

PPP

PUBLIC-PRIVATE PARTNERSHIP
IN LATIN AMERICA.

Facing the challenge of connecting
and improving cities.



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Introduction

The Public Private Partnership (PPP) model's marked development in recent years in different Latin American countries has been accompanied by the need to generate knowledge about this matter so governments, at national and subnational levels, interested in implementing this model can benefit from the prior experience of other countries.

This latest edition is the third book in a series of publications that CAF – Development Bank of Latin America–has promoted with the purpose of generating knowledge in the region in the field of PPP. Its planning forms part of a journey that CAF began in 2010 with the presentation of the book *Infraestructura pública y participación privada: conceptos y experiencias en América y España [Public Infrastructure and Private Participation: Concepts and Experiences in America and Spain]*, continued in 2015 under the title *Public-Private Partnership in Latin America: Learning from Experience*.

The first book, published in 2010, introduced the PPP model as a tool with great potential to attract private investment in public infrastructure, and covered the model's development in several Latin American countries. The second book, which took a different approach from the first, focused on obtaining lessons from the experience gathered in five PPP case studies in the region.

The scope and importance of this second book, given its original approach with respect to other publications on the PPP model, led CAF to undertake a third book that, continuing with the methodology of the case studies, addresses three key challenges in the field of PPP in the region: new types of infrastructure that are adopting this model in the field of telecommunications and water; the need for the transformation of institutional governance; and, the application of the PPP model in cities.

The book consists of seven chapters. Chapter 2 summarizes the main institutional and regulatory developments that have taken place in the Latin American countries since the prior publication. This chapter shows how, in recent years, new countries in the region have been successfully incorporating the PPP model.

Chapter 3 develops the case of the institutional change spearheaded by Colombia to transform the old concession model, which had been questioned, into a new PPP model for the development of an ambitious program of fourth generation highways in the country. This case shows the importance that legal and institutional changes have for the success of PPP programs.

Chapter 4 analyzes the impact of urban highway concessions in Santiago, Chile after more than 15 years since they were first awarded. This case is very interesting for many reasons: first, because it is a unique experience in the world; second, because it has a long history since its conception that allows to obtain lessons with a wide perspective; third, because it has an institutional component of special interest for this publication; and, fourth, because it has an important relationship with urbanism and the concept of the city model.

Chapters 5 and 6 focus on two projects in which the PPP model's application is especially innovative in Latin America. Chapter 5 studies a telecommunications project, the National Fiber Optic Backbone Network, which was designed to provide remote regions in Peru with suitable access to telecommunication data. Chapter 6 analyzes the case of the expansion of the sanitation network of the municipality of Serra in the state of Espírito Santo in Brazil. These projects are interesting given their innovative approach to the PPP model; their complex overlap in the existing regulatory and institutional framework; and the very important impact they may have on the quality of life of the neediest population segments.

The book ends with a seventh and final chapter focused on cities. Given the importance that the improvement of the quality of life in urban areas has for the development of Latin America, and the growing need for investment to ensure that process, this chapter proposes a set of reflections and recommendations for the application of the PPP model in cities. To this end, based on the knowledge and experience acquired in other environments over the years, the key factors to ensure the model's correct implementation in cities are identified. This chapter is groundbreaking given the lack of literature on the subject and the importance that investment in urban areas will have in Latin America in the coming years.



Main PPP Developments in Latin America

Situation of the region in recent years

Advances in the countries with the most extensive PPP experience

Colombia

Chile

Mexico

Brazil

Peru

Countries new to or re-launching the PPP model

Argentina

Uruguay

Paraguay

Ecuador

Costa Rica

Panama

Situation of the region in recent years

Latin America's economic growth in 2016 was one of the lowest in the last 30 years, according to figures from the World Bank and ECLAC.¹ The region's economy contracted 1% after having stagnated in 2015 following four years of deceleration. This was the result of weak domestic demand due to falling commodity prices, fiscal and external adjustments in some countries, and other country-specific factors. However, this economic slowdown was not the same in all Latin American countries. In 2016, important countries for their contribution to regional GDP,² like Argentina and Brazil, reported negative growth, while others, like Bolivia, Colombia or Peru, continued to sustain the positive trend recorded years earlier.

According to the OECD,³ in 2016, Latin America still showed an important gap with the OECD countries in many key aspects of development such as poverty, education and health. In addition, **infrastructure quality** was very uneven (Kogan and Bondorevsky Li, 2016), understanding that this concept includes quality in and of itself, as well as the availability, reliability, sustainability and resilience of the infrastructure.

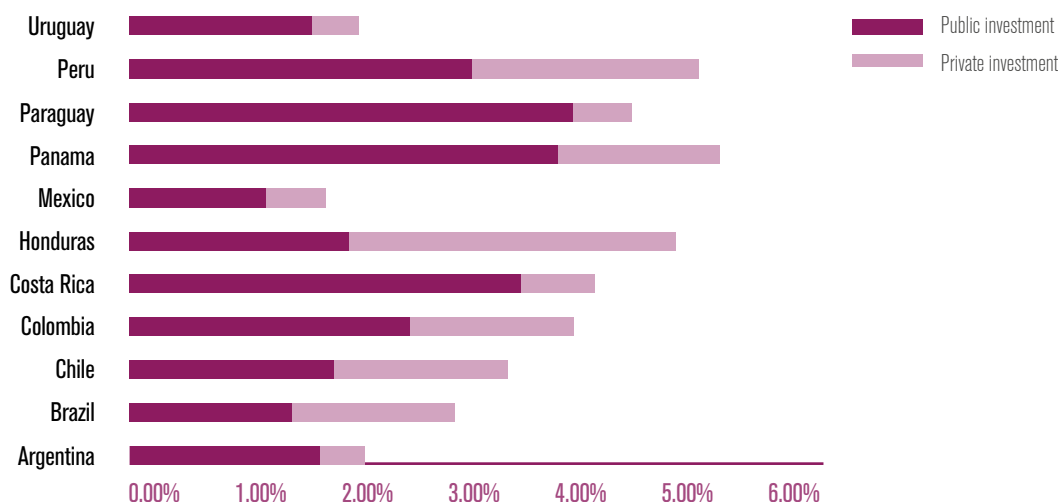
According to Perroti (2011), in order to reduce the existing infrastructure gap, investment levels around 6% of GDP must be sustained over the 2012-2020 period. To achieve this goal, the involvement of the private sector is necessary since public investment in Latin America has not exceeded the 2% -2.5% of GDP in the last decade, as can be seen in Figure 1.

1. ECLAC (2017). Estudio económico de América Latina y el Caribe (ECLAC Economic Survey of Latin America and the Caribbean 2017)

2. Information taken from different national statistics sites

3. Organisation for Economic Co-operation and Development (OECD)

Figure 1. Public and private investment by country in Latin America in % of GDP (2008-2015).



Source: Authors based on data from INFRA LATAM

Public-Private Partnerships (PPPs) have been promoted worldwide as the solution for states to meet their need for infrastructure and public services with the participation of the private sector. Latin America has been no stranger to the implementation of this model, recognized in recent years as a leader in PPP with respect to the rest of the developing regions.

In Latin America, countries with a longer history of PPP have made progress in improving and developing their regulatory and institutional frameworks based on prior experiences. In addition to the usual actors, new countries with limited experience have started to structure and implement PPP systems in recent years in light of the positive results in neighboring countries.

Proper infrastructure planning and perseverance in the PPP model could be a key pillar for Latin American governments seeking to pull out of this economic downturn, establishing the foundation for the future development of the region, bringing countries closer to OECD standards.

However, one of the region's great challenges in this matter is to obtain sufficient resources to finance infrastructure. As stated in a World Bank report: *Financiamiento Privado de la Infraestructura pública mediante APP en AL y el Caribe (Private Financing of Public Infrastructures through PPPs in Latin America and the Caribbean)* (García Kilroy and P. Rudolph, 2017), for the proper development of PPPs, sufficiently mature financial markets must exist; if not, the financial costs may be unaffordable.

According to this report, financial markets in countries like Colombia, Brazil, Mexico, Chile and Peru are sufficiently developed to reasonably take on PPP programs in national currency. The possibility of obtaining low-cost financing in local currency has important advantages. On one hand, it frees countries from the restrictions imposed by foreign financing and, on the other hand, it eliminates foreign exchange risk and associated costs.

Traditionally, banks have been the main private source of public infrastructure financing in Latin America, as seen in Figure 2. Specifically, international commercial banks have had the lead role in this matter, in many cases granting loans in foreign currency.

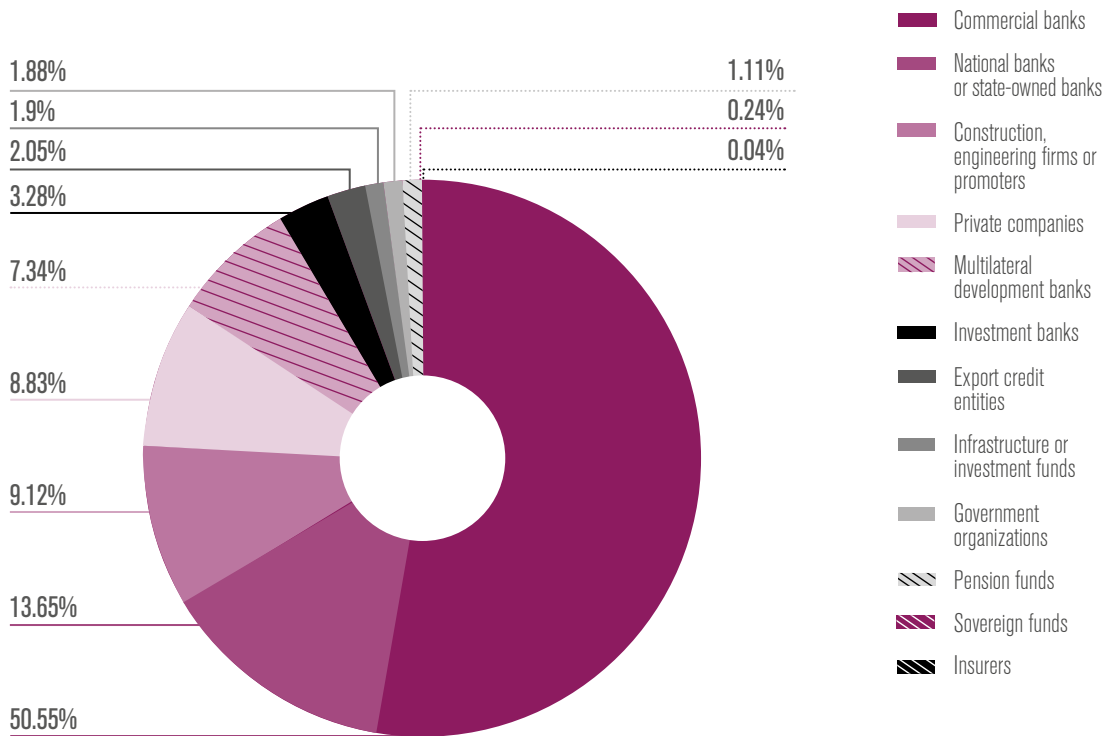
However, due to the increasing penalization that banking regulations are imposing on long-term loans for infrastructure projects, the private sector is paying more and more attention to the possibilities offered by institutional investors (mainly insurance companies and pension funds). As a result, this type of financing, primarily through infrastructure bonds, is gaining acceptance.

In addition to traditional banks and institutional investors, multilateral development banking plays a particularly important role in Latin America. The main function of these institutions is to provide technical assistance to governments, attract investors, and, in particular, provide financing in those cases in which the local market is limited due to lack of experience, shallow financial systems, poor risk rating, lack of preparation of concessionaire companies, or significant foreign exchange risk. Once these problems have been addressed, the participation of multilateral entities in the corresponding country should fade progressively to allow the system to work on its own.

As shown in Figure 2, the participation of these entities in financing in recent years has not been negligible, coming in behind traditional banks and companies.

Another model that is being applied successfully in some countries is the creation of public entities controlled mainly by national governments whose role is to facilitate the mobilization of financial resources required for the development of infrastructure. This is the case, for example, of Colombia's national development bank (Financiera de Desarrollo Nacional, FDN), which was created in parallel with the development of the fourth-generation concessions in order to provide them with support. FDN's work is important. It has been actively involved in more than 20 projects since it was first created, supported by international partners such as CAF, Sumitomo Mitsui Banking Corporation and the International Finance Corporation (IFC).

Figure 2. Private suppliers of capital for infrastructure projects in Latin America and the Caribbean (2005-2014).



Source: Serebrisky et al., 2015

Since 2009, the *Economist Intelligence Unit (EIU)*, with the support of IDB Lab, formerly known as Fondo Multilateral de Inversiones (FOMIN), part of the IDB Group, has published the report *Infrascope*.⁴ The annual report evaluates the capacity of countries in Latin America and the Caribbean to mobilize private investment in infrastructure using the PPP model. The study compiles 23 indicators, grouped in several indexes that assess, among

4. EIU (Economist Intelligence Unit). 2009, 2010, 2012, 2014, 2017. Evaluating the environment for public-private partnerships in Latin America and the Caribbean: The *Infrascope*

other aspects: the regulatory and institutional framework, the experiences and success of projects (maturity), the investment climate, and financial facilities. *Infrascope* is a very useful tool to assess the situation of Public-Private Partnerships in each of the countries of the region, compare them, and analyze the evolution of the sector.

The most recent edition of the report was launched in 2017. The publication highlights the strong commitment that the continent is making to the model in general, as well as the significant development seen in Central America. Table 1 shows the scores and general positions of each country.

Table 1. Overall Infrascope scores, 2017.

Situation	Position	Country	Score / 100
Developed	= 1	Chile	74
Developed	= 1	Colombia	74
Developed	3	Brazil	72
Developed	4	Jamaica	71
Developed	5	Peru	69
Emerging	6	Mexico	68
Emerging	7	Honduras	65
Emerging	=8	El Salvador	64
Emerging	=8	Nicaragua	64
Emerging	=8	Uruguay	64
Emerging	= 11	Costa Rica	62
Emerging	= 11	Guatemala	62
Emerging	13	Paraguay	58
Emerging	14	Trinidad and Tobago	56
Nascent	15	Panama	51
Nascent	16	Dominican Republic	49
Nascent	17	Argentina	48
Nascent	18	Ecuador	44
Nascent	19	Venezuela	8
Average			59

Source: EIU (Economist Intelligence Unit). Evaluating the environment for public-private partnerships in Latin America and the Caribbean: The Infrascope 2017

The main purpose of this introductory chapter is to create a brief compilation of the main events in the PPP sector in Latin America over the period of 2014-2017 broken down by country. Prior editions of this book analyzed the main characteristics of the model in different countries of the region. In recent years, some countries have made progress in the regulatory

and institutional field, while others have done so in the development of new projects. As a result, the structure used to analyze the situation of each country is not homogeneous. This compilation will distinguish between those countries with the longest tradition in PPP and those that are just starting out or re-launching the model.

Advances in the countries with the most extensive PPP experience

The PPP model was first implemented in Latin America at the end of the 1980s and the beginning of the 1990s. The first generation of this type of project was developed in Mexico, Colombia, Argentina and Chile, followed a few years later by Brazil, Peru and Costa Rica.

