Technical Cooperation Document

I. BASIC INFORMATION FOR TC

▪ Country/Region:	Paraguay (PR)
▪ TC Name:	Strengthening and Scaling-up Capabilities of National Innovation System (NIS): Focused on National Funding Agency (NFA) and Government-funded Research Institutes (GRIs)
▪ TC Number:	PR-T1225
▪ Team Leader/Members:	Team Leader: Juan Pablo Ventura (CTI/CPR). Alternate Team Leader: Gustavo Crespi (CTI/CUR); Team members: Pablo Angelelli (CTI/CHL), Gabriel Casaburi (CTI/CAR); Blanca Torrico y Mariela Rizo (IFD/CTI); Ruth Aquino y Diego Recalde (CSC/CPR); Mariano Perales (FMP/CPR); Rodolfo Graham (LEG/SGO).
▪ Taxonomy:	Client Support
▪ Date of TC Abstract authorization:	09/27/2016
▪ Beneficiary (countries or entities which are the recipient of the technical assistance):	Paraguay, through its National Council for Science and Technology (CONACYT), Presidency of the Republic, and Government Research Institutes.
▪ Executing Agency:	Inter-American Development Bank (IDB), Pablo Ventura (CTI/CPR)
▪ Donors providing funding:	Knowledge Partnership Korea Fund for Technology and Innovation (KPK)
▪ IDB Funding Requested:	US$520,000
▪ Local counterpart funding, if any:	US$0.00
▪ Disbursement period (which includes Execution period):	24 months for disbursement and 18 months for execution
▪ Required start date:	February 1, 2017
▪ Types of consultants:	Firms and Individual Consultants
▪ Prepared by Unit:	Competitiveness and Innovation Division (IFD/CTI)
▪ Unit of Disbursement Responsibility:	CSC/CPR
▪ TC Included in Country Strategy (y/n):	Yes
▪ TC included in CPD (y/n):	No
▪ UIS Sector Priority:	Yes

II. JUSTIFICATION AND OBJECTIVES OF THE TC

2.1 Paraguay has achieved outstanding economic growth over the last five years, with an annual growth of GDP of 5.6% (ECLAC, 2014). Underpinning this excellent performance are sound macroeconomic policies, structural reforms and excellent external conditions. However, high poverty, inequality and low investment in knowledge remain the biggest challenges that the country has to face in order to sustain its growth potential. In fact, Paraguay still lags behind most Latin American countries in terms of per capita income and investment in knowledge. Indeed, at 0.06 percent of GDP, investments in research and development (R&D) are significantly lower than region's average (0.76 percent, RICYT, 2015). Poor access to knowledge, human capital and finance together with lack of sophistication of the production structure explain a significant part of

this gap (BID, 2014). Moreover, increasing the contribution of innovation to growth becomes critical in a context of declining commodity prices.

2.2 However, the simple identification of market and coordination failures is not enough for successful policy intervention. This also requires institutional capacities in the public sector for policy design and implementation. Over the last decade Paraguay has embarked in a process of reforms in order to scale-up science, technology and innovation (STI) policies as the country has gradually set up a system of rules, institutions and other policy instruments to ensure the coordination of the country's science, technology and innovation activities. Key ingredient of these reforms has been the establishment of a new national funding agency (National Council for Science and Technology, CONACYT) (http://www.conacyt.gov.py/). CONACYT is in charge of the management, coordination, financing and evaluation of national STI policies and to do this has a multi-stakeholders governance with a board composed of representatives from various ministries, industrial associations, public and private universities, trade unions and the Scientific Society. In this context, CONACYT plays a dominant national funding agency (NFA) role concentrating science, technology, human capital, business innovation and entrepreneurship support programs under a single window[1],[2].

2.3 Another important recent institutional reforms have been the establishment of the National Researchers Program (PRONI) - a program managed by CONACYT- that assesses the productivity of domestic researchers, categorizes them and grants performance incentives and the creation by law of the National Fund for Public Investment and Development (FONACIDE)[3], through which CONACYT will receive between US$30 – US$50 million per year to fund R&D projects and human capital scholarships.

