

Technical Cooperation Document

I. BASIC INFORMATION FOR TECHNICAL COOPERATION (TC)

▪ Country/Region:	Chile (CH)
▪ TC Name:	Support for the National Competitiveness and Innovation Agenda
▪ TC Number:	CH-T1151
▪ Team Leader/Members:	Team Leader: Gustavo Crespi (CTI/CUR). Team Members: Pablo Angelelli (CTI/CUR); Gabriel Casaburi (CTI/CAR); Carlo Pietrobelli (IFD/CTI); Alessandro Maffioli (SDV/SPD); Carlos Guaipatín (IFD/CTI); Mariela Rizo (IFD/CTI); Viviana Maya (LEG/SGO); Francisco Lois (CSC/CHL); Raul Lozano (CSC/CHL); Roberto Monteverde (CSC/CHL); Maria Isabel Palomer (CSC/CHL).
▪ Indicate if: Operational Support, Client Support, or Research & Dissemination	Operational Support
▪ If Operational Support TC, give number and name of Operation Supported by the TC:	Program Support for the Competitiveness and Innovation Agenda (CH-L1088)
▪ Date of TC Abstract authorization:	9/11/2014
▪ Beneficiary:	Ministerio de Economía, Fomento y Turismo
▪ Executing Agency and contact name	Inter-American Development Bank (IDB), Gustavo Crespi (CTI/CUR)
▪ Donors providing funding:	Public Capacity Building Korea Fund for Economic Development
▪ IDB Funding Requested:	US\$400,000
▪ Local counterpart funding, if any:	US\$50,000 (in kind)
▪ Disbursement period (which includes Execution period):	24 months for disbursement and 18 months for execution
▪ Required start date:	January, 2015
▪ Types of consultants	Firm International and Individual International.
▪ Prepared by Unit:	Competitiveness, Technology and Innovation Division (IFD/CTI).
▪ Unit of Disbursement Responsibility:	CSC/CCH
▪ TC Included in Country Strategy:	Yes
▪ TC included in CPD:	No
▪ GCI-9 Sector Priority:	Priority Area 1: Equity and Productivity Priority Area 3: Growth and Welfare

II. OBJECTIVE AND JUSTIFICATION OF THE TC

- 2.1 Chile's growth record has been strong over the past decade, with rates of human and physical capital accumulation sufficient to reduce the output per worker gap *vis-à-vis* more advanced economies. Nevertheless, according to OECD estimates (Johansson et al., 2012) total factor productivity (TFP) growth has remained flat. Furthermore, Chile's TFP growth slowed sharply in the last decade raising worries about the sustainability of its growth pattern (Fuentes et al., 2008). For instance, Magendzo and Villena (2012) showed that TFP annual growth slowed from an average of 2.8% between 1992 and 1997 to approximately zero over the period

1998-2010, raising concerns about the feasibility of long term income convergence towards higher living standards.

- 2.2 Raising TFP growth is a nontrivial challenge, in particular because existing evidence for Chile indicates that earlier TFP improvements can be tied to reforms in financial and product markets from two decades earlier (Crespi, 2006; Bergoeing et al., 2006; Schwellnus, 2010). But the gains from those reforms may have been substantially realized by now. Good framework conditions are an important prerequisite for long-term investments and policies in this area are quite favorable towards businesses and entrepreneurs especially when compared to other Latin American countries. In order to recover its TFP dynamism, Chile needs to go beyond good framework conditions and to strength its innovation system¹.
- 2.3 Chile's innovation spending is the lowest in the OECD, with most of R&D expenditure heavily concentrated in the publicly funded university sector. More broadly, evidence from Innovation Surveys showed that about one-third of firms innovate (Minecon, 2009), which is less than the 40% or so that is usual in EU countries. Furthermore, business innovation spending *fell* in Chile as a percentage of GDP through the mid-2000s (Benavente, 2006), and data suggests that it had not recovered by the end of the decade. Low R&D by private firms may have to do with market failures, as evidence suggests that private rates of return to R&D investment are generally quite high (Benavente et al., 2006).
- 2.4 In the case of Chile, low R&D investments are related to three different but inter-related factors: poor access to finance for innovation, limited supply of human capital and unbalances in the productive structure. Uncertainty may be very discouraging for firms to invest in R&D, especially for smaller firms. In the case of Chile although the degree of financial development is high, important gaps remain when looking at the financing for innovation investment. Indeed, according to a recent study while 20% of large firms reported that lack of financing was an important obstacle for innovation, this figure grows up to 42% in the case of the smallest firms. These constraints particularly affect intangible investments such as a R&D but also the acquisition of modern technology and equipment. Of course these constraints are particularly severe in the case of new firms, where Chile has a shortfall of venture capital investment.
- 2.5 Human capital is another obstacle to productivity improvements for Chilean firms. Innovation and R&D activities are heavily dependent on well-trained workers, especially those with technological qualifications. Despite strong efforts to increase the number of Masters and PhD graduates domestically and internationally, Chile still lacks sufficient advanced human capital in key science, technology and engineering management (STEM) fields, though it is catching up among younger cohorts (OECD, 2013e).