Of these pioneering Latin American countries in the implementation of public-private partnerships, only a few have consistently developed a PPP model in recent years to reach a suitable degree of maturity. World Bank report: *Financiamiento privado de la infraestructura pública mediante APP en AL y el Caribe (Private financing of public infrastructures through PPPs in Latin America and the Caribbean)* states that Colombia, Brazil, Chile, Mexico and Peru are in this group. This report highlights that ongoing development of regulatory and institutional frameworks in an iterative process in which laws are improved over time by learning from projects as they are implemented is one of the main reasons why the model's growth in these countries has been positive. The next section will review the most recent advances made to the PPP model in the aforementioned countries.

Colombia

Colombia is one of the countries in which PPPs have undergone the most significant evolution in recent years. Therefore, it is an experience worthy of studying in detail due to the changes in the regulatory and institutional frameworks in the country after the passing of Law 1508 of 2012. Due to the particular interest of this experience, this book includes an entire chapter dedicated to a case study in Colombia as it seems pertinent to show other countries its effort to bolster the credibility and viability of the PPP model. In addition, this introductory chapter briefly summarizes the latest developments to provide readers with a comprehensive overview of the advances in Latin America in recent years.

In 2010, the change of government in Colombia produced a paradigm shift in the scope of PPPs. The difficulties with the historic problems of the model were identified and a series of revisions in institutional and regulatory matters were implemented.

In regard to the institutional framework, the National Infrastructure Agency (ANI) was created in 2011 to replace the former National Concessions Institute

(INCO). This latter institution, as will be seen in the chapter on Colombia, faced a series of shortcomings from its creation related to the lack of coordination with the different state agencies, as well as internal problems of the institution itself, motivated mainly by the lack of personnel and insufficient training to carry out the activities that it had been entrusted with.

ANI took over all responsibility for planning, coordinating, structuring, contracting, executing, administering and evaluating concession projects in all transport modes, with the intention of extending these competencies to other sectors. However, as of 2017, this had not yet happened. Parallel to the creation of ANI, the Ministry of Transportation underwent a restructuring, dividing the general Vice Ministry into two specialized technical units: the Vice Ministry of Infrastructure and the Vice Ministry of Transportation.

The National Environmental Licenses Authority (Autoridad Nacional de Licencias Ambientales, ANLA) was also created to oversee the study, approval, issuance and monitoring of environmental licenses, permits and procedures in an effort to improve the efficiency, efficacy and effectiveness of environmental management.

In regard to regulatory framework, Colombia did not have specific legislation to regulate the PPP contracts for public works until Law 1508 was passed in 2012. The traditional concession model was considered another form of public procurement. This normative framework tried to address the historical problems plaguing concessions due to the lack of definition in some fundamental aspects of PPP contracts. Up until then, concessions in the country were characterized by a large number of renegotiations and significant contract amendments, which represented considerable delays and cost overruns.

Colombia's new PPP law put limits on the instances for renegotiation and improved the general terms for these types of contracts, establishing standard PPP processes and setting more objective awarding criteria.

Along with the institutional and regulatory changes, the fourth generation of highway concessions (4G) was launched. As will be seen later in the relevant chapter, it is a very ambitious program, composed of 30 projects divided into several phases with an expected investment of COP 52 trillion (USD 17.2 billion).

Chile

Chile is probably the Latin American country with the most stable PPP model and the most developed regulatory and institutional framework, as highlighted in the report *Financiamiento Privado de la Infraestructura pública mediante APP en AL y el Caribe (Private financing of public infrastructures through PPPs in Latin America and the Caribbean)* and as its No.1 position on the 2017 Infrascope ranking also reflects. The main innovation in Chile since the publication of our previous book entitled *Public-Private Partnerships in Latin America: learning from experience* is the bill for the creation of the Infrastructure Fund SA (FICH), which had not yet been passed at the end of 2017.

The bill defines the fund as a corporation with the format of sovereign investment fund in which 99% of the shares will be owned by the state and 1% by the Production Development Corporation (Corporación de Fomento de la Producción de Chile, CORFO). Its main objectives will be the construction, expansion, repair, maintenance, operation, development, financing and investment of infrastructure projects in the country.

The fund will capture financial resources that are guaranteed by the fund's assets, which are the result of the Residual Value (RV) of all existing road and airport concessions. This constitutes the public patrimony that will support concession and PPP projects in all areas of the economy for the next 25 years. The fund's main objective is to free up the public budget from a large part of the burden associated with the provision of infrastructure, since the resources would come from the management of the RV of ongoing projects, in addition to making these investments independent from the political cycle, among other objectives.

According to a PIAPPEM report (Alvaro Rodolfo and Sergio Alejandro, 2016), the FICH would simultaneously solve the problems of *funding and financing* in the development of public infrastructure with the participation of the private sector. The residual value of (existing and future) concessioned infrastructure would become a new funding instrument for new infrastructure. In addition, the fund would provide resources for debt, guarantees and/or capital, and would therefore constitute a new *financing* component.

The original idea was for the FICH to be created with an initial amount equal to USD 9 billion. However, this value will depend on the concessions included to form part of the fund's assets, based on the market value assigned to these residual assets.

Although the creation of infrastructure funds is not new in the region and there are examples of previous experiences in Mexico and Chile, the truth is that the use of REV is a relevant innovation in the sector. The bill's approval and the launch of the fund would convert Chile into the first country to develop this type of structure, clearing a path that, if successful, could be adopted by other countries in the region in the future.

Mexico

In the 2014-2017 period, Mexico has continued to maintain its commitment to Public-Private Partnerships, with no significant changes since the previous edition of this book.

It should be remembered that national legislation has a supplementary nature, given that state and municipal regulation, when it exists, holds more weight in project structuring.

*As highlighted in the report **Financiamiento Privado de la Infraestructura pública mediante APP en AL y el Caribe** (Private Financing of Public Infrastructure through PPPs in Latin America and the Caribbean),* Mexico's institutional and regulatory PPP system is fragmented. There is no specific agency that establishes policies or supervises the entire system, that is, it

does not have a centralized PPP unit, which is one of the country's main weaknesses and greatest challenges that should be addressed in the coming years.

In 2017, a total of 30 PPP projects divided into two blocks were in the preparation or tender phase:

- Block 1 contained 12 APP projects, which were in the bidding phase at the end of 2017. They include four highway conservation projects, seven hospital projects and one highway construction project. The total amount of the 12 projects amounts to MXN 21.82 billion (USD 1.07 billion).

- Block 2 projects were still in the preparation phase at the end of 2017, possibly entering the tender phase in early 2018. With a total amount of MXN 36.44 billion (USD 1.78 billion), this block brings together 18 projects from diverse sectors, including transport, health, water, education and social security.

Table 2. Portfolio of PPP projects in Mexico, 2017

Block 1	
Communications and transport	Highway conservation: Pirámides-Tulancingo-Pachuca
	Highway conservation: Texcoco-Zacatepec
	Highway conservation: Matehuala-Salttillo
	Highway conservation: Saltillo-Monterrey (La Gloria)
	Monterrey-Nuevo Laredo highway La Gloria-San Fernando section
Health (IMSS ¹)	Area General Hospital in the municipality of Bahía de Banderas, Nayarit
	Regional General Hospital in the municipality of Garcia, Nuevo Leon
	Regional General Hospital in the municipality of Tepotzotlan, State of Mexico
	Area General Hospital in the municipality of Tapachula, Chiapas
Health (ISSTE ²)	General Hospital "Aguiles Calles Ramirez" in Tepic, Nayarit
	Regional General Hospital in the South Delegation of Mexico City
	General Hospital "Dr. Daniel Gurria Urgell" in Villahermosa, Tabasco
Block 2	
Communication and transport	Rehabilitation and maintenance of the highway section Tulum - Cancún, in Quintana Roo
	Rehabilitation and maintenance of the highway section Las Brisas - Los Mochis in Sinaloa
	Rehabilitation and maintenance of the highway section Campeche - Merida, in Campeche and Yucatan
	Rehabilitation and maintenance of the highway section Arriaga - Tapachula, in Chiapas
	Rehabilitation and maintenance of the highway section San Luis Potosi - Matehuala, in San Luis Potosi
	Rehabilitation and maintenance of the highway section Tampico (Altamira) - Cd. Victoria, in Tamaulipas
Health (ISSTE)	General Hospital "Dr. Santiago Ramon y Cajal" in Durango, Durango
	General Hospital in Tampico, Tamaulipas
	General Hospital "Dr. Francisco Galindo Chavez" in Torreon, Coahuila
	General Hospital in the North Zone of Mexico City
	General Hospital in the East Zone of Mexico City and State of Mexico
	General Hospital in Acapulco, Guerrero

Continued on next page...

Block 2

Water	Regulation ponds for the Eastern Rivers of the Valley of Mexico (NAICM)
	Wastewater treatment plants in the basins of the eastern rivers of Lake Texcoco
	Modernization project of the National Meteorological Service
	Modernization, improvement and increase of efficiency of the Los Berros water treatment plant for the Cutzamala System
Education	Rehabilitation, modernization and maintenance of primary school physical infrastructure in Mexico
Government	Expansion and provisions for the Penitentiary Complex in Papantla, Veracruz

1 Mexican Institute of Social Security

2 Institute of Social Security and Services for State Workers

Source: Mexican Government

Brazil

Brazil, despite having a proven PPP system, is one of the countries that has introduced major changes in its scheme in recent years. Law 13334 (September 2016) created the Partnerships in Investments Program (PPI for its acronym in Portuguese). The main purpose of the program was to strengthen and broaden the institutional framework for PPPs, while expanding investment opportunities and ensuring adequate expansion of public infrastructure.

The Partnerships in Investments Program also introduced the need to promote greater and fair competition as a fundamental objective, as well as the assurance of political stability and security. It also deemed it necessary to strengthen the regulatory role of states and the autonomy of state regulatory entities.

Law 13334 also created the Council of the Investment Partnership Program of the Presidency of the Republic (CPPI). This body replaced the previous PPP Management Council. Apart from inheriting the former's council's powers, it was also assigned those of the National Council for the Integration of Transport Policies, as well as those of the National Council of Privatization. The CPPI's main function is management, accompanying the PPI's development as well as studying the policies and innovations the ministries propose be included in the program.

Another new institution that emerged as a result of this law was the PPI Secretariat (SPPI). This entity reports directly to the Presidency of the Republic, providing guidance on matters related to the PPI. It also provides ministries and regulatory agencies with support to execute the program's activities, and acts as the Secretariat of the PPI Council, receiving proposals from the ministries and structuring the meeting agenda.

The SPPI coordinates, monitors, evaluates and supervises the PPI's actions, supporting the sectoral steps necessary for their execution, notwithstanding any legal competencies of ministries, agencies and sectorial entities. It can enter into agreements with sectoral entities in order to avoid overlaps and propose program adjustments. Another one of its most important functions is to disseminate PPI projects as well as to accompany actions undertaken by the ministries, agencies and sectoral entities, in its supervisory and supporting role.

Under the new framework, the Planning and Logistics Company (EPL) formed a partnership with the SPPI. EPL conducts studies and executes projects aimed at the new national road, railway, port and airport concessions, seeking at all times their consistency with public interest. It is also responsible for preparing the studies and reports required to obtain environmental licenses, removing one of the main obstacles that hampered the implementation of projects in previous years.

The work carried out by the Brazilian Project Structuring (EBP) since its creation in 2008 is also very relevant. The mission of this private company is to support the public sector in the structuring of PPPs both nationally and sub-nationally. In the projects in which it participates, it manages all the actions until the contract is signed. The analysis of the case study of the expansion of the sanitation network in the municipality of Serra (Espírito Santo) takes a deeper look at EBP's functions given its importance for this project.

Parallel to the new regulations and the institutional changes implemented, the Secretariat of the Investment Partnership Program launched CRESCER, a project aimed at carrying out some of PPI's objectives. In practice, the project will enable business opportunities and help Brazil resume growth after two years of economic stagnation (2015 and 2016).

The CRESCER project is based on 10 fundamental objectives or guidelines:

1. Develop PPP projects under the highest technical rigor. Ensure that the only projects to reach the market have the necessary robustness, consistency and effective capacity to generate returns for society and investors.
2. Focus on improving the provision of services to people and the productive sector.
3. Expand the rule of law through clear contract indicators.
4. Return regulatory agencies to their practical nature, ensuring their autonomy and strengthening them so that they can fully perform their regulatory, monitoring and supervising role.
5. Launch tenders only after issuing public consultation and obtaining endorsement from the national Audit Commission.
6. Publish all information related to tenders in Portuguese and English as a way to increase transparency and facilitate the participation of foreign investors.
7. Extend the minimum bidding term to 100 days, which will allow a greater number of investors to prepare to participate in the tenders.
8. Approve only PPPs for projects with proven environmental feasibility.
9. Change the way of securing long-term financing, carrying it out at the beginning of the works, moving away from the need for interim loans, which increase costs and lead to more bureaucracy in operations.
10. Try to adapt the concessions under development to the aforementioned guidelines as much as possible.

In addition to all of these changes, it should be noted that the CRESCER project also introduced the participation of private banks and other sources of financing apart from traditional public companies BNDES and FI-FGTS (an infrastructure fund that belongs to the Caixa Econômica Federal, the

federal savings and loans bank). This will require well-qualified projects that offer adequate rates of return in line with market conditions, which should help to diversify capital markets and create more space for national and international commercial banks to provide long-term financing for Brazilian infrastructure projects.

Peru

In Peru, in order to further promote private investment and improve the regulation of PPPs, Royal Legislative Decree No. 1224 was enacted in September 2015, which, in practice, has become the new framework law for Public-Private Partnerships. The Decree would be partially amended later by Royal Legislative Decree No. 1251 of December 2016, approving the consolidated amended text of Legislative Decree No. 1224 based on the Supreme Decree No. 254-2017-EF.

In addition to PPPs, Legislative Decree No. 1224 incorporated a new form of private investment participation called Projects in Assets (PA), which allows ministries, and regional and local governments to promote private investment in assets that they own under two schemes: the disposition of assets, which includes their total or partial transfer, including the swap of real estate; or an assignment agreement for asset use, lease, surface use, usufruct or other modalities allowed by law.

The main purpose of this new regulatory framework was to integrate and compile the different guidelines pertaining to PAs and PPPs, as well as concessions that have appeared over the years in Peru, into a single regulatory framework. Thanks to this regulation, the Andean country became the first non-member nation of the OECD to adhere to this organization's principles of governance⁵ regarding PPPs, aligning with international standards and addressing a series of difficulties faced across PPP development phases up until then.

This legislation aimed to improve the efficiency in the management of this type of project by establishing five principles that should govern the development of a PPP or PA at any given stage:

- Jurisdiction. Throughout the process of a PPP or PA, competition must be promoted by establishing similar legal, technical, economic and financial requirements for all tenderers. The objective is to avoid giving higher scores to conditions that do not address the project's main objective, such as being or not a national company. In addition, the legislation requires that, in the event of a renegotiation of the contract, the original jurisdiction conditions are respected.
- Transparency. All quantitative and qualitative information used to make decisions during the evaluation, development, implementation and accountability of a project under PPP or PA modalities must be made public.
- Focus on results. Public entities, within their competences, must make timely decisions so these types of projects can be addressed in a more efficient manner. To do this, they will identify and recognize the existing

5. OECD.
"Recommendation of the
Council on Principles
for Public Governance
of Public-Private
Partnerships." May 2012

obstacles that affect the development of PPP and PA projects, taking the necessary actions to eliminate or correct them. In general, the objective of this principle is to alleviate the process and make it more dynamic, reducing time and procedures. One of the results has been the implementation of a simplified process for PPPs that do not contain an investment component, and the development of services linked to public infrastructure, public services, applied research projects and/or technological innovation.

