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Structure and Operation of the National Policy Councils for Science, Technology and Innovation: the cases of Chile and Spain

Rodrigo A. CEVALLOS and Carlos MERINO MORENO*

Abstract

In the past decades, National Policy Councils for Science, Technology and Innovation (STI) have been deployed worldwide to aid governments steering their efforts on STI, and therefore their countries' progress. Growing demands for social participation, representation and legitimation in the science, technology and innovation policy arenas are portraying this type of organisation as key for the definition of future paths for development. Moreover, councils have slowly gained policy and scholarly attention to achieve better coordination and enhance the strategic approach to STI. However, little evidence has supported the best fit of council for every country's governance configuration. Building on this direction, this chapter presents an exploratory and descriptive comparative qualitative case analysis of two diverse cases: the Chilean and Spanish councils. The results suggest that the higher the capacities that the council has, the harder it is to comply with its councillors' mandate and demands; and that the organisation's learning and cultural development seems to help with fitting expectations and outcomes.

Keywords: science policy, research policy, innovation policy, governance, councils

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I. Introduction

Steering the efforts in science, technology and innovation has positioned itself as a widespread condition in the path for the development of countries. This intention has several complexities derived from their context, depicted by the National Innovation System (NIS) approach. The Innovation System is based on different sources of actors and their interactions, aimed to ‘pursue innovation processes’ and domains bounded either by a geographical/spatial setting, a sector, or specific activities (Edquist, 2005). These actors participate from different spheres, public and/or private sectors, commonly have different interests, and typically also divergent levels of participation in the policy domains comprised in STI. However, this approach is often confronted with the frame of *neoliberalism*, that allegedly promotes non-interventionism from the government but constraining it to the design of *framework conditions* (Lundvall & Borrás, 2005), encouraging a passive role of the state mainly in the western countries (Martin, 2016).

However, due to their legitimate interests, governments foster instances for the spheres to connect and interact with an agreed strategy for their countries to aim their efforts. Among the policy options for this purpose, a relevant share of OECD countries – most of them western countries, nuancing the aforementioned passive role of the state and adding complexity – has decided to deploy National Policy Councils for Science, Technology and Innovation¹ (OECD, 2018b). The councils are rated one of the most important arrangements to achieve coordination of innovation policy, and also serve as a setting for other preferred methods such as the definition of national strategies and visions (OECD, 2012). In these councils, different stakeholders summoned by a country’s government gather to – at least – provide advice on the domains related to STI. The stakeholders of these domains are commonly portrayed as *corporate actors* (Pelkonen, 2006) referred to STI, such as universities, enterprises, and public and/or private research and/or technological institutes, among other organisations.

In the context of a scarcely studied subject such as the governance of STI (Borrás & Edler, 2014; Edler & Fagerberg, 2017), the even lower scholarly attention paid to the organisations that are aimed to drive this governance may seem accessory. However, in the highly prescriptive context of the academic field of innovation policy studies (Flanagan & Uyarra, 2016), the policy reports based on NIS analysis that policy-orientated organisations such as OECD, The World Bank and UNCTAD have increasingly performed for developed and developing countries (Chaminade, Lundvall, & Haneef, 2018); and at the same time confronted to the notion that the NIS approach fails in explaining how coordination is actually going to happen (Braun, 2008), further scholarly work seems critical. Moreover, in an STI landscape that increasingly requires to intertwine stakeholder participation and consensus on the future of STI – to cope and manage demanding objectives in terms of social capillarity, directionality and implementation, such as Grand Challenges (Kuhlmann & Rip, 2018), Missions (Mazzucato, 2018a; Mazzucato, 2018b) or the dimensions of Responsible Innovation (Stilgoe, Owen, & Macnaghten, 2013), more and better theory and evidence seems of the utmost importance in order to provide nurturing analyses and advice.

The objective of this chapter is to understand on an empirical basis the relationship between the structure defined by governments for a council and its general operation. In this process, to shed light on a broader range of options, an exploratory and descriptive study is performed to answer the following research questions:

- 1) How do different models of councils shape their operation?
- 2) How does the structure and operation of different councils relate to their mandates?

A qualitative comparative case study analysis was performed in two councils, the Chilean National Innovation Council for Competitiveness (CNIC) and the Spanish Advisory Council for Science,

¹ The concept used in the cited work is Research and Innovation Council. However, as an umbrella concept, this chapter will use the term National Policy Council for Science, Technology and Innovation, to recognise the geographic – but also normative – boundaries of the organisation, to differentiate the policy councils from the councils mainly orientated to funding activities, and establishing the potential to participate in the domains of science, technology and innovation policy, even when some councils explicitly or implicitly focus in a specific domain.

Technology and Innovation (CACTI). These two countries share significant cultural and institutional features but also differ significantly in the history, design and - arguably - in the implementation and operation of their councils. The Chilean Declaration of Independence from the Kingdom of Spain was signed in 1818, but several of the Spanish-inspired institutions still function today in Chile. However, these countries have developed following different paths in the last decades. Politically, Chile has had a strong presidential regime while Spain is still a monarchy with a parliamentary system; meanwhile, regarding the economic outlook, the Chilean economic growth has been based on harsh pro-market policies from a small and open economy and in Spain liberal policies have been embraced, with a welfare approach while joining the European Union.

Due to the lack of substantial empirical evidence to address our research questions, rather than a binary response on the compliance of the councils' expected products, the basis for this analysis will be the experience of the councillors who participated in these councils. As can be understood from the above questions, the objective of this research is to assess their operation and the councillors' experiences on them, and not the performance of the councils in terms of their outputs or outcomes. This experience is relevant for both the scholarly field of governance of STI policy, specifically their organisations, and provides valuable lessons for policy implementation.

The rest of this chapter is organised as follows: section 2 frames the theoretical background of this research and showcases previous studies. Then, section 3 explains the methodology and results obtained. Finally, section 4 discusses the findings and provides some conclusions and avenues for further research.