¹ Freeman (1987) defines an innovation system as the “network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies.

- 2.6 The Chilean economy shows a remarkable heterogeneity with few high productivity firms that coexist with a large number of firms with very low productivity. In fact, the share of low productivity firms in Chile is three times larger than in the USA², being the productivity gap particularly severe between large and small firms located in the regions outside Santiago³. According to surveys, the likelihood that the lack of technological information could become a major constraint to innovation is 2.5 larger in the case of small firms (INE, 2005)⁴. These asymmetries extend also to the quality of firm level management (WMS, 2012)⁵. These problems translate into a low capacity to adopt technology by low productivity firms and so the set of firms in conditions to innovate remains stubbornly reduced⁶.
- 2.7 The Chilean economy has few knowledge intensive sectors. The economic complexity of country's exports is not only lower than other LAC countries but is also lower than natural resource intensive OECD countries⁷. Between 1984-2010, in relative terms to the rest of the world, the economic complexity of Chilean exports has actually declined. A change in economic complexity depends on the productive capacities of a given society to move towards more complex goods while the complexity of existing goods is eroded by other competitors. In the case of Chile, the entry into more complex goods has been insufficient to compensate by this erosion effect (BID, 2014). This problem of low complexity can also be seen in important sectors for Chilean economy such as mining, energy and services. According to different estimates, this low complexity explains more than 40% of the innovation investment gaps in the private sector with respect to the OCDE (BID, 2014).
- 2.8 Although Chile has improved its business climate this has not been enough to diversify its production structure. Productive diversification is a natural process that can become standstill due to a number of factors, such as: i) coordination problems for the delivery of public goods (e.g. the generation of applied knowledge for the salmon industry); ii) problems to coordinate investment plans by multiple stakeholders (e.g. suppliers development for the mining industry) and iii) self-discovery spillovers (e.g. testing whether is feasible to produce lithium in Chile). These factors constrain the development of a more intensive productive diversification (BID, 2014).
- 2.9 Many of these problems are not new, and they have been recognized as such by policy makers. Indeed, since early 90s Chilean authorities have set up a rather complex system of interventions and several technology development funds were

² It refers to a firm with a productivity which is 2 times lower than the sector average (BID, 2014).

³ SMEs located in the regions show labor productivity 40% lower than those located in Santiago (ENIA, 2006). This does not happen in the case of large firms.

⁴ This problem can be related to scale economies in the provision of technological services which makes SMES not attractive enough for service providers (Llisterri, 2013).

⁵ The World Management Survey (WMS), evaluates management practices of firms in 13 developed countries and 7 developing countries, including Chile. The methodology evaluates the performance of managers across four areas: operations, monitoring, goals setting and incentives. In this survey Chile is in the 15th place among 20 countries.

⁶ No more than 350 firms invest in R&D (OCDE, 2013).