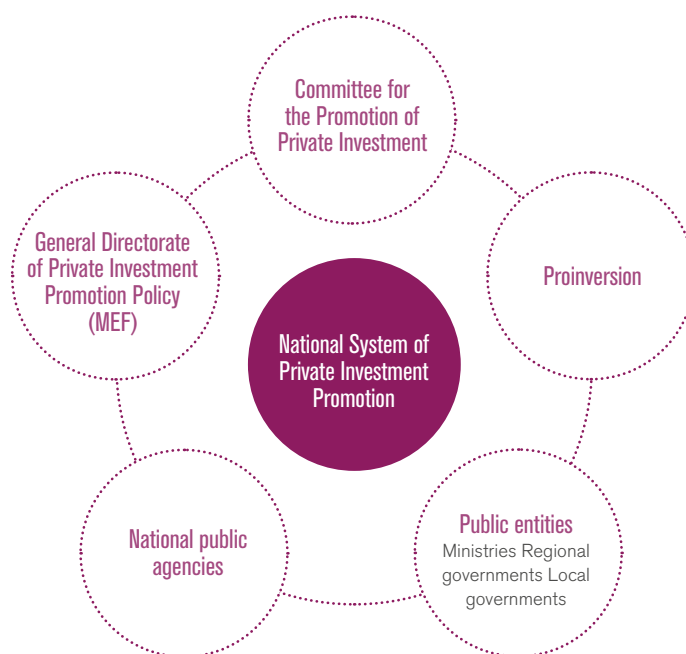
- **Planning.** The state, through ministries, and regional and local governments, prioritizes and guides the orderly development of PPPs and PAs according to national, sectoral, regional and local interests. This principle is implemented through the so-called multi-year investment report in public-private partnerships, which identifies potential projects for development under the PPP mechanism.
- **Budget responsibility.** The state's payment capacity to assume the financial commitments derived directly and indirectly from the performance of the contracts entered into without compromising the budgetary balance of public entities, the sustainability of public finances, or the regular provision of public services in the short, medium or long term, must be considered.

In addition, two principles characterize solely PPPs (excluding Projects in Assets). The first principle states that there must be an adequate allocation of risks between the (public and private) parties, assuring that they are assigned to the party with the greatest capacities to manage them, considering the risk profile of the project usually seen in other countries. The second is the "value for money" principle applied at every phase of PPPs. This principle seeks to ensure an optimal combination between costs and the quality of the public service offered to users throughout a PPP project's life. Comprised of principles, norms, procedures, guidelines and normative technical directives, the objective is to promote, encourage and expedite private investment for the revitalization of the national economy, the generation of productive employment, and the strengthening of the country's competitiveness.

The new regulation introduced the creation of the National System of Private Investment Promotion for the Development of PPPs and PAs. It is a functional system made up of principles, norms, procedures and standardizing technical codes in order to promote, encourage and expedite private investment to contribute to the dynamization of the national economy, the generation of productive employment and the country's competitiveness. This system, although it does not create a new institution, has restructured the existing competences. Member entities include the following:

- **Ministry of Economy and Finance (MEF).** It defines the private investment promotion policy. The General Directorate of Private Investment Promotion Policy, a specialized institution of this Ministry, acts as a governing body and is responsible for establishing the guidelines for the promotion and development of private investment in Public-Private Partnerships and Projects in Assets.
- **Ministries, and regional and local governments.** They are the owners of PPP projects and, as such, they participate in all the development phases of the project.

Figure 3. Institutional framework of the national system of private investment Promotion.



Source: IDB, Public-Private Partnerships in Peru, analysis of the new legal framework

- Private Investment Promotion Agencies. At the national level, the promotion of private investment is carried out by PROINVERSION and the ministries through the Committee for the Promotion of Private Investment. At the regional and local level, the powers of the Private Investment Promotion Agency are exercised directly through the Committee for the Promotion of Private Investment, always under the authority of the relevant municipal or regional council. It is noteworthy that both the ministries and the regional or local governments, along with the Committee for the Promotion of Private Investment, can request technical assistance from PROINVERSION at any stage of the process.
- Public agencies of the national government. They represent a diverse group of public entities, among which regulatory bodies stand out.

One of the great advantages of the implementation of this system was that it addressed some regulatory overlap that had been occurring over the years, as well as the lack of coordination between the three levels of government (ministries, regional governments, and local governments). It also made it possible to define more clearly the attributions of each one of the institutions. The legislative improvement underway in Peru will probably result in a greater attraction of international investment, in addition to representing another step toward development and establishment of the national PPP system.

Countries new or re-launching the PPP model

The success of Public-Private Partnerships in some countries in the world, combined with the need for investment and a lack of public resources, is leading some countries in Latin America to resume PPP initiatives or begin to adopt the PPP model. Countries like Argentina, which had developed this model before, but had not made any progress for nearly two decades, are redefining the model with a package of measures to reactivate Public-Private Partnerships.

Likewise, other Latin American countries that until recently had only used this model sporadically, have begun in recent years to take a more widespread approach to its application. These include countries in Central America (such as Honduras, El Salvador and Guatemala), Ecuador, Paraguay and Uruguay. The most relevant advances of these countries in the years prior to the publication of this book are described below.

Argentina

In the late 1980s, Argentina became one of the first countries in Latin America to carry out a project under the concession modality. However, from around the start of the new millennium, the system has been on hold for political reasons and the wariness of international investors as a result of the 2001 crisis, foreign exchange controls, etc.

The country has had two legislative precedents with PPPs, neither of which resulted in an increase in the number of projects under this modality. The first was Decree No.1299 in the year 2000. Despite representing an excellent regulatory framework, it was issued in a very adverse international economic and political context. The second was Decree No.967 of 2005. Its main problem was its implementation was accompanied by deficient regulation, according to Estrada (2017).

In November 2016, Law No.27328 for **Public-Private Participation Contracts** (CPPP) was passed. It was enacted in February 2017 under Decree No.118, which replaced the above Decree No.967. This new PPP framework law sought to put an end to years of infrastructure deficits in which investment figures totaled around 2% of GDP with almost no private sector involvement.

This regulatory framework aimed to incentivize the private sector to design, build, expand, improve, maintain and supply equipment and goods. Under this framework, the objective was to develop infrastructure projects, housing, activities and services, productive investment, applied research and technological innovation with terms no greater than 35 years.

Likewise, it was established that the CPPP was an alternative modality to classic public works and services construction and concession contracts, leaving out projects whose sole purpose is the provision of labor, the supply and provision of goods, and the construction or execution of works financed for

the most part with public treasury funds. The public sector would choose which contract type was best suited to satisfy public needs for each project, opting for the PPP regime if it considered it to be the most efficient for such purposes.

The infrastructure projects developed under this regulation must be declared of public interest by the contracting authority, which marks a difference with previous regulations.

One of the particularities offered under the new legislative framework is the great flexibility in the design of contracts. The contracts will be defined on a case-by-case basis (tailored to the project's needs). Certain clauses or governing principles will be adopted based on each individual project, depending on whether they apply or not.

One of the unique features of this regulatory framework is that it establishes a requirement that the concessionaire assume the necessary obligations and implement mechanisms to protect the environment, acting in compliance with environmental regulations.

At the time of tendering and contracting, special purpose entities (such as corporations), (financial) trusts, and other types of associative schemes with or without public participation may be created. In addition, wholly state-owned companies and associations may also participate in the tenders, along with the private sector, within a framework of competition and equal status. An important aspect is the fact that the only restriction is on the national component of the consortium that submits a tender in the case of projects involving the provision of goods and services. In this case, at least 33% of the concession company must be owned by Argentine firms.

A significant innovation in the tendering processes is the introduction of competitive dialogue, when a project's complexity or investment warrants it. This establishes a transparent procedure for consultation, debate and exchange of opinions between the project owner and the prequalified interested parties. This procedure, grounded on the experiences, technical knowledge and best practices offered by each of the parties, will allow for the development and definition of the best suited solution in public interest, while providing the basis for tender formulation.

The new regime entailed a paradigm shift in public procurement practices, since it excludes or significantly limits certain privileges previously held by the granting authority, such as the power to revise the contract unilaterally or rescind the contract due to public interest, the impossibility of the contractor to appeal the state's failure to suspend its services, the limitation of the state's liability, among others.

Following the example of other neighboring countries, the framework introduced the possibility of transferring control of the special purpose entity in favor of the financiers or third parties, in the event that the concessionaire fails to meet its financial obligations. In fact, the private party is allowed to present the PPP contract as a guarantee of its financing.

Institutionally speaking, Decree No.118 of 2017, which regulates the regulatory framework, created the Public Private Participation Unit, under the Ministry of Finance, which will be in charge of the normative centralization of

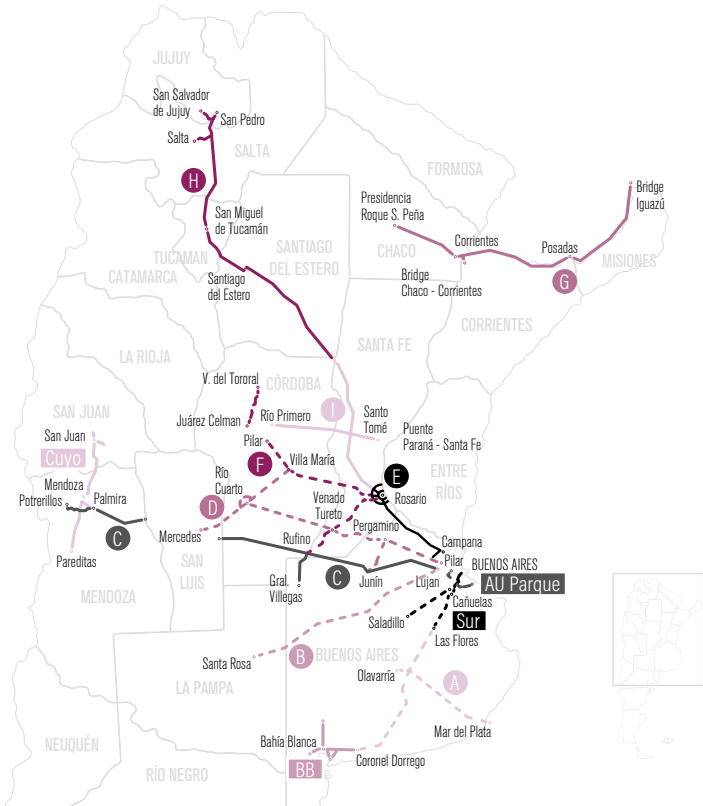
the CPPPs, initial project evaluation, oversight of tendering and execution, and the regulation of the means of transparency and public consultation, among other functions.

The introduction of this new regulatory framework and the implementation of several packages of measures aimed at attracting investors is expected to generate a resurgence of Public-Private Partnerships in Argentina, with the expectation that it reaches in the short term the level of maturity found in neighboring countries. Along these lines, in 2017, Argentina's government launched an ambitious package of projects to be carried out under the PPP model for a value of USD

26 billion. The portfolio includes 60 varied projects and has set 2022 as the horizon date. CAF, among other multilateral organizations, will participate in the structuring of the different types of projects included in the portfolio.

Within the portfolio, road projects stand out for their importance and magnitude. These include 16 projects broken down into three tendering stages, with an estimated investment amount of USD 16 billion. The general objective is better safety and trafficability along the Argentine road network by reducing the logistics and human costs of the current situation. Figure 4 shows the road projects that will be developed.

Figure 4. Portfolio of PPP road projects in Argentina.



Continued on next page...

PPP	National Route N°	Length Km	Total AADT * Veh/Day Year 2016	Max Veh/Day Year 2016	Min Veh/Day Year 2016	Stage
A	3, 226	707	24,400	6,200	1,900	I
B	5	538	23,500	11,700	3,600	I
C	7, 33	877	28,600	8,800	2,900	I
D	8, 36, A-005, 158, 188	911	27,500	12,400	2,200	II
E	9, 11, 34, 193, A-008, A-012	390	56,400	24,200	4,900	I
F	9 AU Rosario - Córdoba, 33	635	32,100	11,100	2,800	I
G	12, 16	780	31,100	11,200	3,300	II
H	34, 9, 66, 1V66	887	19,100	4,600	3,100	II
I	19, 34	664	26,700	6,400	3,200	II
Sur	AU Riccheri, Av. J. Newbery, AU Ezeiza - Cañuelas, 3, 205	247	231,900	147,000	4,700	I
BB	3, 33, 229, 249, 252, 1V252, 1V3	299	7,100	3,700	3,400	II
Cuyo	7, 20, 40	342	9,400	6,000	3,400	II
AU Parque	AU Parque	82	42,000	22,000	20,000	III
Bridge Paraná Santa Fe	Bridge Paraná - Santa Fe	30	11,000	-	-	III
Bridge Chaco Corrientes	Bridge Chaco - Corrientes	34	7,000	-	-	III

* AADT: Average Annual Daily Traffic

Source: Euronews

Uruguay

Uruguay began to implement PPPs following the approval of Law No. 18786 of 2011 and the relevant regulatory decrees in 2012. This regulatory package established the legislative and institutional framework for the sector.

The law enables contracts in the areas of infrastructure (road, port, airport and rail works), prisons (excluding security, health and inmate re-education services), educational centers (excluding educational services), health centers (excluding health services), social housing, energy infrastructure and waste treatment. Sanitation and water supply projects were excluded from the PPP modality.

To implement the PPP system, an institutional framework was created with the Public-Private Participation Projects Unit was designated as the main authority, under the Ministry of Economy and Finance, assigned the task of monitoring the economic-financial aspects linked to prior studies conducted for the projects. It is also responsible for verifying compliance with the budgetary aspects, evaluating associated risks, reviewing tender documents, the adequacy of the tenders received and the provisional award in relation to the previously defined project model. Likewise, it was assigned responsibility in regard to other analyses and records that are under the MEF's competence. In addition, the regulations granted new functions to the existing National Development Corporation (CND). This body is a non-government legal entity

of public law, created by Law No. 15785 of December 4, 1985. It operates as a holding company and is one of the main Uruguayan economic groups, with equity stakes in companies across a variety of sectors. Its mission is to help support and manage projects that promote investment in the country. The main functions it performs include the following:

- Support the development of infrastructure of public interest. To do this, it provides planning, management and administration services to infrastructure works and projects, carrying out structuring, design, engineering and construction activities.
- Draft the technical guidelines applicable to Public-Private Participation projects through the development of recommended best practice guides.
- Harmonize procedures and preparation of manuals, models and instruments that contribute to the design and execution of the aforementioned projects in the most effective and efficient manner.
- Provide third-party fund administration services when they cannot be rendered by other public entities.
- Carry out the financial structuring of projects through the financial trustee CONAFIN AFISA, providing support in the advice, structuring and administration of trusts and funds that operate as an instrument for the financing of works of public interest.

Despite the positive expectations as a result of the approval of the regulations, the truth is that the start-up rate of the model in the country has been lower than expected. Five years after the law was passed, only two PPP projects had been awarded as of 2017.

The first was the Punta Rieles Prison (Unit No. 1). Almost four years after the government approved the works, the construction and management contract was signed in 2015. It was awarded to Consorcio Punta Rieles SA, formed by the companies Teyma Uruguay (an Uruguayan company from Abengoa), Instalaciones Inabensa and Goddard Catering Group Uruguay. The consortium is responsible for building, maintaining, operating and providing services in the penitentiary center, which will have a capacity of 1,960 inmates, with security being the government's responsibility. The Ministry of the Interior will make quarterly payments to the contractor for the availability of beds in the unit for 27.5 years, and the amount of this payment will be determined taking into account the level of availability and effective quality of services; and, if optimal levels are achieved, it will be the equivalent to 200 Uruguayan Pesos (approximately USD 6) per bed per day. The contract also provides compensation for overcrowding, when the daily number of inmates exceeds capacity, up to a maximum of 20%. For financing, the winning consortium prepared an issue of negotiable obligations amounting to USD 85 million in capital markets. The prison is expected to become operational in 2018.