II. Science, technology and innovation policy, governance and policy councils

The high-level governance² of STI remains an understudied subject and, in a more specific context, the study of the organisations of the field of STI has not had significant scholarly attention – with exceptions like Lepori and Reale's study on research agencies (Lepori & Reale, 2019) and Breznitz *et al.*'s thorough work on innovation agencies (Breznitz, Ornston, & Samford, 2018). The policy domains of STI embrace different objectives; science policy aims to address mixed goals, in a wide range from the national prestige to cultural values, which includes national security, and other social and/or economic objectives; meanwhile, technology policy presents a shift from the purposes of science policy to an instrumental approach to 'national prestige and economic objectives', while innovation policy aims to address 'economic growth and international competitiveness' (Lundvall & Borrás, 2005). However, in the complexity of NISs, institutions it is broadly understood that they act as a *guidepost* for the actions to be developed by agents and collectives (Lundvall, 2016), and this makes them *complex social systems* on their own in which networks and relationships matter (de la Mothe, 2004)³. As recognised by Bengt Ake Lundvall, one of the positive impacts of the NIS consists of moving 'the attention in policy circles in charge of research, innovation and industrial development from linear to interactive thinking on innovation' (Lundvall, 2007). In this systemic context, NIS approach points towards 'the desirability of alliances and coordination among the actors within the NIS to avoid system failure – the lack of cooperation and coordination' (Schot & Steinmueller, 2018). This complexity is also a central part of the notion of NIS since it entails the interaction needed between organisations and institutions to promote innovation, and also the *strategic innovation systems management* that the policymakers can develop to increase their influence (Fagerberg, 2017). As has been already mentioned, National Policy Councils for STI are one of the available, and increasingly preferred, policy options to deploy by governments to meet this systemic need.

The notion of governance has been used by the OECD in the STI field stressing its relationship with the concept of coordination, sketching how this latter term is commonly accountable for a substantial share of the failures linked to the former concept (OECD, 2012). The complexity of STI policy domains and the

² For the specific case of Science and Technology, the increased tensions in their governance have led to a shift from government to governance (Borrás, 2012).

³ Probably, due to the context, this quote does not consider the differentiation made by Edquist and Johnson of *Institutions* into *Institutions* and *Organizations* (Edquist & Johnson, 2015).

role of policy councils in their governance were empirically diagnosed in the early 2000s by the Monitoring and Implementing National Innovation Policies (MONIT) project developed by the OECD, mainly as a negotiation arena between actors, having high expectations on the strategic process but lower aspirations regarding the implementation of innovation policies in a horizontal level (OECD, 2005a). More specifically, councils⁴ are defined by Galli and Teubal as part of the organisations of NIS, along with ministries, bureaucratic bodies, regulatory bodies, social bodies, educational bodies, among others; highlighting their role in soft functions such as policy-making (Galli & Teubal, 2005), and are commonly suggested to achieve ‘more coordination in innovation policy’ (Edler & Fagerberg, 2017) and ‘more effective innovation governance’ (Foxley, Saez, & Valenzuela, 2015). Following the analogy of Kuhlmann *et al.* (Kuhlmann, Shapira, & Smits, 2010), the *three dancers of innovation policy*⁵ have in the STI councils a ballroom to compose the melodies for their future dances. Building from these notions, previous studies have defined the councils as could be seen in Table 1. For this research, features from both definitions will be considered, since the first definition explicitly considers the involvement of experts and stakeholders and the second graphically frames their policy domains; both characteristics are essential for the working definition.

-----INSERT TABLE 1-----

STI policy councils could be illustrated as the nervous system of STI policy. The executive capacity resembles the central nervous system by having the chance to analyse and give strategic foresight and then to make things happen. On the other hand, the coordinative capacity shares some properties with the peripheral nervous system, having nerves and nerve fibres, by being sensitive to what is happening in the environment, communicating them to the rest of the system, and gathering resources that will trigger efforts and other systems’ responses. Following the same idea, part of the coordinative capacity of gathering actors and resources will happen involuntarily as an autonomic nervous system response, and others will need voluntary efforts as a parallel to the somatic nervous system. As the OECD data states (OECD, 2018a), the transversal evidence for innovation policy coordination stresses the role of the councils into strategic and coordination tasks. This mandate is related to the characteristics of the councils as a proxy of society and an intertemporal consensus device, and this involvement of the society complies with several, if not all, of the features for *inclusive development* highlighted by Dutrénit and Sutz (Dutrénit & Sutz, 2014). However, not all systems – even those having the same organs – integrate these capacities and operate in the same way. The previous analogy helps to understand the role of the councils on the types of coordination highlighted by Braun the ‘functional/policy coordination’ in the context of a consensual agenda and strategy, and the ‘administrative coordination’ to put the pieces of machinery into action (Braun, 2008); but it in this case with a span that goes beyond the government boundaries and reach.

The differentiation of these organisations, as suggested above, into their structure and operation is critical due to analytical reasons. The structure of an organisation could be easily copied⁶ to be implemented in another country or setting. However, the operation embraces difficulties that are not simple to monitor regarding cultural and idiosyncratic factors among locations. In this scenario, the structure could be understood as a blueprint for an organisation, but the daily operation is what constitutes its performance. Following this idea, comparative studies mainly based on the structure of different STI councils, have been developed by international organisations, e.g., OECD, national agencies – on its own or commanded to international organisations or consultancy companies – or practitioners and scholars of the field (Borowiecki & Paunov, 2018; Escobar & Valenzuela, 2015; OECD, 2009; Schwaag-Serger, Wise, & Arnold, 2015). These analyses on the structures highlight some features such as the floating role of the councils within different governments (closer to the presidency, or to the ministries levels, or even lower

⁴ In this case referring to Science and Technology Councils, which was the common entity at that time, following the ideas of Douglass C. North (North, 1994).

⁵ Namely Innovation Theory, Innovation Policy and Innovation Practice.

⁶ As stated in more detail by Lundvall, ‘strategies based on naïve copying may be avoided and institutional learning across national borders might be stimulated’ (Lundvall, 2016).

in the hierarchy), the different styles regarding the composition of the councils, the abysmal differences in the resources devoted for them, among other relevant characteristics. Regarding the operation of the councils, besides some of the sources mentioned above, two in-depth research cases have been developed based on the experience of Sweden and Finland councils' activity (Edquist, 2018; Pelkonen, 2006). Further details on the councils considered in this research will be discussed in the following subsections.