2.4 Nevertheless, regardless the support from the IDB, CONACYT still need to develop institutional capacities in key areas such as policy planning, project management, information systems, human capital and program evaluation. Furthermore CONACYT needs to develop these capacities in particular regarding to how to encourage STI's technology transfer to the productive sector and how

---

[1] In order to support these reforms, the IDB approved in 2005 the Program for the Development of Science, Technology and Innovation (PR-0126) –PROCYT- which was managed by CONACYT. This program allowed CONACYT starting its operations and to build very basic institutional capacities. This program ended in 2014. A second loan program (PR-L1070), known as PROINNOVA for a total of $10 million was approved by the Bank in December 2015. The loan contract for this second program is pending ratification by the National Congress according to the national procedures. When ratified by Congress, CONACYT will be also the executing authority of PROINNOVA. The PR-T1225 technical cooperation is a part of the efforts the Bank is carrying out to strengthen national STI capacities; while PROINNOVA is focused on innovation, PR-T1225 technical cooperation aims to create capacities in technology institutes, one of the weakest actors in the National Innovation System. PROINNOVA will not finance the implementation of master plans, but some activities could be eligible for funding.

[2] A dominant agency model (or a single window) makes sense for those countries that are in the starting-up phase of building their national innovation system. Lack of critical mass and the need to follow a select and focus strategy is critical at this stage. Over time, when the country advances in the building up of the capabilities more specialization might be needed and so multiple agencies (for science, for human capital, for competitiveness, etc.) might emerge.

[3] The fund is financed through a special tax of energy exports (Law 4758). This legal framework establishes that 33% of total FONACIDE's revenues should be allocated to the support of education and research through the Fund for Excellence in Education and Research.

to promote business innovation[4]. At the same time poor attention has been given so far to government research institutes (GRIs) as mechanisms to build absorptive capacity for technology transfer and assimilation by the productive sector. As the previous experience of successful developed countries suggests, during the early stages of the catching-up process when domestic firms do not have enough scale nor capabilities to carry-out indigenous innovation, GRIs become critical instruments for technology adoption and transfer to the private sector[5]. Paraguay has 12 GRIs, some of them created in the 1970s as decentralized agencies of sectoral ministries or affiliated to national or even private universities, with poor performance in terms of technology transfer and commercialization mostly due to their poor governance, lack of financial sustainability, obsolete infrastructure and limited internal management capabilities[6]. Finally, concerning both CONACYT and the GRIs, there are major unresolved issues of policy governance. Institutional reforms are needed to clarify latent conflicts in policy implementation that lead to duplication in support programs, absence of critical mass and waste of public resources.

2.5 **General Objective.** The general objective of this project is to strengthen the institutional capacities of Paraguay's national innovation system (NIS) for the better implementation of STI policy programs. **Specific Objectives**: In particular, the project will support the Government of Paraguay (GOP) regarding: (a) Strengthening the institutional capacities of the national funding agency (CONACYT) to manage STI policy programs; and (b) Scaling-up the institutional capabilities of GRIs in order to carry-out successful technology transfer to the business sector. Specially, for achieving these objectives, the reference to Korean experience can be very relevant in the sense that the existence of effective NIS organizations (NFAs and GRIs) greatly contributed to Korean manufacturing and ICT industries' rapid growth, leading to the remarkable economic development within a very short time period.

2.6 This technical cooperation is aligned with Bank's Country Strategy with Paraguay, 2014-2018 (GN-2769), under the priority area of productive development through business innovation. It is also consistent with the Update to the Institutional Strategy (UIS) 2010-2020 (AB-3008) and it is strategically aligned with the development challenges of: (i) Low Productivity and Innovation;

---

4 For example, nowadays most of the business innovation support programs are horizontal so they support R&D independently of the sector where these R&D is being carried-out. Given the small budgets for R&D support this practice leads to the fragmentation of the fiscal resources in a large set of much dispersed activities. CONACYT needs to improve is capacities for sector prioritization and focus.

5 More broadly, three arguments are generally given to justify the existence of government research institutes (GRIs): *i*) they can generate knowledge that is considered a public good; *ii*) they can address market failures related to knowledge appropriation that adversely affect the generation of knowledge in the private sector; and *iii*) they can address systemic failures that hinder the development of interactions between institutions involved in R&D and innovation (OECD, 2012). In most countries GRIs have been developed with missions justified by these three types of arguments. In principle, this has also been the case in Paraguay, with however some important qualifications pertaining either to the nature of the missions entrusted to some of them or to the ways that their missions have been fulfilled.

