'en bloc' endowments to the large national public

research organisations (PROs) have been recently diminished in a significant way in a drive to encourage these organisations to earn an increasing part of their budget from other sources of income, typically from public sources on a competitive basis or from private sources (Lepori, van den Besselaar et al. 2007). The increasing conditionality of PROs' funding is largely related to a new set of socio-political expectations and understanding about the role of PROs in the innovation system (Krishna 2007).

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. Some of the most notable examples are instruments fostering the creation of innovation networks. These instruments became rather popular in some countries during the 1990s. The newer versions of networking programmes are perhaps 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). 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).

Last but not least, 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 in an international cross-country comparative basis (Bloch 2007), but also at 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, but also for a more widespread use of the findings by actors in the innovation system. As in other cases, the methodology used was largely adapted to the specific needs of the Brazilian innovation system (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. This is particularly so in the explicit use of benchmarks as tools for innovation policy (Paasi 2005).

Table 2: Examples of deepened policy instruments in innovation policy.

Type of policy instruments	*Examples of deepened policy instruments*	*Country of example*
Regulatory instruments	Competition regulations' exemptions to R&D alliances	EU
	University patent regulations	US, Germany, Norway, Denmark
Economic instruments	Fiscal incentives – mutual funds for innovation	France
	Conditionality of Public Research Organisations	Several countries
Soft instruments	Business angels' network	Flanders (Belgium)
	Biotech firms' networking scheme	Thailand
	Improving management capabilities in firms	UK
Meta-instruments	Prospectar - Technology foresight programme	Brazil
	Benchmarks	Several countries

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 from 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, this paper argues 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, the paper argues 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 way and in an indirect way. Whereas the former approach takes innovation policy as its main object of study, the later 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 define 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 process, 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 to find ways to solve 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 failures) (Edquist 2001), the list has been gradually expanded to include further failures like infrastructure and capabilities failures (Woolthius and Lankhuizen 2005), also in the context of regional innovation systems (Prager 2007).

The third stream of innovation policy literature directs its attention to the innovative capabilities at the firm 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 firms' resources (meaning the static tangible/intangible assets of a firm) rather than on firms'

innovative capabilities (such as the dynamic organisational abilities of a firm) (Dodgson and Bessant 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 in firms. The authors go further on that path suggesting that policy initiatives creating different 'innovation agents' (mediating and facilitating such innovative capabilities) are at the end of the day 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 able to study these political conditions, and to examine to what extent the recent governmental activism and experimentalism in innovation policy contributes to an effective governance of the system.

5.- Governance, institutions and innovation policy

The term 'governance' has received an astonishing deal of attention among scholars and policy-makers during the last decade or so. In spite of this widespread use in academia and in political documents, the conceptual definition of this notion remains still rather vague. Mark Bevir provides the following general perspective: 'The term governance can be used specifically to describe changes in the nature and role of the state following the public sector reforms of the 1980s and 1990s. Typically, these reforms are said to have led to a shift from a hierarchic bureaucracy toward a greater use of markets, quasi-markets, and networks, especially for the delivery of public services. The effects of the reforms were intensified by global changes, including an increase in transnational economic activity and the rise of regional institutions such as the European Union (EU). So understood, governance expresses a widespread belief that the state increasingly depends on other organizations to secure its intentions, deliver its policies, and establish a pattern of rule.' (Bevir 2007): 364. Bevir's account of 'governance' refers to the specific historical situation of changed state-society interactions that follows from a set of political and administrative events. This understanding tends to reflect a 'before' and 'after' of the liberal reforms of the state pursued in the 1980s in the Anglo-Saxon world, and in the 1990s in other parts of the developed and developing world.

Other scholars, typically from the German tradition, relate the notion governance to more general aspects of contemporary post-war state-society relations, not necessarily referring to the specific events and reforms of the 1980s/90s (Benz 2008 forthcoming). Their approach relates governance to the set of different possible forms of coordinating collective action. Governance can assume many different modes, depending on where the actors interact with each other and with the state in hierarchical, network, or in competitive modes. Governance is hierarchical when the state coordinates social interactions by coercive, obligatory and non-competitive means. Likewise, governance assumes a network-based mode when social actors and organisations interact with each

other and with the state in a more heterarchical manner, meaning on a more equal footing based on mutual-dependency. And governance is competitive when actors interact with each other in a market-based form, typically associated with liberalisation and privatisation of activities/organisations performed/owned by the state. Most scholars agree that these three modes of governance rarely exist in pure forms and are separated from the other. Indeed, growing evidence from empirical work tends to show that in different policy areas the modes of governance are typically found in specific combinations with one another.

Two central tenets of the governance approach (in both its Anglo-Saxon and German traditions) are that the state-society relations are changing and becoming more complex and interrelated; and that the backbone of governance is the set of formal and informal institutions, defining the different modes of coordination and interaction between the state and the society. 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'. 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 socio-economic actors behaviour. 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.