National Innovation Council for Competitiveness (CNIC)

By the year 2005, Chile was a thriving small open economy that was concerned about its future competitiveness. President Lagos commanded a commission with the mandate of devising a council⁷ for STI in the last semester of his term. The resultant organisation was named National Innovation Council for Competitiveness (CNIC), this council was heavily based in the now replaced Science and Technology Policy Council of Finland (STPC) and gathered personalities from different backgrounds. The OECD stressed that long-term growth forecasts for Chile seemed nuanced by a low R&D investment – more dramatically by exiguous business investment in R&D – and a fragmented NIS, while being hopeful that the newly devised National Innovation Council can contribute to coordinating policies and actors (OECD, 2005b). CNIC's establishment was considered the 'most important institutional innovation in 30 years' (Benavente, Bravo, Goya, & Zahler, 2016), its operation lasted for almost fifteen years – including a slight variation to National Innovation Council for Development (CNID)⁸ since the year 2014 – and through four presidential mandates of different coalitions that have mandated the Council by decree⁹. In the year 2020, the Council will give room to a new council in the context of a reorganisation of the public Chilean STI institutionalisation.

Advisory Council for Science, Technology and Innovation (CACTI)

The Spanish Law for Science, Technology and Innovation¹⁰ of the year 2011 consolidated a second phase of the Spanish development in Science, Technology and Innovation. As highlighted by Cueto (Cueto Pérez, 2012), the law recognises the development of capacities of the autonomic communities, the full integration of Spain to the European Union¹¹, the need for a new framework for the science system, the growth in the scientific community, and the necessity of new ways to promote economic growth. The law crystallised the position of the Council, with the possibility to intervene in the strategic process of STI and act as a bridge for the society to influence these policy domains (Díez Bueso, 2013). In this context, CACTI acts as a successor of a previous government body in charge of advising on the fostering of science and technology, Advisory Council for Science and Technology (CACT), now including the involvement of the dimension of fostering innovation. CACT was a massive council, with thirty-five councillors, around one-third of them from the government and two-thirds from the rest of society. The new Council has had two periods in operation until the year 2019, which mostly coincides with two governmental conformations.

⁷ 'The issue (of innovation) seemed essential at that moment. We had to do something. We were at light years of the advanced world.' Mr. Ricardo Lagos Escobar, President of the Republic of Chile in the period of the years 2000 to 2006, interviewed on Wednesday 19 December, 2018.

⁸ Shifting from 'National Innovation Council for Competitiveness' (CNIC) to 'National Innovation Council for Development' (CNID), arguably a shift influenced by the mainstreaming of the concept *inclusive development*. For purposes of clarity and ease, in the remainder of the chapter the acronym CNIC will be used despite of the more accurate use of CNIC or CNID according to the timing of reference.

⁹ The first decree was named 'Creation of the advisory commission for the Presidency National Council of Innovation for Competitiveness' (Ministerio de Hacienda de la República de Chile, 2005).

¹⁰ Ley 14/2011, de 1 de junio, de la Ciencia, la Tecnología y la Innovación (Jefatura del Estado, 2011).

¹¹ These differences embrace new difficulties due to the different levels of policy, for further details review Magro *et al.* (Magro, Navarro, & Zabala-Iturriagoitia, 2014).

III. Methodology and results

III.A Research Methodology

As previously introduced, this research considers research cases chosen following the *polar* cases sampling method – *two-tailed* for Yin (Yin, 2003) and *diverse* for Seawright and Gerring (Seawright & Gerring, 2008), which allows the researcher to ‘observe contrasting patterns in the data’ leading to ‘very clear pattern recognition of the central constructs, relationships, and logic of the focal phenomenon’ (Eisenhardt & Graebner, 2007). For this purpose, and based on the criteria developed in previous research (Cevallos & Merino Moreno, forthcoming), the cases of the Chilean and Spanish Council were selected. The article of Cevallos & Merino Moreno presents an index – iNPC – based on the structural characteristics of the councils; the results for these two councils are that the Chilean Council rates as a strong council – iNPC=10 – with transformative potential, and the Spanish Council an agile council – iNPC=4 – with consultant potential. This opposition is a strong reason for these councils to be selected for this study; adding that while having these differences, these two countries (due to historical reasons) also share some institutional and cultural settings, enriching the comparison. However, for this research a different Spanish council from the predominantly used on the RESGOV database will be considered, the Advisory Council for Science, Technology and Innovation (CACTI) due to a better alignment with the policy domains of STI than those discussed in the OECD study. After reviewing the legal conformation of this council’s structure, it sheds light that could also be identified as an agile council (iNPC=4). Therefore, the parallel of the structural characteristics of the councils is summarised in Table 2 and deepening in the coordinative capacity in Table 3.

-----INSERT TABLE 2-----

The next table zooms in the coordinative capacity presented in the previous table for the contemporary councils. Expectedly by research design, both tables lead to a significant differentiation in the structures of these councils.

-----INSERT TABLE 3-----

Data Collection and Analysis

The methodology followed in this research for data collection consisted of interviews conducted in Santiago (Chile) and Madrid (Spain)¹², with current and former councillors, authorities, and staff of the councils between August 2018 and August 2019. The interviews were semi-structured, addressing topics such as: nomination process, dedication to the council, operation of the council, council’s strengths and weaknesses, resources, relations with other governmental bodies, among other topics. The interviews were digitally recorded, and anonymity was guaranteed for the interviewee unless special arrangements were made for publicity, e.g., former President of the Republic of Chile, Mr Ricardo Lagos Escobar. Regarding the councillors, ten from CNIC and five from CACTI were interviewed¹³. The councillors’ interviews were analysed following the structure already mentioned, and quotes of these interviews are displayed for every dimension to complement the analysis. The reason to focus on the testimonies of the councillors is twofold: firstly, they are in the best position regarding the councils since they know the reality of their operation, and secondly, they are also embedded in communities that are related to the decisions and discussions regarding the councils’ outputs and outcomes.