6 These are the Paraguayan Institute for Agricultural Technology (IPTA), ITAIPU Technology Park Foundation (FPTI), Institute for Tropical Medicine (ITM), National Health Institute (INS), Institute of Agriculture Biotechnology (INBIO), ITAPUA Technology Development Center (ARP), Health Sciences Research Institute (IICS), Digital Electronics Laboratory (LED), USCA Technology Development Center (CDT), San Carlos Technology Development Center (CDT), Polytechnic School (FP) and the Scientific Research Development Center (CEDIC).

and (ii) Strengthening institutional capacity and the rule of law. The TC will contribute to the Corporate Results Framework (CRF) 2016-2019 (GN-2727-6) by contributing to the growth of the Government effectiveness Indicator and by strengthen SMEs access to financing. Furthermore, a stronger institutional framework for innovation policies will encourage productivity growth contributing to the Bank's Sector Strategy Institutions for Growth and Social Welfare (GN-2791). Finally, this project is consistent with the Innovation Science and Technology Sector Framework Document (GN-2791-3), in particular regarding the increase of investments in science, technology and innovation and the correct financing for business innovation. This project is also consistent with the goal of the Knowledge Partnership Korea Fund for Technology and Innovation (KPK), that support the development of technological and scientific capacities, as well as institutional strengthening (based on the application of ICT)[7].

III. DESCRIPTION OF ACTIVITIES/ COMPONENTS AND BUDGET

3.1 To reach the objectives the project will finance consultancy activities, travels and experts visits. Implementation of the following components with their products and associated activities is contemplated.

3.2 **Component I: Institutional Assessment of Capacities of CONACYT and GRIs (US$204,000).** This component will be either in parallel or in follow-up building-up on the learning from the Korean experience through a Knowledge Sharing Program (KSP) funded by the Korea EXIMbank[8]. The first activity of this component will be to deliver a concrete methodology to assess the institutional performance of both CONACYT and GRIs. The methodology should consider the particularities and functional differences between a NFA (CONACYT) and GRIs. For CONACYT the methodology should assess at least: its goals, structure (staff, budget, financial mechanism, management autonomy and coordination), programs (monetary instruments, information) and learning (monitoring, evaluation and experimentation capacities). For the GRIs, the methodology should look at valuing the institution at the following levels: management, research, production, transfer and articulation. It is expected that in both cases

[7] See Knowledge Partnership Korea Fund for Technology and Innovation (KPK), operational guidelines.

[8] Under the KSP the following activities will be carried-out by Korean consultants: (a) a diagnostic study on the current situation the national innovation system in Paraguay; (b) a comprehensive and detailed case study of the Korean experience with the implementation of NFA and GRIs. The KSP team will select the Korean NFAs and GRIs to carry-out this activity in agreement with the Government of Paraguay (GOP) and the IDB, based on the results of the diagnostic study. The preliminary targets of Korean NFAs would include: National Research Foundation (NRF), Korean Institute for the Advancement of Technology (KIA), Korean Evaluation Institute of Industrial Technology (KEIT), Korean Institute for Start-up and Entrepreneurship (KISED) and Korean Technology Guarantee Fund (KIBO). Preliminary targets of Korean GRIs would include: Korean Institute of Science and Technology (KIST), Korean Institute of Industrial Technology (KITECH), Korean Research Institute of Bioscience and Biotechnology (KRIBB), Korea Food Research Institute (KFRI) and the Electronics and Telecommunications Research Institute (ETRI). Particular attention will be also given at the studying of the National Research Council of Science and Technology (NST) as a holding agency under the Ministry of Science, Information Technology and Future Planning (MSIP) that coordinate the operations and evaluation of the different GRI. The final three activities of the KSP include: (c) producing a policy paper with general macro recommendations regarding strengthening Paraguay's NSI and with a particular focus on the institutional reforms needed to regulate the operations of the NFA and GRIs (how to govern them, how to coordinate them, how to evaluate them), (d) capacity building workshops and (e) dissemination activities. It is expected that these recommendations will be followed-up by the current technical cooperation.

the evaluation process should cover the following two steps cycle: (a) self-evaluation (the evaluation methodologies should be self-contained meaning by this that they should be simple enough as to be implemented by each institution with certain regularity and based on participatory approaches. This step should conclude with a self-evaluation report) and (b) external evaluation (this step will provide and independent assessment of the institution carried-out by peer-institutions that are best practice of reference for Paraguay. The external reviewers will validate or correct the information in the self-assessment report identifying challenges and gaps that need to be tackled). In order to carry-out this activity the methodological documents will be prepared in collaboration with Korean Science and Technology Policy Institute (STEPI) in order to guide the peer-review process [9]. These methodological documents will take into consideration the lessons learned from the Korean case-studies during the KSP and it will be carefully tailored made to the current institutional capacities of Paraguay.