In the field of innovation, the question about effective governance is a question about how governmental action is steering the interactions of actors taking place in the innovation system. Hence, *the dependent variable of this study, effective governance, can be defined as the successful steering of the actors' interactions in the innovation system in a way that it supports the desired innovative dynamics in the economy and society*. More precisely, since innovation policy is the main mechanism through which steering takes, place, 'successful steering' has to do with the effectiveness of three key aspects of innovation policy, namely, its effective coordination, its suitability, and its reflexivity.

As mentioned before, effective coordination is a key aspect of effective governance because the governance of the innovation system has to do with the alignment of the different actors (individuals, firms, organisations) in the system. The governmental action of innovation policy is of paramount importance to ensure this alignment. Hence, effective governance in terms of effective coordination refers to the ability of innovation policy to bring together and to organize coherently the interactions of the actors in the system.

The suitability of public 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 policy instruments deployed, but also to the overall style of public intervention 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 innovation policy is actually covering the policy needs of the system.

Last but not least, the third key aspect of effective governance as successful steering is reflexivity. This has to do with the social nature of the innovation process, and the ultimate political choices

related to the forms of steering according to the specific 'desired innovative dynamics in the economy'. Hence, effective governance in terms of reflexivity refers to the degree to which innovation policy is actually articulating and expressing the collective aim of the actors' in the innovation system.

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

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

On the basis of the above, the effective governance of a system of innovation as successful steering is characterized by the effective coordination, suitability and reflexivity of innovation policy. Thus, the question that raises at these stage is, what are the conditions under which we can assume that such effective governance is likely to emerge? In other words, what are the possible independent variables associated to the successful (or unsuccessful) steering, understood as effective coordination, suitability and reflexivity? In the following, seven 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 rapid adaptation of the formal institutional framework, a balanced diversity creation and market selection, a clear distribution of roles between public and private actors, policy learning, and public legitimacy and accountability. The seven conditions and their analytical criteria are based on a series of explicit theoretical assumptions amenable for parsimonious empirical testing explained below. They are summarized in table 3.

The first condition for effective governance of the innovation system is the existence of *a strategic innovation policy*. 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 strategic innovation policy provides the basis for priority-setting of governmental action (Borrás, Chaminade et al. 2008 forthcoming). 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 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 political 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 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 farfetched to assume that horizontal and vertical administrative coordination is a necessary condition for effective governance. As Braun mentions, the coordination can take 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 actor's interactions explicitly conducive to reduce redundancies and enhance complementarity and synergy of governmental actions.

The third condition for effective governance is related to the existence of *an innovation policy stimulating a rapid adaptation of formal institutions*. The interactions among the actors in the innovation system are largely shaped by formal institutional frameworks (which are official and compulsory, typically of legal nature) and by informal institutional frameworks (which are spontaneous and self-defined, typically unspoken norms and routines). We can assume that when innovation policy contributes to an effective governance of the system when it is able to stimulate a rapid adaptation of the formal institutional framework in a way that is conducive to the desired levels and patterns of innovative performance in the economy. Evolutionary and institutional economists have generally understood the change in the innovation system to be a co-evolutionary process of transformation in the technology, the industrial structure and the supporting institutions of the system (Nelson 1994). These supporting institutions are the formal 'rules of the game', the formal institutional framework shaped by the governmental action. Hence, from this it can be assumed that that effective governance of the innovation system (achieving the desired levels and patterns of innovative performance) is highly related to the adaptation (indeed the rapid adaptation) of the formal institutional framework, in a way that eases and stimulates new forms of actor's interactions, which in the long term will facilitate a true co-evolution mentioned above. A rapid adaptation of the formal institutional framework in a country is largely associated to the notion of 'institutional competitiveness' in comparative political economy studies (Campbell and Pedersen 2007).

The fourth condition for effective governance has to do with 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, at the end of the day, the aim of policy is to raise the incentives to 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 from that increased diversity. From this perspective, effective governance has to do with striking a balance between both dimensions. 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 issue is that governmental action does not generate more diversity than the innovation system can deal with. This has to do not only with 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 has to do with the governmental action 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 fifth condition for effective governance has to do with 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 governments' actions have traditionally 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 lesser 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.

The sixth condition for effective governance has to do with *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 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 to adaptive policy-making. Secondly, learning relates to the explicit openness of policy-makers to 'take on board the lessons' from successes and failures of own and of other's policy experiences. 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 engaged in these experience exchange activities.

Last, but not least, the seventh condition for effective governance has to do with *the public legitimacy* of innovation policy. The allegedly 'technocratic' nature of innovation policy has been challenged during the past decades by social and political uneasiness on topics like stem cell research, software patents 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 way in which popular criticism and concerns about innovation-related phenomena are politically dealt with (Borrás 2006) (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

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