III.B Results

The results are structured following the same dimensions of analysis used for the councils, as follows.

¹² This was not part of the design of the research, since both councils have members from other cities, but either they declined to participate or preferred to do it in the capital cities.

¹³ The comparison in the number of interviewed may seem imbalanced, but the universe of councillors also differs in a similar proportion because of the composition and the duration of every council. More information about the interviews is available in Annexe 1.

III.B.1 Policy Domain

For both cases, even when the policy domain of innovation is within the scope of the councils, it remains the most unattainable of the subjects. The councillors discourses reflect that the council is prone to the discussion of the issues in the domains of science and technology, but innovation remains auxiliary; most of the time supposing that innovation processes will happen spontaneously by the operation and interests of the companies. Therefore, while the councils do their best for the action on the policy domain of innovation, some councillors recognise that it is a forced task.

‘From my perspective, it is a mistake to mix science, technology and innovation. For a fundamental reason: innovation is made by companies, so the audiences are different (...), and if you go deep into this, the timings are different (...), the financing is different (...). The only thing that binds innovation with science and technology is that they are sources of progress, innovation mainly economic progress and science and technology progress in knowledge and to provide innovation with everything that needs. Therefore it seems to be an error that dates back to the year 1996’. Spanish Councillor N°4

III.B.2 Executive Capacity

The observed evidence points towards unmatched expectations along with higher inputs of executive capacities. Thus, even when the Chilean case seemed better aligned due to its structural definition, the operation of this design did not match the expectations of its mandate. On the other hand, the Spanish case seems less concerned about the operation of the council regarding their executive capacity, since their limits and mandate are not often challenged.

Council’s Role

Regarding the role played by the councils, the experiences that emerged from the councillors’ testimonies suggest that their operation either matched or failed to comply with their expectations. For the case with higher structural inputs, Chilean CNIC, concepts like ‘missed opportunity’ arise, often linked with a diagnosis of deficiencies in the definition of ‘rituals’ regarding the operation of the council. CACTI’s experience is less criticised, in a context of lower expectations from the councillors given the mandate of the Law.

‘...A problem at this time is that the Council does not act on its initiative, it acts on demand of the recommendations that the Government asks it to issue to evaluate or to accommodate its policies, and also according to the demands of information requested by the Council (of Science, Technology and Innovation Policy)¹⁴’. Spanish Councillor N°3

Executive’s Role

The role exercised by the executive is again par or below expectations. For the Chilean case, the function of the ministries is assessed as shallow, even declining to participate in many of the meetings and giving representation of the ministers to third parties; and for the agencies – acknowledged their different role in the council – an excess of independence¹⁵. For the Spanish side, this was the lowest feature regarding the structural inputs, so was not an issue of concern. An unexpected element in the analysis was the role of the president of the council, who in both cases seemed to have a critical role in connecting the operation of the council with the governmental authorities. In the Chilean case, the president has an essential role in the agenda-setting process for the council, between the council and its secretariat, and with the governmental authorities, while in the Spanish council has a role of communication with the government primarily.

¹⁴ This is a governmental policy council, which shares important features with the Chilean Council of Ministers.

¹⁵ A closer look at the complexities between governments and specialised agencies could be observed in the Braun and Guston approach to the principal-agent theory and research policy (Braun & Guston, 2003).

'...In the original design there were going to be meetings with the President of the Republic, and also a Council of Ministers¹⁶ that had to coordinate. It never worked, so the problem was that this (council, CNIC) has a certain role regarding the fostering of public deliberation, but the formal channel to the execution was lost (...) all of this should go into enhancing the alignment, but that alignment only works if there is political will'. Chilean Councillor N°3

III.B.3 Coordinative Capacity

The testimonies gathered suggest that this dimension complies in its operation with the original design, independently of the levels that every council has. The composition is regarded as a critical axis of the work of the council while having the appropriate support in resources is also a growing expectation of achieving higher levels of performance.

Composition

The composition of the councils is commonly assessed as positive in regard to embracing the diversity of actors in the discussion for the future of STI policy for each country. However, some harsh judgements regarding the interests of the actors could be observed from the least to the most traditional communities (because of their organisation or resources), e.g. innovators and entrepreneurs to the science community. However, it did not seem that the explicit representation was an issue, but rather the background of the councillors. The capacity in which the councillors were nominated, on an individual nomination or as representative of a collective, did not emerge as a negative issue but rather as a specific input of information that nurtured the discussions of the councils. Moreover, even when the Spanish council did not consider government officials in their composition, it was highlighted that a position not considered in the law, a Deputy Director of the Ministry of Industries, acted as a secretary of the council and a facilitator with the government that surpassed preconceptions, obtaining higher involvement from the authorities in time.

'The strength of the Council is that the members of the councils (...) are prominent members of the research, business development and innovation communities. Let's say that they are proven people with a curriculum that is powerful enough and well known enough for their opinions to be weighted opinions, that is why it is an advisory council, in such a way that we say that has the authority in the sense that they know what they are discussing. It is evident and recognised that all have a broad background in research, development and innovation'. Spanish Councillor N°1

Resources

Despite the configuration of the support given by the governments to their councils, there is an urgent need regarding the relationship with the resources for supporting their work. Ranging from a secretariat to a think-tank in Chile or from logistic support to at least a small dedicated office in Spain; in both cases having a higher level of independence is highlighted as a feature to achieve higher levels of performance.