As a consequence of the great delays that occurred in the previous process, it was decided to issue Decree No. 251 in 2015, which improved PPP regulations, seeking to improve and streamline administrative processes and avoid the mistakes and inefficiencies in this first project.

The second PPP project signed was related to road infrastructure. On July 24, 2017, the Ministry of Transport and Public Works of Uruguay signed a contract with the PPP Consortium Rutas Del Litoral SA for the design, construction, operation and financing of road infrastructure on Route 21, Nueva Palmira-Ruta 2 section, and Route 24, Route 2-Route 3 segment, comprising a total length of 179 km. The 21-24 road corridor is the main access to the port of Nueva Palmira on the Uruguay River, along which 50% of the country's Heavy Goods Vehicle (HGV) traffic circulates. The project consists of the construction of 130 km of roadways and a new entrance to the Port of Nueva Palmira, in addition to the set-up of another 49 km of the route, all within three years of signing the contract. The 24-year contract contemplates a total investment amount of USD 400 million. The government will pay an annual fee linked to three variables: the work executed, annual maintenance, and a third component based on vehicle traffic.

After these initial advances, the government decided to take a step forward and set out to confront more aggressively the system's development. This is reflected by the Uruguayan PPP portfolio in 2017, as shown in Table 3.

Table 3: Portfolio of PPP projects in Uruguay

Agency	Project	Estimated initial investment (USD) (October 2017)	Status (October 2017)
MTOPE	Algorita-Fray Bentos railway project	-	Evaluation of tenders
	Routes 12, 54, 55, 57 and Carmelo City Bypass on Route 21-Route 97 section	62	Provisionally awarded
	Route 9 (between Rocha and Chuy), Route 15 (between Rocha and junction with Route 13) and connection R9-R15	55	Provisionally awarded
	Route 14 West (from Mercedes to Route 6), Sarandi del Yi Bypass and connection Route 14-Route 3	93	Provisionally awarded
	Routes 14 (between Route 6 and Route 15) and Route 15 (between Route 14 and junction with Route 13)	127	Tendering process underway
	Route 6 (from Belloni Avenue to intersection with Route 12) and San Ramon Bypass	76	Preliminary studies
	IP-Route 3 (Dual carriageway between Routes 1 and 11) and San José Bypass	72	Preliminary studies after private initiative
ANEP	First PPP educational project	48	Evaluation of tenders
ANEP	Second PPP educational project	79	Evaluation of tenders
ANEP	Third PPP educational project	41	Structuring
ANEP	Fourth PPP educational project	120	Structuring
ASSE	Pasteur Hospital	-	Public initiative record
MVOTMA	PPP-housing	50	Review of preliminary studies

Source: PPP Unit of Uruguay

Another interesting innovation in Uruguay is the creation of a financial trust fund for infrastructure debt in Uruguay (CAF I) by CAF-AM with a value of USD 350 million. The objective of this fund is to facilitate the channeling of institutional investor savings, especially pension funds, into the financing of PPP projects.

The Debt Fund for Infrastructure in Uruguay was launched at the end of 2016 on the electronic stock exchange Bolsa Electrónica de Valores SA (BEVSA) and the Montevideo Stock Exchange. The four Uruguayan pension funds (AFAPs) and the state-owned Banco de Seguros del Estado will invest in the proposal based on the needs for the projects, while CAF will co-finance 10% of the investment in debt.

This fund, which is managed by CAF-AM Administradora de Activos Uruguay SA, a Uruguayan company owned by CAF Asset Management Corp. (a subsidiary of CAF – Development Bank of Latin America), grants loans to infrastructure projects executed by concession companies or Public Private Partnership contractors (PPP).

The Debt Fund for Infrastructure signed its first contract. In this case, the project, supported by a 23-year USD 87 million loan, includes the rehabilitation and maintenance works on Routes 21 and 24, under the responsibility of the consortium integrated by Sacyr Concesiones (43%), Sacyr Construcción (8%) and Grinor (49%).

Paraguay

The first legal framework for PPPs was adopted by Paraguay in 2013 with the enactment of Law 5102 for the Promotion of Investment in Public Infrastructure and Expansion and Improvement of State-managed Goods and Services. This law was regulated in 2014 through Regulatory Decree No. 1350.

It regulates the project structuring procedure and the selection of the private participant under a specific norm different from the general regime of public procurement, establishing the Public-Private Participation Contract as a different contractual category.

It introduces in the Paraguayan legal regime the figure of private-sector initiative, which enables private parties to identify potential projects and propose to the State how they should be structured. It falls to the State to determine whether the project proposed under this modality has the necessary conditions of public interest for the government to adopt it. A total 16 projects in different areas have been submitted through this system, all of which were ultimately rejected for various reasons.

A great variety of entities participate in the process, fulfilling different purposes throughout project life cycles. The one with the most important role is the Public-Private Participation Project Unit, which reports to the Technical Secretariat of Planning. This entity was created based on the regulatory framework. The Ministry of Finance and contracting authorities, of which the Ministry of Public Works and Communications is the most important,

are involved in the management of PPPs. Other entities participating in the process include the National Directorate of Public Procurement, the Attorney General of the Republic, the Central Bank of Paraguay (BCP), the National Council of State-owned Companies, and the Development Finance Agency.

The first PPP project in the country, which was at an advanced stage at the time of writing this book, corresponds to the expansion and duplication of National Routes 2 and 7. In March 2017, the project contract was signed by MOPC and the SACYR SA–MOTA ENGIL SA–OCHO SA Consortium for US\$ 507 million.

The project to modernize the Silvio Pettirossi International Airport in Asuncion, with a total planned investment of US\$ 140 million, was still in the bidding phase in late 2017. Three tenders were submitted by companies from different countries (Argentina, France, Spain, and Chile). At the time of writing this book, pre-feasibility studies were underway for another road expansion and improvement package, the opening of a waterway on the Paraguay River, and a package of wastewater plants in Alto Paraná, for a total estimated investment of US\$ 2.2 billion.

Ecuador

The 2008 constitution dismantled much of the public works concession framework that had been in place since the 1993 State Modernization Law. Until that time, important projects such as the Quito Airport and the San Francisco Hydroelectric Plant had been tendered under the country's concession system. With this constitutional change, control of strategic sectors, including power, transport and water, was transferred to the State. As an exception, in special situations or projects, and under exceptional circumstances, the government could delegate these functions to the private sector through concession contracts. As a consequence of the regulatory changes in 2008, numerous projects had to be renegotiated, including the concession contract for the new Quito Airport and the Port of Manta.

After almost a decade since the constitutional change, in which the public sector assumed almost total responsibility for investment in infrastructure and services, the government of Ecuador decided to reactivate PPPs in the country. To this end, in December 2015, the Organic Law on incentives for public-private partnerships and foreign investment was enacted, which would later be regulated in 2016 through Decree No. 1040. This regulation provided the sector with a regulatory, fiscal and institutional framework that encompassed not only concessions, as the legislation prior to the 2008 Constitution did, but also other PPP modalities.

Based on this regulation, Ecuador has sustained a proactive attitude toward the implementation of the model, with a large portfolio of PPP projects focusing entirely on the road and port sector. Concessions include the ports of Posorja, Providencia, Bolívar, and Manta (maintenance and operation); and road projects include Route Río 7-Huaquillas, the Guayaquil South Viaduct, and Routes Naranjal-Río 7, Santo Domingo-Quevedo-San Juan, and Guayaquil-Salinas.

Today, Ecuador continues to face major challenges in the implementation of its PPP program. One is the creation of a specialized technical unit to centralize the sector's activity based on the model used in other countries. This will undoubtedly contribute to creating a solid, attractive investment environment for private companies.

Costa Rica

Central America is by far the Latin American region where the PPP scheme has developed the most in recent years. Although Central American nations still fall in the category of emerging countries in terms of PPPs, as reflected by their ranking in the 2015 and 2017 editions of *Infrascope*, they are on track to achieving a high degree of development and maturity in just a few years.

The main driving force behind this revolution is the strong commitment of Central American governments to the model. As these are relatively small nations with low budgets, PPPs have become [useful] tools for the development of infrastructure and public services.

Costa Rica was the first country in Central America to create a regulatory framework for collaboration contracts between the government and a private partner through the General Law of Concession of Public Works with Public Services (Law No. 7762 of 1998). This regulation was later partially modified by Law 8643. Despite being the Central American country that started off developing the PPP model with the greatest zeal, Costa Rica's prominence in this regard has lessened due to the significant opposition to the model in recent years. Take the case of the San José-San Ramón and San José-Caldera toll roads covered in the CAF publication *Public-Private Partnerships in Latin America: Learning from Experience*.

In order to resume the model, in December 2016, the Costa Rican government approved Decree 39965-H-MP called "Regulation for public-private collaboration contracts." This decree clearly establishes, for the public and private sectors alike, the norms, guidelines and procedures for the execution of projects under the PPP modality, being the first regulation in this regard, as prior ones referred only to concessions. It also covers implementation processes and defines the functions of the associated parties: financing, economic compensation, ownership of goods and services, minimum terms and conditions of contracts, among others. As a pilot project for the model, a train station in the Canton of Flores (Heredia Province) was selected. MAVSK Arquitectos SA, the Costa Rican Railway Institute (Incofer) and the Municipality of Flores will partner.

Panama

Panama is a country with great potential for the implementation of the PPP model. It has a good investment climate, partly due to the attraction of the Panama Canal, with direct foreign investment in recent years standing at around 9% of GDP. By taking advantage of this potential and developing

an appropriate PPP model, the country would be able to consolidate the provision of logistics infrastructure at a level comparable to that of OECD member countries, with the ensuing economic repercussion for Panama.

However, as of 2017, Panama did not yet have specific legislation for Public-Private Partnerships. Concessions, however, were regulated by Law No. 5 (April 15, 1998), which established the general framework for this type of collaboration between the public and private sectors. Later, Law No. 22 (June 27, 2006) regulated public procurement and generalized the framework of concessions, allowing state companies to grant concessions, among other things.

In addition to this general regulation, some sectors have their own provisions:

- The electricity sector has a regulatory framework that establishes a vertical separation between generation, transmission and distribution; the privatization of distributors and private investment in generation, with generators that sell to distributors under long-term PPP contracts and a regulatory entity that oversees distribution and transmission rates.
- Water and sanitation sector Law No. 2 of 1997 allows the use of private sector capital, although there has not yet been widespread implementation of this model.
- The port sector is governed by the Maritime Authority of Panama, which has the power to grant concessions for the exploitation of existing ports or ports to be built (BOT model).
- The road sector depends on the National Highway Company (ENA), a State-owned company that can undertake highway concessions directly (limiting private sector participation) or invest in private-sector transportation companies. This company, for example, manages the North and South road corridors that had previously been awarded to Mexican companies.

Apart from these sectors, the Panama Canal Authority, due to its importance, has the autonomy to develop almost any type of contract.

Although some shortcomings have been recognized to date in the development of PPPs, such as an insufficiently competitive award procedure, or certain risk problems associated with “approvals,”⁶ in fact, the execution of these concession contracts has enabled the Panamanian government to gain experience in the development of collaboration between the public and private sectors. This has created an atmosphere of maturity that may ensure the establishment of the concession model and take a step further by beginning to use other more sophisticated PPP mechanisms similar to those of other countries in the area, which would enable it, among other things, to take advantage of its potential thanks to its strategic location.

This need to create and stabilize a PPP framework is not new. In 2011, the government tried to develop a PPP law (Law No. 349). A bill was sent to Congress, but was withdrawn in the face of opposition from public sector workers who felt their job security threatened by a possible increase in the participation of the private sector. Despite this first attempt, the government

6. Concessionaire application for and securing of conditions secured under other contracts, even when granted under different regimes

is being urged by the private sector to review this bill and provide the country with the proper regulatory and institutional framework.

If developed, the legal framework would enable the State to undertake certain risks, as well as certain obligations (co-financing) and contingencies (guarantees). It would also establish limits on the economic use of public assets. In addition, it would establish a framework for other key aspects of this type of contract such as arbitrations, economic-financial rebalances; and, especially, everything related to the regulation of public tariffs.

Regarding the institutional scope, very little has been done to date. This hinders the implementation of PPP projects in the country. Panama needs to develop and use methods that will enable it to determine whether or not a project generates economic, social and fiscal benefits; establish an adequate system of evaluation and allocation of risks; determine whether it is necessary to create regulatory agencies; and implement a PPP unit that can serve as an important aid in the development of the model.



Colombia: evolution of its
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Introduction

Since the early 1990s, public-private partnerships in Colombia have mainly included transport infrastructure works and the provision of some public services. Concession schemes have been widely used under this concept for the execution of large infrastructure projects. Infrastructure in Colombia has, however, historically been characterized by low levels of development and quality compared to other countries in the world. In addition, public works concessions in the country have faced a variety of problems and lack of any stable legal or institutional framework to foster efficient project development. Then in 2010, a new government came to power and identified the fundamental changes in institutional and regulatory matters that were needed for a real highway system that would serve as the backbone for the country's economy and market.

Since then, a series of noteworthy reforms have been implemented: (i) institutional strengthening through the creation of a new infrastructure agency for the transportation sector, a new vice ministry of infrastructure and an environmental licensing agency; and (ii) the strengthening of the regulatory framework through the approval of a new Public-Private Partnerships Act and the Infrastructure Act. These changes have played a fundamental role in spurring the sector, enabling the implementation of the most ambitious transportation infrastructure program in Colombia's history: the fourth generation of road concessions (4G).

These changes, introduced in response to the problems arising from previous concessions granted for the construction of transportation infrastructure, have had a positive impact on galvanizing the sector. As a result of these institutional and regulatory advances, the country has improved its capacity to develop and implement PPP projects in the transportation, water, sanitation and electricity sectors. According to the *Infrascope* index, Colombia¹ currently has the most favorable setting in the region for establishing PPP. In fact, many Latin American countries have adopted this as a successful model for improving their own PPP frameworks.

This case study focuses on analyzing in detail the process of regulatory and institutional evolution in Colombia in terms of PPPs in the road sector. The first sections provide a global overview of the reasons behind this reform and the main aspects of the changes that strengthened the scenario to promote private investment in infrastructure in the country.

This report analyzes the implications this reform has had on the structuring, financing and management of 4G road concession projects: contractual improvements made in comparison to previous generations; the different procedures followed in public-private project implementation, and the financial challenges for the country in the face of the elevated investment needs of the 4G program.

Finally, the report presents a series of lessons learned and new challenges for consolidating this strategy over the long term.

1. *Infrascope* 2017 indicates that Colombia and Chile are the best-positioned countries for PPP infrastructure projects in the region.

Designing Change: Reasons for a new framework

Despite the significant progress made in Colombia in recent years, the historical lag in the country's transportation infrastructure persists. According to the World Economic Forum (2016), Colombia stands at 110 among 140 nations in terms of quality of infrastructure, a position similar to countries like Mali (109), Nicaragua (108) and Perú (112). The country lags considerably behind when it comes to the quality of its highways (126), railroads (106), ports (85) and aviation infrastructure (74). In fact, the lack of proper infrastructure is indicated as one of the three main obstacles to doing business in the country.