⁷ A good is complex when is produced by few countries that also produce diversified goods BID (2014).

established in order to simulate innovation by the private sector⁸. However, these funds operate mostly following a demand driven and horizontal approach, which lead to problems of fragmentation and critical mass in many sectors. Furthermore excessive degrees of freedom are left to the two most important executing agencies⁹, leading to problems of overlap and lack of coordination. In 2005 a National Council for Innovation and Competitiveness (CNIC), with the mission of proposing general guidelines for a national innovation strategy and a ministerial cabinet to ensure a coherent policy mix in line with the innovation strategy were set up. However, there is still a long way to go in order to rebalance the policy mix towards strategic priorities¹⁰, to redesign public programs in order to align them better with market failures and to improve the efficiency of public investments in science, technology and innovation. Coordination problems also go beyond the interactions between the different agencies within the central government but also extend to issues of multilevel governance between the central and the regional (sub-national) governments¹¹.

- 2.10 The new Chilean Government (GCL) (2014-2018) understands innovation as a critical driver of inclusive growth. In order to achieve this, the GCL has set four broad objectives: (a) to promote the productive diversification; (b) to encourage sectors with high growth potential; (c) to increase SMEs productivity and (d) to generate new exports. The GCL has requested IDB's support for the implementation of this National Competitiveness and Innovation Agenda (2014 -2018) and a lending program is currently under preparation for this (CH-L1088).
- 2.11 **General Objective.** The purpose of the technical cooperation is to contribute to the implementation of the National Competitiveness and Innovation Agenda (2014-2018). **Specific Objectives:** In particular, the project will support the Government of Chile regarding: (i) Strengthening the institutional framework for the design, coordination and implementation of strategic innovation policies with particular focus on regional capacity building and strategic decision making and (ii) Redesign of Science, Technology and Innovation Policy Mix, with particular focus on redefining the roles of technological institutes and generating new mechanisms for innovation financing.
- 2.12 This technical cooperation is consistent with the Ninth (9th) IDB Capital Increase guidelines (GCI-9) as it will strengthen SMEs access to financing and facilitate a regionally more balanced national innovation system. Furthermore, a stronger institutional framework for innovation policies will encourage productivity growth

⁸ These are the National Technology Fund (FONTEC), later called INNOVA, the Agricultural Innovation Fund (FIA) and the National Fund for Scientific and Technological Development (FONDEF).

⁹ These are the Chilean National Development Agency (CORFO), the National Commission for Science and Technology (CONICYT) and the National Institute for Industrial Property (INAPI).

¹⁰ Less the 20% of the public support for science, technology and innovation in Chile is "mission oriented", while this figure grows up to 60% in the case of OECD countries (Mowery, 201).

¹¹ The lack of institutional capacities at the sub-national level implies that while the regions explain more 50% of the GDP and employment, more than 85% of the public support for Science, Technology and Innovation is allocated to Santiago (metropolitan area) leading to unbalances in regional developments.

contributing to the Bank's Sector Strategy Institutions for Growth and Social Welfare (GN-2791). This project will contribute to the Bank's Country Strategy with Chile for the 2014-2018 under the strategic pillar on productive development and competitiveness and the priority areas on competitiveness and innovation and regional equity and development (GN-2785). This project is also consistent with the goals of the Public Capacity Building Korea Fund for Economic Development that aims at strengthening public sector management in all fiscal related sectors through assistance aimed at facilitating efficient allocation and use of public sector resources to generate higher public value at the national and the sub-national government level¹².