'I think that the Council without the Secretariat is worthless; it does not work. There has to be a technical team to do the routine work, elaborate information, nurture the Council (...) There have to be people with a profile related to mid to long-term strategic thinking, which is the role of an Innovation Council, and I believe that there are currently people with that profile and high-level, but not all of them, not all of them'. Chilean Councillor N°10

Summary

Following the structure of the research, the executive capacity of the councils seems to have greater room to improve than the coordinative capacity, enhancing the expected role of the councils. From a longitudinal perspective, the experiences of the councillors suggest the internal policy learning process of

¹⁶ This ineffective relationship with the Council of Ministers was also highlighted in the current Chilean strategy for STI (CNID, 2017).

the organisations. In the Chilean case, due mainly to political reasons within the government, the discussion shifted from an orientation regarding the STI budget as the centre for the debate, to the future challenges and the society's involvement on these; and on the Spanish side, it moved from a council that was only considered to be informed about the governmental decisions on STI policy to a more active role in the discussion of these subjects. According to the testimonies gathered, these shifts had to do with the change of governments – in the Chilean experience also with the leadership styles of the council's presidencies – and the active role of the council to enhance their participation. However, the overall strategic capacity of the councils seems nuanced in the long run, either by design – low executive capacity as in Spain – or operation – low long-term binding through presidential terms as in Chile¹⁷ – and despite the contextual characteristics of the political regimes of Chile and Spain.

'The rules of the game – the responsibilities and attributions that we have as councillors – the responsibilities, obligations, rituals that the Council itself has of what it should be, and has to do, and how the conversations are organised, and the commitments are generated, and the distillates of that work, I think they are still in a very arbitrary field (...) Over time, that 'high expectations', that we were going to generate a series of critical strategic guidelines, was acquiring a certain colour and smell of disenchantment'. Chilean Councillor N°5

Despite this particular comparison of cases, further research seems needed to understand the real implications of the councils, and whether they are conceived as a means or as an end by the governments, with the broader view of the potential decoupling between our original argumentation regarding their *restricted* or *entrepreneurial* role and their relationship with the overall economic model of the countries.

IV. Conclusions and discussion

'One size does not fit all' seems the new mantra when discussing STI policy and the results of this research are on the same track. From the research design, it was expected to devise the differences between the two models of councils presented. For the evidence gathered in this research, it is confirmed that there is significant heterogeneity not only in the structure but also in the operation of the councils due to their official and even to their unofficial and social characteristics. These considerations should be borne in mind by scholars and policy advisers while acting prescriptively in regards to the STI domains and ultimately STI organisations since these features defie the specific design of governance mechanisms. However, some commonalities also emerge, specifically regarding the policy domain of focus of the council and its approach, the need for an upgrade of resources, the intertemporal challenge, and the high esteem on the composition of the councils, among others.

For the discussion about the policy domain, the gathered evidence suggests that this definition requires more advanced levels of policy learning, since a relevant share of the councillors appears more comfortable with the discussions based on the domains of science and technology, while the policy domain of innovation is still harder to grasp. This idea shares some commonalities with the observation of Edquist, in which an innovation council should be separate from a science and technology council, since these are policy domains with different communities and aims (Edquist, 2018). This process may be connected with the concept of *bounded rationalities* suggested by Kuhlmann *et al.* (Kuhlmann *et al.*, 2010), experiences that could be enhanced by the fostering of actors' *evolutionary paths* (Dutrénit, Natera, Puchet Anyul, Vera-Cruz, & Torres, 2018) which at least in this evidence seems to be useful. This practical difficulty confronts the well-established notion of the innovation policy governance, as a transversal and gathering instance for a full-array of related actors.

¹⁷ This issue has been highlighted in previous literature as 'the lack of a transversal and solid political agreement' as the main source for CNIC's not meeting their mandated role, jointly as it had not been backed by a specific law (UNCTAD, 2017). However, this last argument was not expressly present in the discourse of the councillors.

Regarding the existence of relevant shifts within councils for every government change - defined as *dynamic inconsistency*¹⁸ - still poses a challenge for long-term strategies that have not been significantly nuanced by the existing mechanisms - e.g. maintaining a policy of staggered renovation of councillors for every CNIC's term (CNIC, 2007) - but leaving space for long-term *coordination by commitment and trust* (Nooteboom, 2000). From the last two points, the issue of independence emerges as one of the findings of this work. Apparently, there is a transversal will of the councils of having more independence from the current government in defining their products and outcomes, and also that these agreements can ensure their intertemporal autonomy and have the chance to be honoured despite the political shifts. These findings are a severe threat to the effectiveness of the devices constructed to foster the governance for STI, affecting the outcomes of the resultant shared view, and mining the trust in the current and successive processes of the deployed institutionalisation.

Nevertheless, essential differences could also be highlighted. As it can be distilled from Braun's work (Braun, 2008), it is easier for a government to comply with material considerations, mostly represented in the coordinative capacity in terms of resources and composition, than to resign to the exercise of their power and will as the executive capacity requires. This phenomenon is aligned with the founded evidence regarding greater gaps in operation with greater structural capacities, and the lower achievement obtained from the executive capacity in comparison with the coordinative capacity for the studied Councils. Moreover, the coordination tasks –that due to the defined structure were evident in the Chilean case and less clear in the Spanish case – seemed more straightforward to handle with the rest of the societal actors than within the government, either between different ministries or most notably from the council to the agencies. As expected, the capacity of the councils to address their coordination and strategic challenges is nuanced either explicitly by their design – structure – or implicitly by their implementation – operation.

The phenomena addressed in this chapter adds a layer of complexity to the study of governance for STI, specifically on the level of the efforts made by public organisations to gather expertise and will in devising the shared views for the future. Meanwhile, the evidence and analysis collected for this research open several avenues for future work. For instance, each studied dimension revealed a rich set of information that could lead to relevant findings, for the underpinning theory, the transversal theoretical concept of governance, and the implementation of governance and policies: e.g. the boundaries of the action of the councils (the specifics of their field of activity), the relationship of independence, dependence or interdependence with the government, a more general theory for councils definition, among others. Specifically relevant due to their policy implications is the need to make explicit the mechanisms¹⁹ and tasks commanded to the councils and its president, to serve as a guide but also to manage expectations regarding the council's outcomes and outputs.

¹⁸ Identified as part of the *sources of risk* for public intervention on the STI policy area by Benavente and Price (Benavente & Price, 2014), previously identified by Orozco and colleagues (Orozco *et al.*, 2015), on a study focused on the Chilean case, as governmental policies rather than achieving the expected role of state policies.

¹⁹ As a functional output of this research, based on the observed experiences collected, a practical advice on how to design and implement a National Policy Council for Science, Technology and Innovation is offered in Annexe 2.