According to multilateral entities such as the Inter-American Development Bank and the World Bank, the countries of Latin America and the Caribbean region invest less than 2% of GDP in infrastructure on average. In the case of Colombia, although public investment in infrastructure in terms of GDP has increased since 2010, it continues to be less than the annual recommended investment—of around 6%—to tackle the country's competitiveness needs (Fay and Morrison, 2007). Although the investment figure—nearly 4% of GDP—is currently above the OECD² average, the challenge for Colombia is maintaining its level of public investment over the long term to avoid getting stuck in the middle-income trap, and thus be able to address its enormous pending infrastructure needs (OECD, 2016).

2. Organisation for Economic Cooperation and Development

Figure 1. Public investment as % of GDP, 2000-2014: Colombia vs. OECD Average



Source: OECD, 2016

The low level of infrastructure development has continued to be an obstacle to economic growth in the country, limiting the development of competitive advantages due to the disconnectedness of its markets and associated high costs of transportation. In addition, the country presents very high levels of inequality in terms of per capita GDP, in part explained by the lack of territorial equity of its infrastructure provisions (OECD, 2016).

The failure to develop adequate transportation infrastructure is rooted in a variety of factors, among which experts have identified a combination of economic, political and institutional. In particular, Sánchez (2016) cites:

- i. The lack of adequate technical, financial and legal framework for projects.
- ii. The absence of a legal framework to promote project development according to international technical and financing standards.
- iii. Lack of public policies and medium and long-term plans for strategic orientation of investment and development of transportation infrastructure in the country.³

On these different aspects, it is worth highlighting two particularly sensitive points if the goal is to improve conditions for effective investment: institutional structures and regulations. The next section includes an analysis of the institutional and legal framework in Colombia as the principal driver of change toward a new model to foster private sector participation in the development and financing of long-term infrastructure projects.

The analysis provided in this section takes a chronological approach. In Colombia, the concept of the concession, which preceded PPPs, was closely tied to transportation, specifically road concessions, before being more widely adopted for use in other sectors. For this reason, the development of the institutional and legal framework is closely tied to the transportation sector.

Institutional framework

A public entity reporting to the National Ministry of Transportation was created in 2003 to handle the planning, structuring, contracting, execution and administration of transportation infrastructure deals developed with the participation of private capital. This entity, the National Institute of Concessions (INCO) was in charge of handling transportation infrastructure concession contracts, replacing the National Roads Institute (INVIAS) in this role.

In the context of an analysis of the institutional framework, other planning organizations and institutions related to the transportation sector have traditionally been involved, such as the National Department of Planning (DNP), in charge of promoting strategic vision in the sector through the design, orientation and evaluation of public policies; and the Ministries of Transportation (MT), Finance and Public Credit (MHCP) and Environment (MA), as governing bodies responsible for ensuring compliance with national and territorial development plans. In summary, Figure 2 shows the different public entities involved in the institutional cycle of a PPP in the transportation sector before the institutional change discussed in this chapter took place.

This context sheds light on one of the biggest problems related to PPPs, which has to do with the lack of coordination between INCO and the different institutions and government entities involved in project structuring and execution (see Figure 2). There are legal gaps, inconsistencies in certain relevant tasks, significant fragmentation and, in some cases, duplicity

3. In this regard, The Intermodal Transportation Master Plan (Plan Maestro de Transporte Intermodal) 2015-2035 was recently created as a roadmap for progress on roads, airports, ports and railroads.

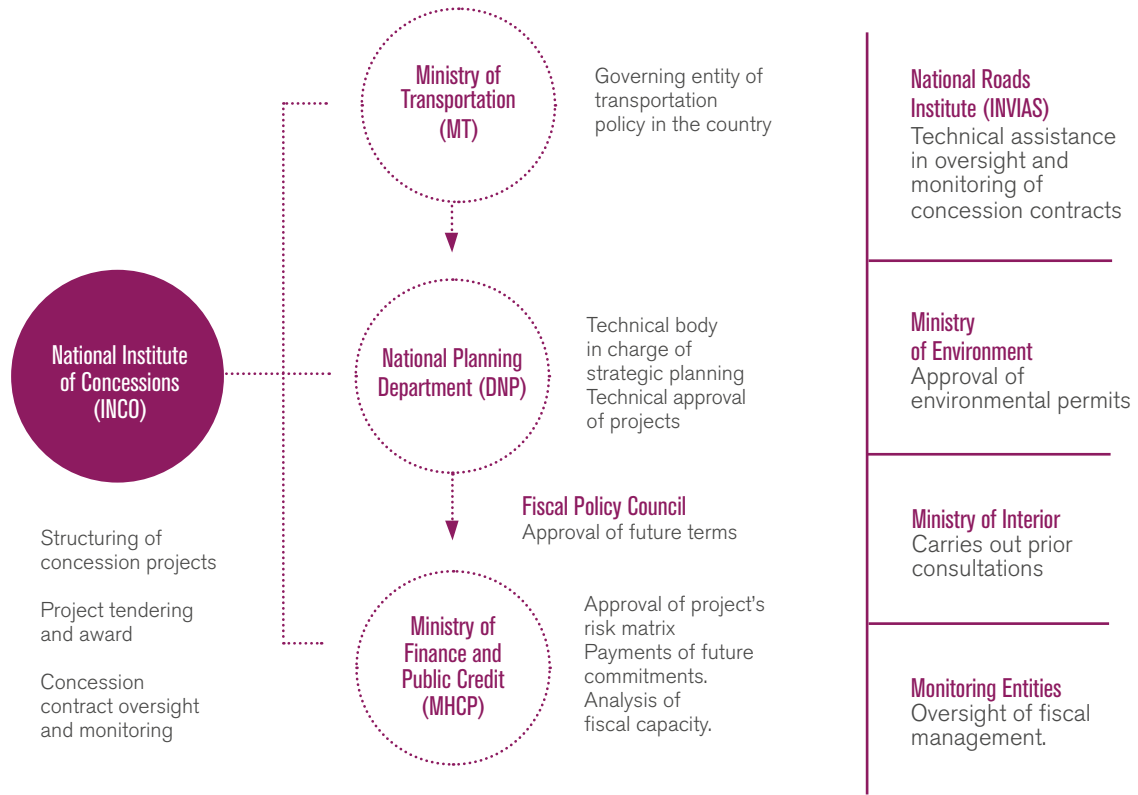
of functions across different entities throughout the process of this type of project implementation (Restrepo y Molina, 2008). Project identification and preselection, as well as assessment and selection of the mode of contracting, were done jointly with the Ministry of Transportation and INCO. Prior consultations were handled by the Ministry of the Interior. The Ministry of Environment, Autonomous Regional Authorities and, in some cases, districts and municipalities, granted environmental permits. The paperwork for property assessment for the purchase of land could be done either through the Agustín Codazzi Geographic Institute, an entity that carried out its functions, or by private assessors registered with auction houses or corresponding associations. In the same sense, INCO, the Fiscal Policy Superior Council (CONFIS), MHCP and INVIAS all had different roles in contract structuring, award and project management. Furthermore, in many cases and particularly in the stages prior to project execution, it was not clear which entity or entities were responsible for carrying out which tasks, nor the purview of each in cases of shared responsibility. Hinojosa (2011) cites two examples: first, the task of project structuring handled by the Ministry of Transportation, despite being a function assigned to INCO by the law that established it; and second, the tasks of inspection, surveillance and oversight of ports, highways and railroad projects shared by INCO and the Superintendency of Ports and Transportation.

In addition, the fact that INCO was the only entity responsible for everything related to concession contracts posed serious conflicts of interest. Considering that INCO was attached to the Ministry of Transportation, it acted simultaneously as the institution in charge of supervising concessions and as an agency of the executive power, holding a vested interest in the success thereof. Moreover, the lack of outside supervision of this agency fostered poor management of its funds, including irregular practices. Insofar as INCO's management was concerned, it had 14 different directors in eight years, several of whom have been or are currently under investigation for irregularities during their mandate. All of the aforementioned had a great deal of influence

on significant instability of the leadership, staff and internal management within the agency.

Among the problems that could be considered inherent to INCO, two major ones stand out. The entity's technical shortcomings, due mainly to the lack of personnel as well as proper training to undertake the tasks conferred upon it by Decree 1800 of 2003. Aside from that, the inadequate coordination within INCO's organizational structure as well as the inter-institutional setting across the other entities involved in project structuring and management processes for PPPs.

Figure 2. Institutional framework



Source: Prepared by author

Initially, INCO requested a staff of 67 officials, which was approved by Decree 2106 in July 2003. The first problem had to do with the excessively politicized composition of the staff, with 24 positions subject to free appointment and removal.

The next problem was the insufficient number of staff members. Mainly, there were not enough specialists to cover the functions assigned to them, and this was further aggravated by a budget that was limited to the existing number of personnel, making it impossible to hire support personnel. This led the MHCP and the DNP to create an investment project called “Technical and Administrative Provision and Support for the Institutional Strengthening of the National INCO” aimed at allowing INCO to hire support personnel in the form of short-term contractors.

While this solution was relatively useful initially, it ended up being one of the most serious problems within the organization because of the disparity between staff and support personnel, which grew worse as the number of support personnel increased in comparison to staff. The lack of incentives and the sense of not belonging to the entity fostered a low level of commitment among support personnel, which hindered

any long-term training of personnel that eventually represented up to 75% of the entire workforce (Hinojosa, 2011). In addition, low salaries fostered high turnover of managing officials and previously trained specialized personnel. The problem was further compounded by the failure to clearly define the professional profiles of management or official staff positions, thus hindering the selection of the right candidates for these positions according to area of expertise and the responsibilities involved in practice. All of this made it impossible to create a fixed workforce with the necessary training and sufficient in number to properly carry out contract structuring and management.

Finally, INCO did not possess an organizational structure or good governance consistent with the multiple functions it was assigned (ANI, 2015). The structure did not establish any differentiation between crosscutting responsibilities, i.e. financial, legal, administrative aspects, etc., or between the functions of its subdivisions, i.e., the deputy divisions created within INCO. In this sense, there were no directives establishing the type and level of competence required by the different divisions, nor the processes or products they were in charge of. The lack of unified criteria and technical consistency across these divisions had negative consequences on the different phases of project implementation in the PPPs structured and managed by INCO.

The entity had significant weaknesses when it came to the processes of planning, structuring, award and monitoring of PPPs. The entity's lack of technical and economic rigor was rooted in inadequate execution of the technical, financial and legal studies needed for project structuring and award (ANI, 2015). As a result, projects often made it to the governing agencies in an immature state, making the task of reviewing them very complex. And in tendering processes, there were no tools to prevent projects from simply being awarded to the lowest bidder.

In addition, the entity's lack of management and administrative training, absence of qualified interdisciplinary teams and tools for managing project contracts led to contracts with serious problems in terms of monitoring, noncompliance with conditions—projects that went unexecuted, others not submitted according to the required specifications, among others—and delays in project execution (ANI, 2015; STRATCO, 2012). With regard to project execution, there was general mismanagement and lack of logic in the remuneration of private parties. One of the main problems in this sense was that the contractual structure of concessions allowed concessionaires to receive public funds as well as toll proceeds without any prior results or specific goals. As a result, the private sector parties lacked incentives to fully complete projects, nor did they need to make major capital contributions, since they could finance projects largely with public funds. During the operating phase, one of the biggest problems was that addressing disputes among parties took too long due to the lack of a proper system of conflict resolution.

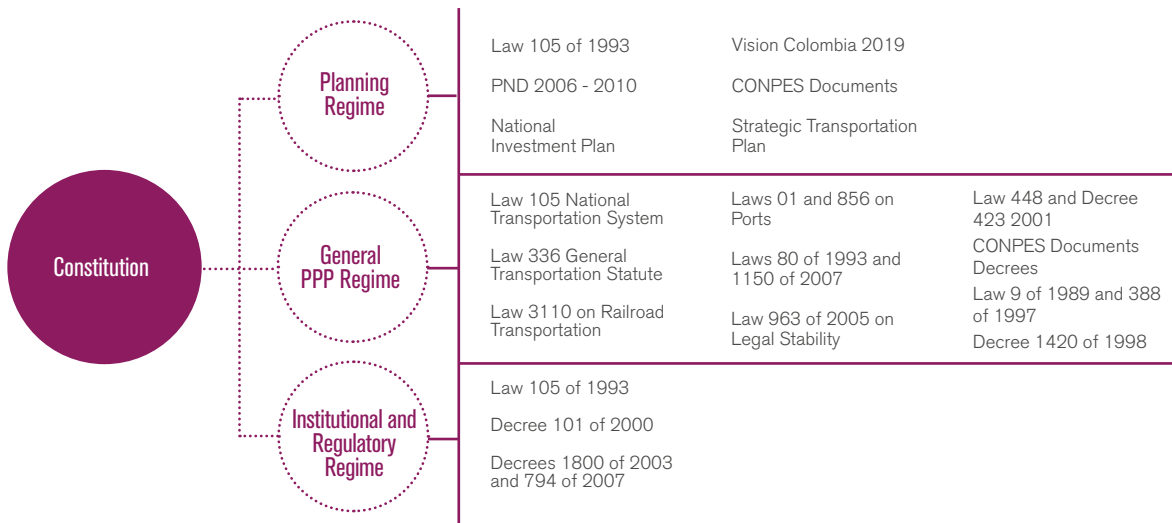
In response to the aforementioned issue, the need for a change in the institutional structure involving PPPs was proposed. This need, as discussed in greater detail in subsequent chapters, led to the creation of the National

Infrastructure Agency (ANI), the entity created to replace INCO equipped with greater technical capability and experience in the design and supervision of contracts.

Regulations

Until 2012, Colombia did not have any specific regulations governing PPP contracts for public works. The traditional concession model was considered another form of public procurement. Provisions like Decree 22 of 1983 were approved, whereby legislation began to incorporate the possibility of granting public contracts to private parties via concession. Later, the National Council of Economic and Social Policy issued a document (CONPES 2597 of 1992) establishing the first strategies for concessions and the bases for public-private partnerships in Colombia. Thus, for a long time the applicable regulatory framework for concession contracts was limited to the Public Contracting Statute (Law 80, 1993), the Transportation Act (Law 105, 1993) and the Debt Act (Law 185, 1995)

Figure 3. Applicable legal and regulatory framework for PPPs in the transportation sector.



Source: Rios Ferrer, Guillén-Llarena, Treviño and Rivera (2012).

The evolution of this base framework was accompanied by a complex regulatory development process related to public-private partnerships in the transportation sector for highways, railroads and ports, with around 30 laws and decrees regulating the sector, as shown in Figure 3.

Table 1 compiles and describes some of the principal laws, decrees and policy documents applicable to PPP schemes in Colombia as of 2010. That was the year that marked the breaking point in terms of the country's infrastructure, underscoring the legislative and institutional needs required to efficiently develop PPP projects.

Table 1: Evolution of the Regulatory Framework for Public Works Concessions in Colombia.