3.3 The second activity under this component is to apply the assessment methodology. Once these institutional assessment methodologies are approved by the GOP, the same one will be implemented in CONACYT and three selected GRIs of Paraguay. Along with the self-assessment, relevant partner institutions from Korea will conduct the peer evaluation to assess institutional capacity and to provide recommendations that help improving capabilities of CONACYT and three selected Paraguay's GRIs; this activity will be carry out also in collaboration with Korean Science and Technology Policy Institute (STEPI).

3.4 The criteria for selection of the three Paraguay's GRIs to be assessed will be based on: strategic importance for the Paraguayan economy, basic capabilities for R&D, technology transfer activities and financial support from CONACYT. During the assessment phase we expect intense communication and field work by Korean researchers from peer institutions to Paraguay. Based on these criteria, Paraguay's pre-identified GRIs would be: the Paraguayan Institute for Agricultural Technology (IPTA), the Agricultural Biotechnology Institute (INBIO) and the Digital Electronics Laboratory (LED-UCA). However, a final decision will be made after the results of the KSP program and specific recommendations from the KSP team.

3.5 **Component II: Development of Master Plans (US$189,000).** Based on the results of the institutional assessment, this component will finance the consultancy necessary to develop master plans for the improvement of the institutional capacities of CONACYT and three GRIs. The Plans should propose goals to achieve institutional strengthening, setting objectives, output and outcome indicators and concrete actions needed to overcome the gaps found during the assessment phase. Each Master Plan should identify strategic focus areas for economic development and also pre-identify investment needs and financial requirements for implementation (e.g an infrastructure development plan should be part of the Master Plan). It should also identify concrete institutional development projects that could be later one supported through the TC, IDB lending operations or FONACIDE.

[9] STEPI is a Korean government policy think tank that operates under the office of the Prime Minister with the mission of providing support for the country's planning, design and implementation of STI policies.

3.6 **Component III**: **Implementation Master Plans (US$107,000).** This activity will support a series of specific consultancies aimed at supporting key aspects of the master plan that could be eligible for TC support. This could include consultancies and technical support for strategic planning, organizational change, prospective studies, development of new policy instruments, human capital development strategies, human resources incentives and management, pre-feasibility studies for infrastructure projects (e.g. building a new facility for the GRI or CONACYT), strengthening of information systems, development of a research policy, development of a dedicated area for technology transfer, adoption of international quality standards in terms of biosecurity, definition of a ethics code for research, human capital development policy, strategy for talent attraction or retention, training workshops for managers and managerial staff, etc.

3.7 Implementation of the Masters Plans will also strongly build on the Korean technical capabilities. For example, in the case of CONACYT, training workshops on technology foresight and policy planning could be developed (with the support of KIAT or KISTEP), guidelines for the management of peer-review evaluation systems could be established (with support of KEIT) or technical reports to support innovation financing (with KIBO) or the creative industries (with KISED) could be developed. The right mixed will be tailored to the CONACYT's needs with the support of the CTI team. Regarding the GRIs, the three Paraguay's GRIs selected will receive implementation support by peer Korean GRIs (for example, KIST could be a good implementation match for some of the activities listed in 3.5 for the Paraguayan Institute for Agricultural Technology (IPTA), while KRIBB could be good match for the Agriculture Biotechnology Institute (INBIO) and ETRI for Digital Electronics Laboratory (LED-UCA). The scaling-up of the infrastructure investments needed for the full implementation of master plans will be supported through the Bank's lending programs and FONACIDE. Finally implementation of master plans would lead to medium and long term cooperation agreements.