References

- Benavente, J. M., Bravo, C., Goya, D., & Zahler, A. (2016). Collaboration in clusters and technology consortia: The case of Chile. In E. Fernández Arias, C. F. Sabel, E. H. Stein & A. Trejos (Eds.), *Two to tango: Public-private collaboration for productive development policies* (pp. 189-236). Washington, DC: Inter-American Development Bank (IDB).
- Benavente, J. M., & Price, J. J. (2014). Evolution of the public institutions of science, technology, and innovation in Chile. In G. Crespi, & G. Dutrénit (Eds.), *Science, technology and innovation policies for development* (pp. 45-62). Springer. Retrieved from <http://www.econis.eu/PPNSET?PPN=884371069>
- Borowiecki, M., & Paunov, C. (2018). *How is research policy across the OECD organised?* (). OECD Publishing. doi:10.1787/235c9806-en Retrieved from <http://dx.doi.org/10.1787/235c9806-en>
- Borrás, S. (2012). Three tensions in the governance of science and technology. In D. Levi-Faur (Ed.), *The oxford handbook of governance* (pp. 429-440). Oxford University Press. doi:10.1093/oxfordhb/9780199560530.013.0030 Retrieved from <http://oxfordhandbooks.com/view/10.1093/oxfordhb/9780199560530.001.0001/oxfordhb-9780199560530-e-30>
- Borrás, S., & Edler, J. (2014). Introduction: On governance, systems and change. In S. Borrás, & J. Edler (Eds.), *The governance of socio-technical systems: Explaining change* (pp. 1-22). Edward Elgar Publishing. doi:10.4337/9781784710194.00010 Retrieved from <http://www.elgaronline.com/view/9781784710187.00010.xml>
- Braun, D. (2008). Organising the political coordination of knowledge and innovation policies. *Science and Public Policy*, 35(4), 227-239. doi:10.3152/030234208X287056
- Braun, D., & Guston, D. H. (2003). Principal-agent theory and research policy: An introduction. *Science and Public Policy*, 30(5), 302-308. doi:10.3152/147154303781780290
- Breznitz, D., Ornston, D., & Samford, S. (2018). Mission critical: The ends, means, and design of innovation agencies. *Industrial and Corporate Change*, 27(5), 883-896. doi:10.1093/icc/dty027
- Cevallos, R. A. & Merino-Moreno, C. (forthcoming). National Policy Councils for Science, Technology and Innovation: A scheme for structural definition and implementation. *Science and Public Policy*. Accepted: May 18th, 2020. doi: 10.1093/scipol/scaa052
- Chaminade, C., Lundvall, B., & Haneef, S. (2018). *Advanced introduction to national innovation systems*. Retrieved from <http://lup.lub.lu.se/record/ee76fc4a-c7e8-4638-8f3d-0e1d2ec5746f>
- CNIC. (2007). *Hacia una Estrategia Nacional de Innovación, volumen 1*. (). Santiago de Chile:
- CNID. (2017). *Ciencias, tecnologías e innovación para un nuevo pacto de desarrollo sostenible e inclusivo*. (). Retrieved from <http://www.cnid.cl/wp-content/uploads/2017/05/CTI-para-un-nuevo-pacto-de-desarrollo-CNID-2a-edicion.pdf>
- Cueto Pérez, M. (2012). *Incidencia de la nueva ley de la ciencia en el régimen jurídico de las universidades*. *Revista de Administración Pública*, núm 187. Madrid: CEPC - Centro de Estudios Políticos y Constitucionales. Retrieved from [https://ebookcentral.proquest.com/lib/\[SITE_ID\]/detail.action?docID=3222780](https://ebookcentral.proquest.com/lib/[SITE_ID]/detail.action?docID=3222780)
- de la Mothe, J. (2004). The institutional governance of technology, society, and innovation. *Technology in Society*, 26(2), 523-536. doi:10.1016/j.techsoc.2004.01.009

- Díez Bueso, L. (2013). La gobernanza del sistema español de ciencia, tecnología e innovación. *Revista De Bioética Y Derecho*, (28), 20-32. doi:10.4321/S1886-58872013000200003
- Dutrénit, G., & Sutz, J. (2014). Introduction to national innovation systems, social inclusion and development. *National innovation systems, social inclusion and development* (). Cheltenham: Edward Elgar Publishing. doi:10.4337/9781782548683 Retrieved from <http://www.elgaronline.com/view/9781782548676.xml>
- Dutrénit, G., Natera, J. M., Puchet Anyul, M., Vera-Cruz, A. O., & Torres, A. (2018). Dialogue processes on STI policy-making in latin america and the caribbean: Dimensions and conditions. *Science and Public Policy*, 45(3), 293-308. doi:10.1093/scipol/scx044
- Edler, J., & Fagerberg, J. (2017). Innovation policy: What, why, and how. *Oxford Review of Economic Policy*, 33(1), 2-23. doi:10.1093/oxrep/grx001
- Edquist, C. (2005). Systems of innovation, perspectives and challenges. In J. Fagerberg, D. Mowery & R. Nelson (Eds.), *The oxford handbook of innovation* (). New York: Oxford University Press.
- Edquist, C. (2018). Towards a holistic innovation policy: Can the Swedish National Innovation Council (NIC) be a role model? *Research Policy*, doi:10.1016/j.respol.2018.10.008
- Edquist, C., & Johnson, B. (2015). Institutions and organizations in systems of innovation. In C. Edquist (Ed.), *Systems of innovation; technologies, institutions and organizations* (pp. 41-63)
- Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal*, 50(1), 25-32. doi:10.5465/amj.2007.24160888
- Escobar, B., & Valenzuela, A. (2015). *Autoridades para la promoción de innovación: ¿cuán efectivos son los diferentes modelos nacionales?*. Santiago, Chile: CIEPLAN.
- Fagerberg, J. (2017). Innovation policy: Rationales, lessons and challenges. *Journal of Economic Surveys*, 31(2), 497-512. doi:10.1111/joes.12164
- Flanagan, K., & Uyarra, E. (2016). Four dangers in innovation policy studies - and how to avoid them. *Industry and Innovation*, 23(2), 177-188. doi:10.1080/13662716.2016.1146126
- Foxley, A., Saez, R. E., & Valenzuela, A. (2015). *Outcome report on the first meeting of the global forum of national advisory councils on science, technology and innovation*. (). Santiago, Chile:
- Galli, R., & Teubal, M. (2005). Paradigm shifts in national innovation systems. In C. Edquist (Ed.), *Systems of innovation; technologies, institutions and organizations* (pp. 342-370)
- Ley 14/2011, de 1 de junio, de la ciencia, la tecnología y la innovación, (2011).
- Kuhlmann, S., & Rip, A. (2018). Next-generation innovation policy and grand challenges. *Science and Public Policy*, 45(4), 448-454. doi:10.1093/scipol/scy011
- Kuhlmann, S., Shapira, P., & Smits, R. (2010). Introduction. A systemic perspective: The innovation policy dance. In R. Smits, S. Kuhlmann & P. Shapira (Eds.), *Theory and practice of innovation policy* (). Cheltenham, UK ; Northampton, MA, USA: Edward Elgar.
- Lepori, B., & Reale, E. (2019). The changing governance of research systems. agencification and organizational differentiation in research funding organizations. In D. Simon, S. Kuhlmann, J. Stamm & W. Canzler (Eds.), *Handbook on science and public policy* (). Northampton: Edward Elgar.