Document	Details
Law 80 of 1993.	Issuing the general statute for government procurement, and forming the first basis for the traditional concession contract.
Law 105 of 1993	Issuing basic provisions on transportation, including new mechanisms for return on investment in road concessions and proposed long-term financial mechanisms, among others.
CONPES 2775 of 1995	Entitled "Private Sector Participation in Physical Infrastructure," it adopted the first policy guidelines for private participation in infrastructure (assignment of risk, systems of payment, definition of responsibilities, among others).
CONPES 3045 of 1998	Entitled "Road Concessions Program 1998-2000: Third-Generation of Concessions," it made regulatory adjustments and also specified the policy on road concessions for the new millennium.
Law 448 of 1998	Adopting measures on the handling of contingent obligations of state entities and issuing other provisions on the matter of public debt.
Decree 423 of 2001	Regulating the contingent obligations of state entities and consolidating risk policy in state procurement.
CONPES 3107 of 2001	Entitled "Policy for Managing State Procurement Risk for Processes of Private Participation in Infrastructure," establishing general and specific policy directives for handling risk in the transportation, energy, communications, potable water and basic sanitation sectors.
CONPES 3133 of 2001	Introducing modifications to the management of state procurement risk for private participation in infrastructure projects established in CONPES document 3107, April 2001.
CONPES 3413 of 2006	Entitled "Program for the Development of Highway Concessions 2006-2014," outlining the policy guidelines for developing the highway concessions program.
Law 1150 of 2007	Introducing measures for the efficiency of Law 80, establishing policies for extending contracts and the framework for conditions for the state to grant guarantees, among others.

Source: Authors based on CONPES 3760 (2013) and Barreto (2015).

According to the DNP (2013), due to the absence of specific legislation on PPPs, many of the fundamental points of PPP contracts were not clearly defined. Over the years, this resulted in:

- i. The state paying concession projects in advance.
- ii. Contract additions limited to only 50% (Law 80 of 1993) and 60% (Law 1150 of 2007).
- iii. Payments per project, regardless of fulfillment of service.
- iv. Risk not efficiently assigned across public and private sector.
- v. Failure to analyze appropriateness of mode of execution (conventional vs PPP scheme).
- vi. Financial agent and builder not clearly differentiated.⁴
- vii. Lack of incentive schemes to attract institutional and financial investors.

4. Most concessionaire companies were made up of construction partnerships that rather than use Project Finance, they financed investments either through public resources, highway tolls or at a corporate level, thus barely attracting participation from any other type of investors. The financing structures developed in these contracts thus seemed more like public works contracts.

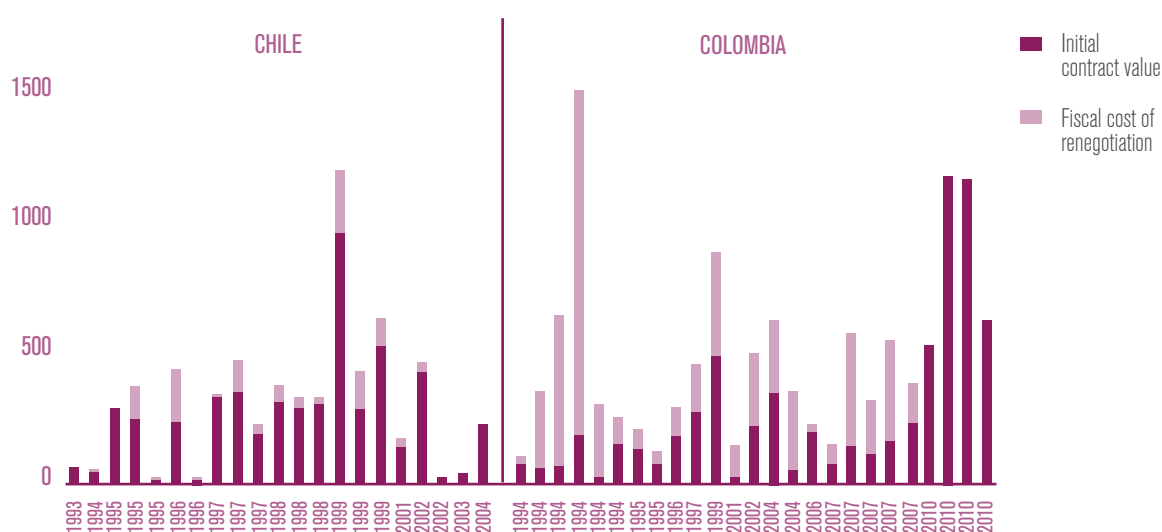
Partly due to the abovementioned reasons, successive generations of concessions granted in Colombia were characterized by numerous renegotiations and delays, large payments for guarantees of traffic and construction cost overruns. The following paragraphs provide an explanation of the mistakes involved in the lack of transformational results in infrastructure, as well as a detailed description of road concessions, the most paradigmatic case in the country.

Significant modifications to contracts have been one of the main problems identified in infrastructure concession contracts carried out in Colombia. On this issue, the OECD reviewed road concession programs in Chile, Colombia and Peru during the 1993-2010 period⁵ and their fiscal implications—see OECD (2013). The study found that the 25 concession contracts signed for the purposes of building, improving or maintaining roads in Colombia between 1994 and 2010 were renegotiated 430 times (20.5 renegotiations per concession). This involved 131 years of additional concession periods and fiscal costs of USD 5.6 billion,⁶ exceeding the initial value of all contracts signed before 2010—see Figure 4. For this period, the ratio of the fiscal cost of renegotiation to initial contract value is 279% in Colombia, compared to 70% in Chile and 27% in Peru (Porcel, 2014). Finally, the study concludes that changes to the contractually agreed terms were a product of the lack of structure in the definition of projects, imperfect design of contractual mechanisms and opportunistic conduct by system agents.

5. In the case of Chile, the study analyzes the concession contracts awarded in the 1993-2004 period, so the comparison drawn is not entirely complete given the different timeframes considered.

6. In contrast, the 21 road concessions analyzed in Chile between 1993 and 2004 were renegotiated 60 times, representing an estimated value in fiscal costs of 1.2 billion dollars.

Figure 4. Fiscal costs of renegotiations in Chile and Colombia in millions of constant dollars, December 2009.



Source: OECD (2013).

According to CONPES 3760 of 2013, in general terms, “road concession contracts in Colombia have shown significant delays in relation to original project schedules, creating disputes that have led to the installation of numerous arbitration courts, lawsuits and fines for such things as additions to contracts (in term and amount), additional works executed without meeting

all requirements, land and environmental cost overruns, schedule overruns and the resulting financial imbalance in contracts, disputes over tendering and award processes, artificially low bids in expectation of later renegotiation, among others.”

For all the aforementioned reasons, road concessions carried out in the country—divided into generations—constitute the most paradigmatic case of cost overruns, delays and conflicts of interest. Each generation shares common elements, such as the contract award period, the institutional framework supporting contracts and the intrinsic characteristics thereof. Table 2 sums up the main features of road concession contracts in Colombia for first, second and third generations, i.e., those developed before the institutional and regulatory transformation that is the subject of this chapter. The table also exhibits the flaws presented in the case of road concessions in Colombia for the 1993-2010 period.

Renegotiations arising from these projects have meant a lack of compliance with the originally agreed conditions, translating into increases in concession timeframes, rates adjustments, reductions in royalty amounts paid by the concessionaire to the government, increases in public revenue contributions, among others. The costs of these changes for Colombia have been very high, and a constant throughout the concessions implemented.

Given this reality, Colombia raised the issue of the need for structural change in the concession scheme, particularly with regard to an increase in institutional capacity to guarantee an adequate transfer of risk and thus reduce the probability of renegotiations. This required the creation of a PPP law that, in addition to limiting the possibility of renegotiation, would improve the general terms of this type of contract, standardize the processes involved in these partnerships, and establish more objective criteria for awarding contracts.

Table 2: Generations of Road Concessions in Colombia

Generation	Time Period	Regulatory and institutional framework	Characteristics of contracts / errors	Nº of projects awarded	Total km	Investment
First	1994-1997	Prepared and awarded by: INVIAS Law 80 of 1993 Law 105 of 1993 Law 99 of 1993	Lack of studies, engineering designs and demand analysis: problems in planning and project structuring. Problems related to land availability, generating project delays. No environmental licenses or the necessary agreements with the communities. Ambiguous formula for assigning contracts and contradictory incentives. Excessive guarantees of minimum income to compensate for construction cost overruns. Poor distribution of risk.	11: seven of which were declared deserted and awarded directly without tendering.	1,649 km	USD 958 millions

Continued on next page...

Generation	Time Period	Regulatory and institutional framework	Characteristics of contracts / errors	Nº of projects awarded	Total km	Investment
First			Financial solvency of concessionaires not considered: no capital contributions and problems getting financing. Many modifications to contracts: advance payments and additions to value of contract to move construction stage forward. Undefined mechanisms of conflict resolution. Fixed concession term: 17 years.			
Second	1997-1999	Prepared and awarded by: INVIAS Law 80 of 1993. Law 105 of 1993 Law 99 of 1993.	Better structuring (more solid preliminary studies). Inadequate formula for State objectives and subject to manipulation by private investors. More balanced assignment of risk (State assumed real-estate and environmental risk). Additions and renegotiations after excessively low bids during tender. Variable concession term associated with Expected Earnings of concessionaire instead of fixed term	Two, one of which INVIAS declared lapsed for contract noncompliance.	1,041 km	USD 504 million
Third	2001-2003	Prepared and awarded by: INVIAS and management.	Progress in contractual models tools of analysis Establishment of Expected Earnings as sole variable for award.	2	590 km	USD 116,2 millones
	2004-2007	Prepared and awarded by: INCO Law 1150 of 2007 CONPES Document 3045	Technical assignment of risk and guarantees. Setting a basic scope for project. Intervention prioritized in road segments without strategic value or connections between them. Scheme with low capital contributions from shareholders and little institutional or foreign investment. Lack of incentives to complete construction on time and carry out operation and maintenance according to appropriate standards. Constant modifications to contracts. Problem of contract renegotiations heightened. Reduction in physical scope of projects for financial reasons. Inadequate urban development in access zones in major cities.	8	1.182 km	USD 645 millones

Source: Authors based on Hinojosa (2011), Sánchez (2016), Vassallo (2010) Bravo and Robayo (2012).

The New Institutional and Regulatory Framework

Toward a new model

Considering all of the above, the national government recognized the need to strengthen the scenario in order to involve private capital in the development and financing of the country's infrastructure. Once it pinpointed infrastructure as a key factor to speed up economic growth and respond to investment needs, the government set out to work on two fundamental points: the regulatory and institutional framework. It did this to promote a change in the development of public-private partnerships, with the objective of achieving a stable, clear regulatory framework that was furthermore sustained by effective and technically sound institutions. The paragraphs below lay out the key points in the new model adopted in the country for the generation of public-private alliances in the sector.

Institutional strengthening

As explained previously, INCO experienced numerous systemic problems from the time it was created. This was attributable in part to the fact that the institution was not a state priority; it was awarded just eight concessions in the eight years of its existence. When the Juan Manuel Santos government moved into the Casa de Nariño in 2010, it brought with it a significant change of direction, adopting a policy of attracting private participation in public infrastructure development with the goal of benefitting from experience, innovation and private investment and freeing up resources so as to optimize public investment in sectors that are less attractive to the private sector.

The National Development Plan "Prosperity for All" (2010-2014) laid out the need for institutional strengthening in the transportation sector and the redefinition and sharpening of the skills, functions and scope of actions of existing institutions to meet the new challenges in the development and financing of infrastructure. As a result, the government implemented different reforms in the entities with direct and indirect purview over transportation infrastructure in order to strengthen the ties of private capital to projects in this sector and develop new PPP schemes to address the country's infrastructure needs. The most notable progress in terms of institutional reforms included:

- i. The transformation of the National Institute of Concessions (INCO) into the National Infrastructure Agency (ANI).
- ii. The transfer of authority over airport concessions from Aerocivil to ANI.
- iii. The creation and subsequent strengthening of the National Environmental Licensing Authority.
- iv. The creation of the State Legal Defense Department.
- v. The creation of the Vice Ministry of Infrastructure.

- vi. The creation of the Intersectoral Commission on Infrastructure (CII, Decree 2306).
- vii. The creation of the National Development Bank (FDN).

The following paragraphs summarize the institutional provisions aimed at strengthening the ties between private capital and infrastructure projects in the transportation sector and the development of PPPs in the country.

As an initial measure, the National Institute of Concessions (INCO) became the National Infrastructure Agency (ANI)—Decree 4165, 2011—with the objective of creating the necessary technical capacity to improve efficiency in the administration of infrastructure and thus carry out the necessary development of the transportation sector, reconcile the interests of the state and the private sector to benefit public interest and promote private participation in the development of transportation infrastructure. ANI thus acquired authority over the tasks of planning, coordination, structuring, procurement, execution, administration and assessment of concession projects for all modes of transportation, with the intention that it would later acquire authority in other sectors as well.

The main institutional difference between ANI and the former INCO is that the new agency was more robust in its internal structuring. First, ANI was given a Judicial Vice Presidency, thus granting it broad authority; second, it was also given an Executive Vice Presidency closely tied to the Vice Presidency of the Republic. This has endowed ANI with powerful decision-making powers and allowed it to resolve conflicts swiftly and efficiently.

Although the National Development Plan (PND) pointed out that one of INCO's shortcomings was the integration of the functions of structuring with project execution, supervision and assessment under the umbrella of one institution—causing inefficiencies in the planning and evolution of projects, as well as the assignment of risk associated with the construction, operation and maintenance of infrastructure—it was decided that ANI would keep those same powers. Nevertheless, action was taken to eradicate some of the biggest problems facing INCO since its inception: the shortfalls in technical and administrative staff, the lack of training thereof and the high levels of turnover this brought about. First, INCO personnel positions were eliminated and new ones created for ANI, consisting of 206 positions (Decree 665, 2012). Next, INCO officials were incorporated into equivalent career positions on the new ANI staff, thus conserving their experience and training within the new entity. Finally, employment conditions and worker incentives were improved in an effort to retain employees and ensure the entity's long-term technical viability.

ANI was created in an effort to unify authority in terms of the structuring, award and/or procurement of concession projects, or other forms of PPP, over all transportation infrastructure projects. This way, ANI would be able to focus its efforts on the entire transportation sector. For this reason, infrastructure projects subject to concession contracts under the purview of INVIAS and Aerocivil were also transferred to ANI. Likewise, any infrastructure assigned to INVIAS or Aerocivil that was required for a contract of this kind would also be transferred over to ANI before signing the contract.

With the change in the legal nature and name of the National Institute of Concessions to a State Agency of Special Nature, a new institutional framework was put into effect for managing concession projects and other types of public-private partnerships in the country. However, as with the regulatory framework (see next section), this was accompanied by overall institutional strengthening aimed at creating an environment favorable to infrastructure development in Colombia.

One of the key complementary actions taken, aside from ANI's creation, was the establishment of the Environmental Licensing Authority (Decree 3573, 2011). Since Law 99 of 1993, the authority to grant environmental licenses for projects of national importance was held by the Ministry of Environment. Since 2007, there had been an exponential increase in the number of projects requiring oversight, and consequently, in requests for environmental licensing, permits and procedures. The Office of Environmental Licenses, Permits and Procedures of this ministry did not have the institutional, technical or administrative capacity to carry out the evaluation and follow-up of such a volume of projects and licensing processes. For all these reasons, the National Environmental Licensing Authority (ANLA) was created as a technical body with administrative and financial autonomy, attached to the recently created Ministry of Environment and Sustainable Development, in charge of the study, approval, issuance and follow-up of environmental licenses, permits and procedures, with the aim of improving the efficiency and effectiveness of environmental management.

Another parallel action within this institutional development was the creation of the Vice Ministry of Infrastructure by way of Decree 087, 2011. This came about as part of the restructuring of the Ministry of Transportation (MT), which split its general Vice Ministry into two specialized technical vice ministries: the Vice Ministry of Infrastructure, focused on infrastructure development; and the Vice Ministry of Transportation, on regulating transportation services. This division was intended to strengthen the processes of planning, regulation, evaluation and follow-up and coordination related to infrastructure and transportation under the ministry's purview; and in addition, the thematic specialization of the vice ministries was meant to foster greater efficiency in the formulation and adoption of policies, plans, programs and directives on economic and technical regulation in infrastructure and transportation.