Indicative Results Matrix

Outcomes Section					
Outcome statement: The Institutional Capacity of the Paraguayan National Innovation System (NIS) is strenghtened to desing and implement STI transfer policy programs					
Outputs Section					
Component 1: Institutional Assessment of Capacities of NFA and GRIs					
Outputs	**Unit of measure**	**2017**	**2018**	**End of Project Target**	**Means of Verification**
Institutional Assessment Methodology (NFA and GRI) Documents designed and approved by the IDB	Documents	2	0	2	Consultants's report
Institutional Assessment Methodology (NFA and GRI) Documents implemented in Paraguayan STI agencies	Documents	2	2	4	Consultants's report
Component 2: Development of Master Plans					
Master Plans completed containing concrete actions needed to overcome the gaps found during the assessment phase.	Plans	2	2	4	Consultants's report

Component 3: Implementation Master Plans					
Report delivered by the Consultans including the key aspects of Master Plans adressed	Reports	0	1	1	Consultants's report
Training workshops on technology foresight held for managers and staff	Workshops	0	2	2	Workshop invitations
Operational Guidelines for CONACYT and GRIs designed	Guidelines	0	4	4	Consultants's report
Medium and long term NFA/GRI-Korean Institutions Cooperation Agreements Approved by the IDB	Agreements	0	4	4	Agreement on IDBDocs

Indicative Budget (in US$)

Activity/ Component	Description	Activities	IDB/Fund Funding	Counterpart Funding	Total Funding
Component I	**Institutional Assessment**	1)Institutional Assessment of CONACYT	34,000	0	34,000
		2)Institutional Assessment GRI 1	30,000	0	30,000
		3)Institutional Assessment GRI 2	30,000	0	30,000
		4) Institutional Assessment GRI 3	30,000	0	30,000
		5) CONACYT/GRI Technical support	80,000	**0**	80,000
		Sub-Total	**204,000**	**0**	**204,000**
Component II	**Master Plans**	1) Institutional Set Up Master Plan	25,000	0	25,000
		2) CONACYT Strengthening Plan	25,000	0	25,000
		3) GRI 1 Strengthening Plan	25,000	0	25,000
		4) GRI 2 Strengthening Plan	25,000	0	25,000
		5) GRI 3 Strengthening Plan	25,000	0	25,000
		6) CONACYT/GRI Technical support	64,000	**0**	64,000
		Sub-Total	**189,000**	**0**	**189,000**
Component III	**Implementation Support**	1) Managers and staff training	35,000	0	35,000
		2)Operational Guidelines CONACYT	18,000	0	18,000
		3) Operational Guidelines GRI	54,000	0	54,000
		Sub-Total	**107,000**	**0**	**107,000**
Independent External Evaluation		**External Evaluation Report**	**20,000**	**0**	**20,000**
TOTAL			**520,000**	**0**	**520,000**

IV. EXECUTING AGENCY AND EXECUTION STRUCTURE

4.1 The executing agency will be the Bank. This is based on 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, CONACYT will contribute to the discussion of the terms of reference of the different studies, assist the international consultants during their missions to Asuncion and

approve the final outcomes of the different studies. Bank's execution is in compliance with the section 4.5 of the Proposal for a new Bank policy on technical cooperation (GN-2470-2), which requires, in case of Bank-executed TCs, that: (a) the beneficiary country or group of countries concurs and (b) the proposed activities are consistent with the Bank's country and /or regional strategy and program

4.2 The Bank through CTI 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 a technical report every six months with information about activities, products and results and lessons learned. 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.

4.3 The Bank will contract individual consultants, consulting firms and non-consulting services in accordance with current Bank procurement policies and procedures.

V. MAJOR ISSUES

5.1 A risk with the implementation of this TC is that the Paraguayan Government 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 Policy.

VII. ENVIRONMENTAL AND SOCIAL STRATEGY

7.1 Given the nature of the program, there are no associated environmental or social risks. Based on the Environment and Safeguards Compliance Policy (OP-703) this operation is classified as "C." (See Safeguards Policy Filter Report and the Screening Form).

Required Annexes:

- Annex I: Request letter
- Annex II: Terms of Reference
- Annex III: Procurement Plan

STRENGTHENING AND SCALING-UP CAPABILITIES OF NATIONAL INNOVATION SYSTEM (NIS): FOCUSED ON NATIONAL FUNDING AGENCY (NFA) AND GOVERNMENT-FUNDED RESEARCH INSTITUTES (GRIS)

PR-T1225

CERTIFICATION

I hereby certify that this operation was approved for financing under the **Knowledge Partnership Korea Fund for Technology and Innovation (KPK)** through a communication dated September 27, 2016 and signed by Chang Yeon You (ORP/GCM). Also, I certify that resources from said fund are available for up to **US$520,000** in order to finance the activities described and budgeted in this document. This certification reserves resource for the referenced project for a period of four (4) 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, represent a risk that will not be absorbed by the Fund.

Original Signed — *Dec/01/2016*

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

Date

Approved: *Original Signed* — *Dec/05/2016*

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

Date