III. DESCRIPTION OF ACTIVITIES/COMPONENTS AND BUDGET

- 3.1 **Component I. Strengthening the Institutional Framework for Innovation Policies.** This component includes tasks and activities associated to knowledge sharing and institutional capacity building in order to improve the governance of the Chilean national innovation system with regards to: (a) Identifying priority sectors where to focus innovation policy; (b) Improving multilevel governance of innovation policy and (c) Increasing capacities for industrial property policies. These activities are:
- 3.2 **Strategic Selectivity Study: Learning from the Korean experience.** Most of innovation policies in Chile are horizontal. The National Council of Innovation for Competitiveness (CNIC) has not built yet the institutional capacities to identify and orient public investments in science, technology and innovation towards activities with high spillovers and multiplier effects. This background study will build institutional capacities by learning from the Korean experience for both identifying sectors to be targeted by technological policies and, most importantly, the different mechanisms used for implementation (call for proposal, tender, consortia setting, etc.). On the top of the study, the activity will include training activities of Chilean public officers by representatives from the Korean Evaluation Industrial Technology Institute (KEIT).
- 3.3 **Institutional Regional Review Study:** Chile is in the process of defining a complete overhaul of the institutional framework that regulates the relationship among the central government and the regions. Chile is a geographically complex country organized in 15 regions along a distance of more than 5,000 kilometers. So far regional governments have developed very little capacity both to plan and set innovation policy priorities at the regional level and even less with regards to decide which innovation policy instruments could be better run at the regional level. This study will provide the CNIC with a diagnostic tool and a methodology in order to strength local innovation policy capacities through the establishment of Regional Innovation Councils (RICs). More specifically the methodology will implement a pilot study in two regions where in addition to the diagnostic of local institutional capacities, a proposal for setting two RICs will be advanced in

¹² See Public Capacity Building Korea Fund for Economic Development, operational guidelines.

combination with training activities for regional officers. The two regions chosen for the pilot study will be selected by the CNIC. The CNIC will be involved in the whole process with the aim of replicating the methodology in the remaining regions afterwards.

- 3.4 **Intellectual Property Rights for Development:** During the last decade the GCL has gradually strengthen the institutional capacities in this area, mostly through the establishment of the National Institute for Industrial Property (INAPI). INAPI plays two important roles in the Chilean innovation system. First is the entity in charge of managing industrial property rights by not only protecting domestic inventors, but also by setting channels for technology transfer and dissemination. Second, according to the legislation, INAPI is the official policy advisor with regards to industrial property policies to the President of the Republic. As such INAPI must fulfill the legal mandate of proposing a National Industrial Property Strategy to the President. In order to feedback into this process, this activity will assess both the content and the process leading to the setting of industrial property national strategies in comparison countries relevant for Chile such as the cases of the Korean Intellectual Property Office (KIPO), Japan Patent Office (JPO), Australian Patent Office (IPAustralia) and Brazil's Patent Office (INPI), among others. It is expected that the result of this activity will lead to a new IP national strategy being drafter and proposed to the President.
- 3.5 **Component II. Redesign of Science, Technology and Innovation Public Support Programs:** This component will include studies and knowledge sharing workshops that will provide inputs for improving the effectiveness of public programs in key areas of interest of the Chilean Government. The activities are:
- 3.6 **Best Practices for the Assessment of Research Institutes (RI).** The experience of successful catching-up countries such as Korea, Finland or Israel, suggests that RIs are key innovation system actors during the early stage of catching-up. Indeed, there are three arguments that justify RIs: (a) they can generate knowledge that is considered a public good for regulatory purposes; (b) they can address market failures related to knowledge appropriation that adversely affect the generation of knowledge in the private sector and (c) they can address systemic failures that hinder interactions between scientific institutions and firms. Chile has a network of RIs comprised by four public technological institutes and about 40 research centers. Although in principle these institutions were created to fulfill the three missions, in practice they are very underdeveloped institutions. The Government has decided to revamp these organizations but before public officers in charge need to know about best practices regarding the governance, priority setting and funding of RIs. This activity will produce a background study based on OECD countries evidence and after a preliminary review of three RI's centers in Chile will put forward a policy proposal to regulate the GRIs' operations.
- 3.7 **Technology Finance Guarantee Programs:** Liquidity constraints seriously affect SMES capacities to adopt new technology, in particular when this adoption requires the deployment of intangible co-investment such as R&D, marketing, training, etc. Chile has a credit guarantee program for SMES (FOGAPE) which

however does not make any special consideration for technology investment related lending. This activity will produce study providing inputs to CORFO in order to establish a technology credit guarantee fund in collaboration with the private banks and with the support of technology appraisal centers. In order to design this instrument, the experience of Korea's Technology Finance Corporation (KIBO) will be reviewed and shared in Chile through a discussion workshop.