- Lundvall, B. (2007). National innovation systems-analytical concept and development tool. *Industry and Innovation*, 14(1), 95-119. doi:10.1080/13662710601130863
- Lundvall, B. (2016). National systems of innovation: Towards a theory of innovation and interactive learning. In B. Lundvall (Ed.), *The learning economy and the economics of hope* (). Anthem Press. Retrieved from <http://www.jstor.org/stable/j.ctt1hj9zjd.9>
- Lundvall, B., & Borrás, S. (2005). Science, technology and innovation policy. In J. Fagerberg, D. Mowery & R. Nelson (Eds.), *The Oxford Handbook of Innovation* (). New York: Oxford University Press.
- Magro, E., Navarro, M., & Zabala-Iturriagoitia, J. M. (2014). Coordination-Mix: The hidden face of STI policy. *Review of Policy Research*, 31(5), 367-389. doi:10.1111/ropr.12090
- Martin, B. R. (2016). Twenty challenges for innovation studies. *Science and Public Policy*, 43(3), 432-450. doi:10.1093/scipol/scv077
- Mazzucato, M. (2018a). Mission-oriented innovation policies: Challenges and opportunities. *Industrial and Corporate Change*, 27(5), 803-815. doi:10.1093/icc/dty034
- Mazzucato, M. (2018b). *Mission-oriented research & innovation in the european union*. (). Brussels: doi:10.2777/360325
- Decreto N°1408: Crea Comisión Asesora Presidencial Consejo de Innovación para la Competitividad, (2005). Retrieved from <https://www.leychile.cl/Navegar?idNorma=245508&tipoVersion=0>
- Nooteboom, B. (2000). Institutions and forms of co-ordination in innovation systems. *Organization Studies*, 21(5), 915-939. doi:10.1177/0170840600215004
- North, D. C. (1994). Economic performance through time. *The American Economic Review*, 84(3), 359-368. Retrieved from <http://www.econis.eu/PPNSET?PPN=260449245>
- OECD. (2005a). Governance of innovation systems. Volume 1. Synthesis Report. *Paris and Washington, D.C.: Author, 2005, pp. 117* (pp. 117)
- OECD. (2005b). *OECD Economic Surveys: Chile 2005*. (). Paris: Paris: OECD Publishing. doi:10.1787/eco_surveys-chl-2005-en
- OECD. (2009). *Chile's National Innovation Council for Competitiveness*. ().
- OECD. (2012). *OECD science, technology and industry outlook 2012*. (). FR: OECD Publishing. Retrieved from [https://ebookcentral.proquest.com/lib/\[SITE_ID\]/detail.action?docID=1057622](https://ebookcentral.proquest.com/lib/[SITE_ID]/detail.action?docID=1057622)
- OECD. (2018a). OECD Database of governance of public research policy (RESGOV). Retrieved from <https://stip.oecd.org/resgov/>
- OECD. (2018b). *OECD Science, Technology and Innovation Outlook 2018*. (). Paris: OECD Publishing. doi:10.1787/sti_in_outlook-2018-en Retrieved from http://dx.doi.org/10.1787/sti_in_outlook-2018-en
- Orozco, L. A., Cancino, R., Garcia, M., Moreno, G., Petit-Breuilh, J., Goñi, J., . . . Ordoñez-Matamoros, G. (2015). Redes de política y gobernanza de los sistemas nacionales de innovación: una comparación entre Chile y Colombia. In R. Casas, & A. Mercado (Eds.), *Mirada Iberoamericana a las Políticas de Ciencia, Tecnología e Innovación: Perspectivas comparadas* (pp.221-258) Consejo Latinoamericano de Ciencias Sociales - CLACSO. Retrieved

from <https://www.narcis.nl/publication/RecordID/oai:ris.utwente.nl:publications%2F7e77f708-84f1-4110-8883-a98cf9d66d87>

- Pelkonen, A. (2006). The problem of integrated innovation policy: Analyzing the governing role of the science and technology policy council of Finland. *Science and Public Policy*, 33(9), 669-680. doi:10.3152/147154306781778623
- Schot, J., & Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. *Research Policy*, 47(9), 1554-1567. doi:10.1016/j.respol.2018.08.011
- Schwaag-Serger, S., Wise, E., & Arnold, E. (2015). *National research and innovation councils as an instrument of innovation governance*. (). Retrieved from <http://lup.lub.lu.se/record/358845c4-356c-4b46-a5a2-c6cfd81a5f>
- Seawright, J., & Gerring, J. (2008). Case selection techniques in case study research: A menu of qualitative and quantitative options. *Political Research Quarterly*, 61(2), 294-308. doi:10.1177/1065912907313077
- Stilgoe, J., Owen, R., & Macnaghten, P. (2013). Developing a framework for responsible innovation. *Research Policy*, 42(9), 1568-1580. doi:10.1016/j.respol.2013.05.008
- UNCTAD. (2017). *Curso de formación sobre políticas de CTI - MÓDULO 2: Formulación y evaluación de políticas de CTI*.
- Yin, R. K. (2003). *Case study research: Design and methods*. Beverly Hills etc.: Beverly Hills etc. Sage Publications.