With the purpose of strengthening coordination across sectors among the different public entities involved in the structuring, finance, procurement and execution of projects in the arena of transportation infrastructure, Decree 2306 created the Intersectoral Commission on Infrastructure (CII) in 2012.⁷ The CII's main purpose was to provide coordination of transportation infrastructure, efficient project execution and to act as a decision-making body on environmental, land, budget and prior consultation matters and public service networks, if the competent authorities should so request.

Finally, Decree 4174 of 2011 created the National Development Bank (FDN), a development bank aimed at supporting the development of the country's infrastructure program.

7. Today the Intersectoral Commission on Infrastructure and Strategic Projects (CIIPE), following the repeal of Decree 2306, 2012 by Decree 2445, 2013. The latter vested the CIIPE with authority over all strategic projects considered in the national interest.

Legislative and public policy strengthening

In addition to the institutional strengthening described previously, and in order to confront the problems related to public works concessions, the national government also promoted a series of regulatory reforms aimed at fostering a specific and complete legal framework for regulating PPPs. To this end, it issued the PPP Act (Law 1508, 2012),⁸ establishing a new, stable and clear regulatory framework, as well as all related legal provisions.

The new law defined PPPs as “*an instrument to bring in private capital, expressed in a contract between a state entity and a private individual or legal entity, for the provision of public goods and related services involving the retention and transfer of risk between the parties and payment mechanisms related to the availability and level of service of the infrastructure and/or service.*” In essence, the law consists of four basic guidelines:

- i. It defines PPP projects as well as their scope of application and a series of general principles guiding these types of schemes (right to payment, contract terms, additions and extensions, among others).
- ii. It regulates PPP projects of public initiative (selection procedure, open or pre-qualification system, prerequisites for opening selection processes and selection criteria, among others).
- iii. Establishes a framework for private initiative PPP projects⁹ (project structuring by private agents; prior review of private initiative; evaluation, acceptance or rejection of private initiative; disbursements, additions, among others).
- iv. Sets forth a series of common provisions for the development of PPP projects.

The Institute of Political Science Legislative Observatory—see Legislative Observatory (2012)—cites the following principal objectives of Law 1508, 2012:

- i. Attract long-term investors with sufficient financial capacity for the construction, operation and maintenance of works.
- ii. Introduce payment for availability and level of service.
- iii. Clarify roles and functions of state entities participating in the process of project formulation, review and execution.
- iv. Design regulatory regime applicable to private initiatives involving adequate awards and incentives for their development.

In addition, it is important to underscore the mandatory requirement that all projects duly structured in the feasibility phase be put up for tender (ANI, 2016). In order to correct the shortcomings presented in previous concession projects, Law 1508, 2012 introduced a different set of principles from those contained in the prior regulations applicable to PPPs. Major issues to highlight in this sense include the rationale for using a PPP mechanism, the assignment of risk, the system of payment for service indicators, and financing capacity, among others. The table below presents a comparison of the structural changes introduced under the new law with the provisions contained in the framework under Laws 80 of 1993 and 1150 of 2007.

8. Establishing the legal framework for Public-Private Partnerships, issuing organizational policies regarding budget and other provisions.

9. The difference between public initiative and private initiative projects are covered in the section on “Specifics of projects of public and private initiative.”

Table 3: Comparison of Law 1508 of 2012 and previous legislation.

Law 80 of 1993 and 1150 of 2007	Law 1508 of 2012
Analysis of selection procedure for project execution was not required.	Requires rationale for using PPP scheme as an efficient and necessary modality for project execution.
An agreement could be negotiated to pay in advance.	The right to reimbursements or any other payment is subject to the availability of infrastructure (effective delivery of functional units that have completed final stages of construction).
There was no efficient assignment of risk.	Contracts with a clear distribution of risks, attributing them to the party that is most capable of preventing, controlling and mitigating each risk.
The right to collect funds was contingent upon project execution.	Payment mechanisms depending on the availability of infrastructure, fulfillment of level of service and quality standards.
The private party did not tie its own capital to project execution.	The concessionaire is obligated to obtain firm financing and the necessary capital resources. Furthermore, financial or financing capacity and investment or project structuring experience constitute enabling prerequisites.
Extension or addition of up to 60% of estimated term, regardless of amount of investment.	Requests for additional resources and the value of extensions in time cannot exceed 20% of the value of the original contract signed.
There was no specific regulation for private initiatives.	Establishes the regulatory framework applicable to private initiatives.

Source: Authors based on DPN (2013, Barreto, R (2051) Legislative Observatory (2012) and Sanchez, A (2016).

In addition, Law 1508 was accompanied by major regulatory development and other provisions regulating ties between private capital and project development in Colombia. Of note is the Infrastructure Act (Law 1682, 2013), which provides tools for overcoming the chief problems that can affect infrastructure projects, such as land, environmental and network management. In the public policy realm, the approval of CONPES document 3760 in 2013 is noteworthy. It established the fundamental policy guidelines for the implementation of roads projects under the PPP scheme (effective structuring to accelerate investment in infrastructure; selection processes that promote transparency of participation; results-focused contract management, and risk distribution in the program). Finally, it is important to highlight the issuance of other regulations and complementary decrees on themes covered under the PPP Law, such as Decree 1467 of 2012 (on availability, levels of service and quality standards, public contributions, selection criteria and procedure, pre-feasibility, feasibility, and PPP project execution, among others), and Resolution 3656 of 2012 (on the parameters of evaluation of the PPP as a modality for project execution).

In summary, Law 1508 creates a stable legal framework for structuring projects with ties to private capital, introducing a new generation of concessions (4G). As pointed out earlier, this law was in response to the inadequacies in projects carried out during the previous generations (Table 2). It sought to strengthen competition in the country by improving road infrastructure

capacity and providing adequate regional connectivity. The fourth-generation concessions program was thus based on four basic guidelines: (i) effective structuring to accelerate investment in infrastructure; (ii) selection processes that promote participation framed in transparency; (iii) results-focused contract management; and (iv) better criteria for risk identification and distribution. The characteristics of the 4G road concessions program are explained in detail in the section on PPP Project Management.

Actors and Roles

According to MHCP (2015), public entities that participate in the different processes involved in the general implementation of a PPP can be classified into three types:

- i. Implementing agencies: public bodies with the power to implement the programs and projects established in the National and Territorial Development Plans. Their task is to promote PPP projects or evaluate private initiatives, carry out studies required by law and submit them for consideration by governing agencies for their approval, and carry out the signing of the contract with the private party, as well as contract management during the concession period.
- ii. Governing agencies: national and territorial bodies whose task is to ensure compliance with said development plans, guaranteeing efficient public investment expenditure and oversight of the public budget.
- iii. Approval agencies: national and territorial bodies whose role is to issue authorization of public budget commitments for projects requiring disbursements of public resources and authorization of any pertinent fiscal commitments.

This chapter focuses on the analysis of public-private partnership projects developed on a national scale. To this end, we analyze the actors and roles they play in the implementation of these types of partnerships. In the specific case of transportation infrastructure on a national level, the actors include implementing (ANI) and governing agencies (MT, DNP, MHCP), as well as approval agencies (CONPES, CONFIS). Each is briefly described below, along with their principal function within the institutional framework:¹⁰

Ministry of Transportation (MT)

The transportation sector consists of the Ministry of Transportation, which has purview over the National Roads Institute (INVIAS), the National Infrastructure Agency (ANI), the Civil Aeronautics Special Administrative Unit (AEROCIVIL), the Superintendency of Ports and Transportation (SUPERTRANSPORTE), and the National Road Safety Agency (ANSV).

The Ministry of Transportation is the national government body specifically in charge of the design and approval of policies, plans, programs and projects, in addition to the economic regulation of transportation, traffic and infrastructure in all modes of transport in the country, including road, maritime, river, railroad and air transportation. The ministry is also in charge of

10. Both the actors as well as the processes associated with PPP project implementation at the territorial level vary to a certain degree compared to national-scale projects. For more information see MHCP's Manual of Processes and Procedures for PPP Execution (2015).

coordinating across the different sectors and formulating recommendations to the agencies in charge of setting concession contracts in motion.

By way of Decree 946 of 2014, the Transportation Infrastructure Planning Unit (UPIT) was created within the ministry and put in charge of the comprehensive planning of infrastructure development in coordination with the other agents in the transportation sector. It bears mentioning that, while this unit is responsible for planning transportation infrastructure projects, ANI has at times handled this task since it was created. In parallel, Decree 947 of 2014 created the Transportation and Infrastructure Regulatory Commission (CRIT). Its main objective is the design and definition of the economic regulatory framework for transportation infrastructure and services, setting thresholds of economic regulation for the sector.

National Infrastructure Agency (ANI)

ANI is a state agency of special nature under the purview of the Ministry of Transportation. It is the body in charge of the planning, structuring and execution of concession projects and other forms of public-private partnership for the development of public transportation infrastructure at the national level throughout the entire life-cycle of all modes. Its mission is infrastructure development through PPPs to generate connectivity, quality services and sustainable development. As a state agency of the decentralized sector of the executive branch, it is a technical agency with sufficient financial and operating authority to structure and manage all transportation infrastructure projects and connected or related services, as well as PPP projects for other types of public infrastructure. Given the importance of this agency, the section on Specific Characteristics of the National Infrastructure Agency will explain ANI's objective, general functions and governing principles.

National Planning Department (DNP)

The DNP is an administrative department that belongs to the executive branch of public power and is under the direct purview of the Office of President of the Republic. This technical body is in charge of the planning, structuring, coordination and follow-up on all plans, programs and projects implemented in the country. The DNP also handles the prioritization, evaluation and follow-up of investment resources, as well as those coming from the National General Budget and the General System of Royalties. Likewise, it does ex ante and ex post project evaluations. Indeed, its ex post concession evaluations of first, second and third-generation concessions were largely what led to the creation of ANI.

It bears mentioning that there is a program within the DNP, called the Private Participation Support Program (PAPP), whose objective is to strengthen the technical and regulatory mechanisms that promote ties with the private sector in infrastructure financing, provision, operation, maintenance and associated services in different economic and social sectors. The specific objectives of this program are: (i) to foster mechanisms and projects that

bring in the private sector to increase investment in infrastructure, equipment and associated services; (ii) to strengthen the technical and institutional capacity of the entities in charge of infrastructure development, at both the national and sub-national levels, to conceptualize, prepare and evaluate PPP initiatives and projects; (iii) support the preparation of pre-investment studies, structuring and/or implementation of PPP projects.

The DNP is responsible for managing the Single Register of Public-Private Partnerships (RUAPP), a public database that compiles information on the status of projects developed under this scheme on a national and territorial scale. This register, created under the provisions of Law 1508 of 2012, Article 25 and Regulatory Decree 1467 of 2012, Article 21, allows for oversight of PPP projects developed all over the country throughout their life cycles, from the initiative, structuring and evaluation stages to completion of concession period, including all initiatives that were rejected.

The DNP plays a role in different phases throughout the PPP structuring process for both public and private initiative projects, as will be shown in greater detail in the section on PPP Project Management. In summary, the DNP evaluates and justifies the mode of procurement—conventional or PPP scheme—validating or not the value for money analysis done by the entity that's promoting the project in the pre-investment stage. It also does the annual programming for PPPs, jointly with the MHCP, in accordance with fiscal spending policies; and collaborates with the MHCP in the review and approval of future terms for projects.

Ministry of Finance and Public Credit (MHCP)

MHCP is the governing agency of fiscal and macroeconomic policy in Colombia and, in coordination with the DNP, is in charge of formulating the financial plan for the various sectoral plans. Therefore, in the transportation sector, this body has the role of preparing the Financial Plan for Infrastructure and Transportation, which is subject to approval by the National Council on Economic and Social Policy (CONPES).

As pointed out earlier, MHCP works jointly with the DNP on the annual programming for PPP projects in accordance with fiscal spending policies and in keeping with the quotas for this type of project per sector as established in the national plan. The program is then taken to the Council of Ministers for validation. A process of approval of future terms for each project and assignment of contingent risks follows. The Ministry of Finance has an important role in guaranteeing compliance with the maximum annual cap of 0.4% of GDP in commitments for future terms, which is why it evaluates and supervises both certain and contingent fiscal commitments arising from the projects presented by the implementing agencies.

The MHCP also plays an important role in contributions from the State Entities Contingencies Fund (FCEE), in that it approves the assessment of contingent obligations and the FCEE contribution plan submitted by the implementing agency. In Colombia, there is a contingency fund created prior to the new law,¹¹ and managed by the Ministry of Finance. All projects

have to make contributions to the fund to cover potential contingent government obligations. Contributions are set based on a risk-assessment methodology established in 2012 that is currently being applied to the fourth generation of concessions. This methodology establishes a risk matrix for impacts versus probability. The grantor entity make a contribution to the fund based on the type of risks. Said contributions become part of the public deficit. The resources go into a trust managed by the Fiduprevisora entity belonging to the state. The fund contains different sub-categories (real estate risks, guarantees to sub-nationals, infrastructure). The fund currently holds some USD 300 million. Subnational projects go through the Ministry of Finance only if there are state resources available. Otherwise, the Ministry of Finance only reviews the risk distribution for the purposes of use of the contingency fund.

11. The Contingency Fund was created in 1998 under Law 448.

National Council of Economic and Social Policy (CONPES)

CONPES, created by Law 19 in 1958, is the senior national planning authority and serves as an advisory body to the government in all aspects related to the country's economic and social development. To this end, it is commissioned with the coordination and guidance of the bodies in charge of economic and social management in the government through the study and approval of papers on general policy development (CONPES documents). In the context of this chapter, CONPES is in charge of general policy design for infrastructure and coordination of the different sectors. In this sense, it is in charge of defining the annual limit for authorizations of commitments for future terms for PPP projects and annual quotas per sector for said authorizations prior to review by CONFIS. This body also formulates recommendations for the agencies in charge of setting concession contracts in motion. CONPES's approval is necessary, as long as the financial structuring term of a PPP project is longer than thirty years.

Senior Council for Fiscal Policy (CONFIS)

CONFIS is an advisory body, under MHCP's purview, in charge of directing fiscal policy and coordinating the Colombian budget system. CONFIS is responsible for granting fiscal approval for PPP projects that have been approved by the Ministry of Transportation, the MHCP and the DNP, and registered with the National Bank for Investment Programs and Projects (BPIN) and the RUAPP, after analyzing and assessing the fiscal implications thereof. Once ANI has prepared the contractual documents and there is no objection to said documents by any of the pertinent bodies, CONFIS evaluates and determines whether there is sufficient room in the budget for future contract terms that could exceed the current government's term in office, and if so, the future terms for projects are approved. In addition to finally approving contracts of public initiative, CONFIS is also in charge of approving additions to this type of project that may involve greater spending of public resources in comparison to the initial value of the contract.

Financiera de Desarrollo Nacional, FDN (National Development Bank)

FDN is a development bank specialized in the financing and structuring of infrastructure projects. This financing entity was created in the context of actions taken to strengthen the institutional capacity of the infrastructure projects described in this case study. FDN provides and mobilizes financial resources in the road, air, river, maritime and energy sectors, as well as social infrastructure for the education and health sectors. In addition, the bank plays an advisory role, using its technical expertise to support state entities in the design and implementation of projects developed under PPP schemes. In summary, FDN's double role has supported both the financial and structural needs of infrastructure projects in the country.