3.8 Contingent Reimbursable Matching Grants Programs: The Chilean innovation public support system is based on a battery of non-reimbursable financial instruments (e.g matching grants). Although evidence from different impact evaluations suggests that these instruments have been effective to induce innovation investment by the private sector, as the system is scaling-up concerns are emerging regarding its sustainability and fiscal costs. Without losing proven advantages of the matching grants model several developed countries have set models that combine the matching-grants with a reimbursable mechanism contingent to the success of the innovation investment. This model guarantees that a fraction of the public resources involved can be recovered and used for further support. This activity will review international experiences on contingent reimbursable matching grants programs implemented in Korea and Israel and it will provide recommendations for its implementation in Chile.

3.9 Indicative Results Matrix:

Component/Outcomes/Outputs	Indicator	Baseline	Goal
Component I			
Outcome 1: Public Science, Technology and Innovation budget allocated to priority sectors	%	18	30
Outputs 1:			
• Background report on KEIT	#	0	1
• Workshop on KEIT model in Santiago	#	0	1
Outcome 2: Regions with established RICs	#	0	15
Outputs 2:			
• Methodology report for RICs	#	0	1
• Pilot Implementation (regions)	#	0	2
Outcome 3: National IP Strategy sent for Presidential approval	#	0	1
Outputs 3:			
• Background report for IP strategy	#	0	1
Component II			
Outcome 1: New policy document to Assess Research Institutes	#	0	1
Outputs 1:			
• Report proposal to assess Research Institutes	#	0	1
• Research Institute Assessed	#	0	3
Outcome 2: New policy document for technology guarantees	#	0	1
Outputs 2			
• Report on KIBO technology guarantees.	#	0	1
• Discussion Workshop	#	0	1
Outcome 3: New policy document for Contingent Reimbursable Grants	#	0	1
Outputs 3			
• Report on reimbursable grants models.	#	0	1
• Discussion Workshop	#	0	1

- 3.10 The total amount of this project will be US\$450,000 of which US\$400,000 will be funded by the IDB through the Public Capacity Building Korea Fund for Economic Development (KPC). The following table splits this budget among the different components, for more details see Annex III. The counterpart funding for US\$50,000 (in kind) will be used for the domestic workshops.

Indicative Budget (US\$ dollars)

Activity/ Component	Description	Activities	IDB/Fund Funding	Counterpart Funding	Total Funding
Component I	Institutional Framework	1)Strategic Selectivity Study	80.000	30.000	110.000
		2)Institutional Regional Review Study	100.000	0	100.000
		3)IPR for Development	50.000	10.000	60.000
		Sub-Total	230.000	40.000	270,000
Component II	Redesign of Public Support Programs	4) Best practices for assessment of RI	70.000	10.000	80.000
		5)Technology Finance Guarantee	65.000	0	65.000
		6)Early Stage Entrepreneurship	30.000	0	30.000
		Sub-Total	165.000	10.000	175,000
Final Evaluation			5,000		5,000
TOTAL			400.000	50.000	450.000

- 3.11 The Bank through CTI's specialists will supervise the technical and operational activities related to the project. Although the Bank will be the executing unit of this project, the beneficiary will still have to submit technical reports every six months with information about activities, products and results achieved over the last period. The reports will have to include a schedule for using the resources over the next six month period together with information on lessons learned. The half year reports will discussed in monitoring meetings with the beneficiary. Additionally, the technical cooperation will have an external evaluation by an independent consultant, paid by the project, who will certify the fulfillment of the indicators and goals included in the results matrix.