Table 1. Definitions of councils in the literature

VINNOVA 2015	OECD 2018
<p>National councils for innovation or for science, technology and innovation are non-temporary bodies composed of experts or high-level stakeholders (or a combination of both), explicitly (e.g. by law) tasked by the government with doing one or several of the following:</p> <ul style="list-style-type: none"> a) producing reports b) overseeing policy evaluation c) giving advice d) coordinating policy areas e) driving change f) making policy decisions (sometimes including decisions regarding budget allocations). 	<p>Research and Innovation Council, i.e., a non-temporary public body that takes decisions concerning Higher Education Institutions (HEI) and Public Research Institutions (PRI) policy, that has been explicitly mandated by law or statutes to do one or several of the following:</p> <ul style="list-style-type: none"> a) providing policy advice b) overseeing policy evaluation c) coordinating policy areas relevant to public research (e.g. across ministries and agencies) d) setting policy priorities (i.e. strategy development, policy guidelines) e) joint policy planning (e.g. joint cross-ministry preparation of budgetary allocations)

Source: Cevallos & Merino-Moreno (forthcoming).

Table 2. Comparison of the councils’ structure

Chilean Council of Innovation for Development (CNIC)					Spanish Advisory Council for Science, Technology and Innovation (CACTI)				
Executive Capacity	Council’s Role	Joint Planning	Coordination	Advice	Executive Capacity	Council’s Role	Joint Planning	Coordination	Advice
	Executive’s Role	Involvement of the Top Level	Involvement of the Ministries Level	Involvement of the Upper Management Level		Executive’s Role	Involvement of the Top Level	Involvement of the Ministries Level	Involvement of the Upper Management Level
Coordinative Capacity	Composition	Government Officials	Outstanding Personalities	Representatives of Society (Stakeholders)	Coordinative Capacity	Composition	Government Officials	Outstanding Personalities	Representatives of Society (Stakeholders)
	Resources	Funding for external capacities	Funding for internal capacities	Funding for logistics		Resources	Funding for external capacities	Funding for internal capacities	Funding for logistics

Source: Authors.

Table 3. Comparison of the councils' features of coordinative capacity

Composition	CNID (CHILE)	CACTI (SPAIN)
Government Officials	4 councillors	Nil
	Ministers of Finance, Economy, Education, and Agriculture, or their representatives.	
Outstanding Personalities	14 councillors	10 councillors
	One of them is appointed president of the council by the government with partial dedication.	One of them is elected president of the council by the councillors.
Representatives of Society (Stakeholders)	2 councillors	4 councillors
	One vice-president for research from the universities and one expert in vocational training from the professional institutes, both in consultation with the Ministry of Economy.	Two representatives of the central business confederations and two of the main unions.
Guests	3 councillors	Nil
	The chairpersons of the agencies for research, for innovation, and the Innovation Division of the Ministry of Economics.	
TOTAL	23 councillors	14 councillors
Resources	Funding for institutionalisation, studies and logistics provided by an exclusive secretariat and budget.	Funding for logistics provided by a ministerial office.

Source: Authors, based on Chilean and Spanish normative frameworks as of year 2019.

Annexe 1. Information about the interviewed councillors

Councillor	Council	Country	Date and Place of Interview
Councillor N°1	CNIC	Chile	August 07th 2018; Santiago, Chile
Councillor N°2	CNIC	Chile	August 13th 2018; Santiago, Chile
Councillor N°3	CNIC	Chile	August 17th 2018; Santiago, Chile
Councillor N°4	CNIC	Chile	August 21st 2018; Santiago, Chile
Councillor N°5	CNIC	Chile	August 22nd 2018; Santiago, Chile
Councillor N°6	CNIC	Chile	December 21st 2018; Santiago, Chile
Councillor N°7	CNIC	Chile	December 26th 2018; Santiago, Chile
Councillor N°8	CNIC	Chile	December 26th 2018; Santiago, Chile
Councillor N°9	CNIC	Chile	December 27th 2018; Santiago, Chile
Councillor N°10	CNIC	Chile	July 05th 2019; Santiago, Chile
Councillor N°1	CACTI	Spain	October 10th 2018; Madrid, Spain
Councillor N°2	CACTI	Spain	February 26th 2019; Madrid, Spain
Councillor N°3	CACTI	Spain	March 15th 2019; Madrid, Spain
Councillor N°4	CACTI	Spain	April 08th 2019; Madrid, Spain
Councillor N°5	CACTI	Spain	April 24th 2019; Madrid, Spain

Source: Authors.

Annexe 2. Practical advice for the design and implementation of a national policy council for science, technology and innovation

1. Define a clear focus of activity for the council in order to address its domain effectively.
2. Define explicitly and in advance, the processes, functions, outputs and outcomes expected from the council and its councillors.
3. Define explicitly and in advance, the processes of communication between the council and the government.
4. Define explicitly and in advance, the processes that the government will follow to evaluate and eventually implement the proposals of the council.
5. Define explicitly and in advance, the scope of action of the council, in terms of its boundaries in interacting with other organisations.
6. Provide the council with the independence needed in order to be isolated from a potential influx of interests, especially from the government.
7. Provide the council with the appropriate resources to match the outcomes and outputs expected, specifically human resources and relevant information.
8. Designate a president for the council with proven social and political skills and technical knowledge.
9. Designate councillors with various backgrounds, ideally with experience in different activities related to the purpose of the council, and in a manageable number.
10. Schedule activities and delivery dates for the outputs of the council well in advance, considering the best timing for these outputs to be evaluated and eventually implemented; while the meetings should be informative, reflexive and executive.

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