IV. EXECUTING AGENCY AND EXECUTION STRUCTURE

- 4.1 The executing agency will be the Bank based on two reasons. First, its capacity to implement technical cooperation projects and its knowledge to identify highly qualified international consultants because of its experience in similar operations among different countries in the region. The beneficiary of this TC, the Ministry of Economics will contribute to the discussion of the terms of reference of the different studies, assist the international consultants during their missions to Chile and provide inputs and feedback on the final outcomes of the different studies. The Ministry of Economics is the executive secretariat of the Inter-Ministerial Cabinet for Innovation as such it plays a critical role in the coordination of the science, technology and innovation policies in the Chilean context. This fact significantly increases the changes that the lessons learned during this project will be adopted by the executing agencies. The second reason for Bank being the executing unit is in order to speed the TC implementation and the urgency to implement the reforms in the Government's agenda. If the Ministry of Economics were the executing unit, according to the Chilean budgetary process, the resources of this TC would have to

be included in the national Budget. Given that the 2015 budget cycle is already closed, the actual implementation of the TC would have to be delayed until 2016.

- 4.2 The Annex I includes the official request letter for this TC (signed Aide Memoire from CH-L1088 identification mission), while Annex IV includes the official request letter from the Ministry of Economics for the Bank to be the executing unit of this project.
- 4.3 The procurement of individual consultancy services will be carried out by the IDB in accordance with the policies of its Human Resource Department (HRD). The procurement of firm consultancy services will be carried out by the IDB in accordance with the Policies for the Selection and Contracting of Consultants Financed by the Inter-American Development Bank (GN-2350-9), while the procurement of consulting services different from consultants will be carried out by IDB in accordance with its Corporate Procurement policies¹³.

V. PROJECT RISKS AND ISSUES

- 5.1 A risk with the implementation of this TC is that the GCL disagrees with the recommendations emerging from the some of the studies and so does not move forward with the policy implementation of some of them. In order to mitigate this risk the project team will be deeply involved in the dialogue with the beneficiary in order to accompany the process of discussion and assimilation of the different policy recommendations.

VI. EXCEPTIONS TO BANK POLICY

- 6.1 There are no exceptions to Bank policies in order to execute this TC

VII. ENVIRONMENTAL AND SOCIAL CLASSIFICATION

- 7.1 This TC does not have environmental issues. Regarding Social strategy, this project will be designed addressing gender and minorities' social inclusion concerns. Based on the Environment and Safeguards Compliance Policy (OP-703), the TC has been qualified as category "[C](#)" which confirms an environmental, social and / or cultural minimum or no impact.

REQUIRED ANNEXES

- Annex I: [Request from Client](#)
- Annex II : [Terms of Reference](#)
- Annex III: [Procurement Plan](#)

¹³ Policy for the Selection and Contracting of Consulting Firms for Bank-executed Operational Work (GN-2765-1) will also be applied once it's implemented on 2015.

SUPPORT FOR THE NATIONAL COMPETITIVENESS AND INNOVATION AGENDA

CH-T1151

CERTIFICATION

I hereby certify that this operation was approved for financing under the Public Capacity Building Korea Fund for Economic Development (KPC) through a communication dated September 11, 2014 and signed by Suyeong Yu, Director of the International Finance Bureau, Ministry of Strategy and Finance of the Republic of Korea. Also, I certify that resources from said fund are available for up to US\$400,000 in order to finance the activities described and budgeted in this document. This certification reserves resources for the referenced project for a period of six (6) calendar months counted from the date of eligibility from the funding source. If the project is not approved by the IDB within that period, the reserve of resources will be cancelled, except in the case a new certification is granted. The commitment and disbursement of these resources shall be made only by the Bank in US dollars. The same currency shall be used to stipulate the remuneration and payments to consultants, except in the case of local consultants working in their own borrowing member country who shall have their remuneration defined and paid in the currency of such country. No resources of the Fund shall be made available to cover amounts greater than the amount certified herein above for the implementation of this operation. Amounts greater than the certified amount may arise from commitments on contracts denominated in a currency other than the Fund currency, resulting in currency exchange rate differences, for which the Fund is not at risk.

Original Signed

11/19/2014

Sonia M. Rivera
Chief
Grants and Co-financing Management Unit
ORP/GCM

Date

APPROVAL

Approved:

Original Signed

11/20/2014

Jose Miguel Benavente
Division Chief
Competitiveness & Innovation Division
IFD/CTI

Date