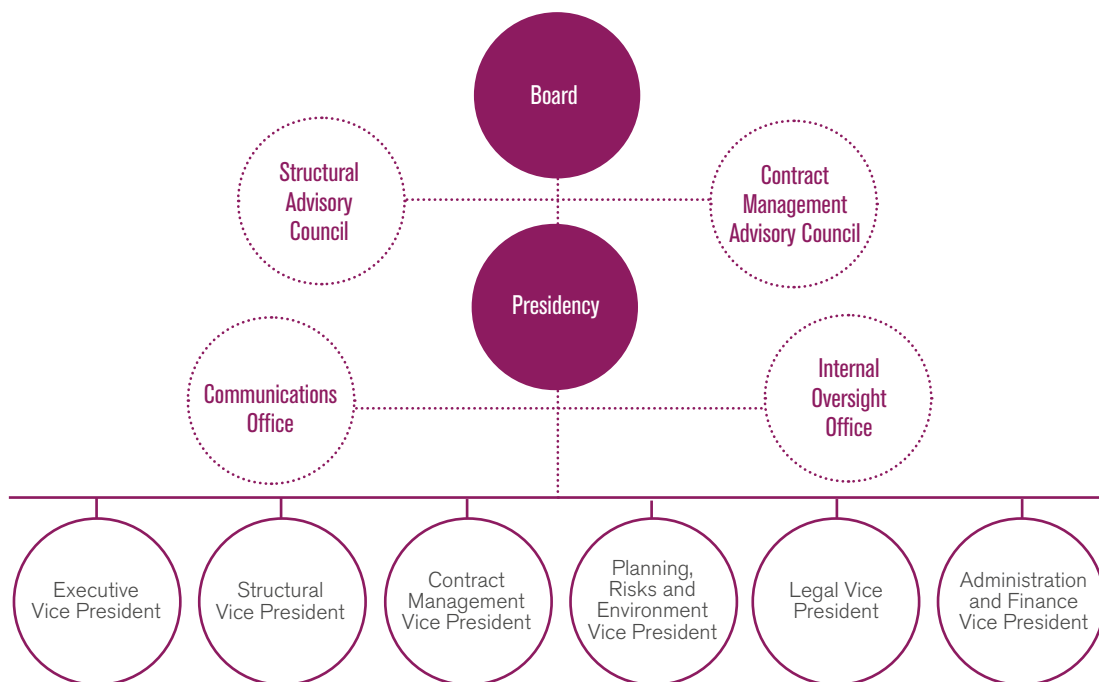
Specific characteristics of the National Infrastructure Agency (ANI)

As mentioned in previous sections, ANI was created as a result of the process of review and strengthening of the institutional framework in Colombia. Decree 4165 of 2011 modified the legal nature and name of the former INCO, which changed from public establishment to State Agency of Special Nature, with its own legal status, property and administrative, financial and technical autonomy, under the purview of the Ministry of Transportation. In addition, its functions were strengthened and its organizational structure adapted. One interesting aspect is that the person appointed as president of ANI was initially appointed director of INCO, thus lending crosscutting knowledge to lead the process of transformation to the new agency.

ANI was formed as follows for the purpose of carrying out its functions: board of directors, communications and internal oversight offices; in addition to six different vice presidencies and different advisory and coordinating bodies (structural advisory council; contract management advisory council; personnel commission and internal oversight coordinating committee). See Figure 5.

As pointed out in the previous section, in accordance with CONPES 4165 of 2011, this agency's objective is the *planning, coordination, structuring, procurement, execution, administration and evaluation of concession projects and other forms of public-private partnership for the design, construction, maintenance, operation, administration and/or exploitation of all modes of public transportation infrastructure and connected or related services. Likewise, ANI will fulfill the same role for the development of PPP projects for other types of public infrastructure if the national government should expressly so determine with regard to infrastructure projects similar to those mentioned in this article, in keeping with the regulations governing the distribution of functions and authority and their assignment.*

Figure 5. ANI organizational chart.



Source: Prepared by author

As a consequence of the change of orientation, ANI was put in charge of different general functions, among which the following are notable (its other functions figure in CONPES 465, 2011):

- i. Identify, assess feasibility and propose concessions or other types of PPP initiatives for the development of transportation infrastructure and connected or related services.
- ii. Plan and draft the structuring, procurement and execution of concessions and other types of PPP contracts for the design, construction, maintenance, operation, administration and/or exploitation of public infrastructure and connected or related services that have been previously identified by the Ministry of Transportation or assigned by the national government.
- iii. Create and administer a database of potential transportation infrastructure projects for development through concession or other types of PPP contracts.
- iv. Define methodologies and procedures in the planning, pre-award, award and post-award stages, and project evaluation for concession or other types of PPP contracts under its purview.
- v. Identify and propose, based on technical, feasibility, economic, financial and legal analysis, the modifications required for concession projects or other types of PPP under its purview, for the purpose of assuring the appropriate conditions for their development.

Since ANI's creation, the country has made major progress in structuring transportation infrastructure projects, both in terms of the completion of large projects, as well as in the construction of others that are just getting started.

In accordance with FDN, eight of 32 4G projects approved reached final closing in November 2017. Indeed, ANI is currently considered one of the best agencies for managing PPPs in the Americas. Proof of this is that the 4G program has received distinguished praise from LatinFinance,¹² which cited it as a model for other countries in the region. ANI's philosophy is based on teamwork and timely decision making. It has talented human resources (500 employees) and the physical, technological and financial means necessary to promote true infrastructure development by fostering private capital ties. To meet this objective, the entity operates as follows: it assigns a team to each contract composed of a lead engineer (full-time assignment) and three legal counsels (part-time) to deal with real estate, financial and judicial defense issues, respectively.

The infrastructure agency is financed principally by contributions from the national budget, support payments for supervision from the concessionaire, payments for use, management or exploitation of transportation infrastructure and income arising from the development of contracts the agency executes, among others (Decree 4165, 2011).

One of the major problems inherited from INCO came about in the initial project structuring phase, specifically related to the processing of environmental licenses and land management. The Office of the Vice President of the Republic has played a very important role in coordinating the different state, business and regional entities involved, as a key player in the proper functioning of ANI's institutional framework. As a result of its involvement, conflicts with other public administrations (like the ANLA) have been resolved, as well as with different communities affected by road infrastructure works, thus streamlining the entire process. Finally, ANI promotes swift, timely and accurate decision making through clearly defined conflict-resolution procedures.

Even though projections for 2017 estimate PPP or concession investment in excess of COP 7 billion (roughly USD 2.36 billion)—more than twice investment in 2010), numerous challenges remain to consolidate the country's infrastructure development. In terms of institutional framework, ANI continues to face a series of problems concerning its relationship and coordination with other state agencies. For instance, although project planning was not originally assigned to ANI, this institution was ultimately the one that spearheaded the task.

In this sense, it would seem reasonable that the Ministry of Transportation should be in charge of planning. In any case, hopefully the recent creation of the Transportation Infrastructure Planning Unit (UPIT) in that ministry will improve this situation. Furthermore, the agency is only in charge of projects at the national level, although in some cases it has reached agreement with subnational entities to help with project structuring. ANI could play a much more important role than it currently does in institutional strengthening and improving the technical capacity of subnational entities that undertake PPP project development.

12. See press release: "FDN Programa 4G arrasó en premios de Financiación y Proyectos de infraestructura de LatinFinance." In Bogotá, October 4, 2016. (https://www.fdn.com.co/sites/default/files/comunicadofdn_oct2016_premioslatinfinance_.pdf)

In addition, ANI still faces significant challenges ahead, such as the implementation of results-driven contract management. The agency currently does not have a team big enough to manage all projects, despite the existence of different internal working groups for highway projects with the Contract Management Vice Presidency.¹³ Secondly, ANI could benefit from better corporate governance so as to allow the agency to function without the need for such heavy-weight political leadership, establishing rules for appointments and giving strength to its board of directors. Currently, intermediate positions have limited decision-making capacity, complicating and slowing down the resolution of some processes. Finally, the country must think about social infrastructure development and define a regulatory framework for this sector. This also poses a significant challenge in terms of defining the functional units for this type of project.

13. Created via Resolution 1452, 2013.

PPP Project Management

General principles for new concessions

As shown in previous sections, project management for PPPs in Colombia has undergone a substantial transformation as a result of the regulatory and institutional evolution that has taken place in the country in the past 25 years. Since 1993, four generations of road concessions have been implemented, each one incorporating regulatory adjustments in their contracts, related to financial, legal, institutional issues and risk distribution, among others, all aimed at improving on the contracts from preceding generations. The first three generations of road concessions (1, 2 and 3G), commissioned under the Procurement Act of 1993, were more like long-term public works contracts with significant advance payments by the government.

As of 2010, major structural changes were carried out in institutional structures (the creation of ANI, the Vice Ministry of Infrastructure and the National Environmental Licensing Authority), regulatory arenas (Law 1508, 2012 on PPPs and Law 1682, 2013 on Infrastructure), and public policy (CONPES 3760, 2013), with the objective of achieving structural change in the concession schemes implemented up until that time, in addition to developing infrastructure in the country (Sánchez, A., 2016) These changes provided for the structuring of the most extensive transportation infrastructure program ever implemented in Colombia: the fourth generation of road concessions (4G). The 4G program consisted of 30 contracts, including 21 public initiatives and nine private initiatives, covering 9,000 km of roads with a projected investment of some COP 52 trillion (USD 17.2 billion, approximately) that would in turn be split into several stages.

One of the main differences of these concessions compared to previous generations was the structural maturity of projects put up for tender. One of the major problems with the first three generations of concessions was that the projects were not sufficiently prepared before reaching the tender stage. This led to cost overruns, delays, lawsuits and renegotiations during the construction

and operating stages. In the case of 4G contracts, the government worked with technical, legal and financial advisors for nearly four years on the proper structuring of projects to guarantee their technical and financial viability and make them attractive for private investors.

In previous generations, project finance was not used, but rather projects were financed through corporate finance, although a mini-perm financing structure was used in some cases. The 4G projects aimed to incorporate the best international practices, in terms of project structure as well as finance. Therefore, the selection criteria were changed for contractors in public tenders for new projects, starting with the pre-qualifying stage. This changed from requiring participants to merely show proof of a specific technical capacity, to include aspects related legal and financial capacity and investment experience.

Finally, improvements were made to achieve transparency in the project tendering and award processes at all times. Furthermore, ANI produced some standard specifications that left very little room for conflict. Until now, projects have been awarded to both international companies associated with local ones, as well as national construction companies. Table 4 sums up the key changes implemented in 4G contracts. The following numbered sections provide more details on the changes in the latest generation of road concessions:

- i. Functional units. In the first three generations of road concessions, public resources were contingent upon the delivery of each project milestone. However, these milestones were not related to user services, thus entitling the concessionaire to charge tolls without having completed the project. In 4G contracts, each project is divided into Functional Units (FU), i.e., sections of the road that can be built, implemented, operated and maintained regardless of completion of the entire project.
- ii. Selection of candidates. For the selection of contractors for public and private initiative PPP projects that do not require disbursement of public resources, Law 1508 of 2012 provides for the use of a prequalification system. The government decided to use prequalification for 4G contracts, emphasizing judicial, legal and financial capacity and investment or project structuring experience. The final list is composed of a maximum of 10 and a minimum of two pre-qualifiers. In the event of more than 10 pre-qualifiers, a lottery system is used to narrow down the list to 10. This has led to many companies not being able to present proposals for projects for which they were perfectly qualified. Finally, the winner of the contract will be selected from among the prequalified candidates.
- iii. Concessionaire payment. 4G contracts involved a shift to a procedure in which payment to the concessionaire can only commence once one of the FUs in the project becomes available and, in addition, government advance payments to the concessionaire have ceased. Each FU has an associated payment amount that is contingent upon its completion and handover, as well as compliance with a series of quality and performance indicators in

14. In private initiative projects, the concessionaire can receive as a contribution from ANI up to 20% of the estimated budget for project investment.

the operating stage (availability payment). The percentage share of each individual FU in the total payment is equivalent to the investment share for that FU in the total project investment. Concessionaire income comes from three sources:

- Toll stations: Toll collection for the concessionaire commences once work is completed on the respective FU.
- ANI contributions:¹⁴ These contributions are established in the national budget and paid out once the work on the respective FU reaches completion.
- Commercial income from the exploitation of certain surrounding areas (e.g., service stations, hotels, advertising, etc).

iv. Financing. Financial risk in these projects is assumed entirely by the concessionaire, in addition to being responsible for obtaining the necessary financial resources—both debt and equity—in order to meet the obligations stipulated in each contract. The contract does not limit the amount of debt the concessionaire can take on, but it does establish a minimum amount of equity. Furthermore, the contract establishes a series of protective measures for loan providers, giving them step-in rights for the project in the event of a termination attributable to the concessionaire.¹⁵

15. In a recent plenary session, the Chamber of Representatives passed Bill 285 of 2017C –084 of 2016S, which adds and modifies provisions aimed at strengthening public procurement in Colombia. The additions to Law 1508, 2012, articles 30 and 32, reinforce the rights of loan providers in the event of termination arising from acts of corruption, clearly establishing the procedure to follow for contract liquidation, as well as when the loan provider exercises its step-in rights.

Table 4: Contractual changes included in 4G projects compared to previous generations.

Criteria	Details
Selection of candidates.	Pre-qualification with emphasis on candidates' financial capacity Facilities for participating in Infrastructure funds Selection of awardee from pre-qualifiers
Function units and payment	Subdivision of concession into functional units Concessionaire payment depends on certification of availability of FUs Payment varies based on availability of service and quality Coverage of exchange rate for concessionaires (portion of future terms was granted in dollars)
Green	Finance risk entirely assumed by concessionaire Establishment of equity minimums Concessionaire debt unlimited as long as previous condition is met Facilities for bank financing, issuance on stock market, infrastructure shares, among others, depending on requirements per different project stages Loan providers' step-in rights
Contract term	Variable between a minimum 25 and maximum 29 years. Variable based on the concessionaire obtaining the present value of toll revenue (PVRP)
Payment for termination	Specific payment formulas in the event of contract termination
Assignment of risk	Transfer of construction and availability risks to the concessionaire Maximum construction time of six years Insurance required for construction and availability risks Limitation of supply risk: cashflows designed for future terms (guarantee of traffic) Partial transfer of land, environmental and social risks, and relocation of basic services.
Additions	Limited to 20% of originally agreed contract value
Conflict resolution	The candidate will choose from the following options in their offer: (i) amiable compositeur (<i>Ex Aequo et Bono</i>)(ii) national arbitration; or (iii) international arbitration.
Public-private comparator	Mandatory to determine and adopt procurement mechanism to demonstrate greater value-for-money for each project.

Source: ANI, Law 1508/2012, 4G Concession Contract

- v. Guarantee of traffic. 4G concession contracts have contingencies incorporated to mitigate traffic risk. Each contract sets a minimum based on present value of toll revenues (PVR) for the project. In the event of a decline in projected traffic, ANI shall pay the concessionaire the difference between real income to date and the PVR agreed for years 8, 13, 18 and, as the case may be, for year 29 of the concession. On the other hand, if the concessionaire reaches PVR before the minimum term expires, it must continue operating the road until year 25, taking in thereafter only a percentage of the total income from tolls.
- vi. Contract term.¹⁶ Contract term varies between a minimum of 25 and maximum of 29 years. The final term depends on the concessionaire attaining the present value of toll revenue (PVR), which is specific to each contract as follows:
 - If the concessionaire has not reached PVR by year 25, the contract term will be extended until the first of: (a) four additional years or (b) the date on which the PVR is reached.
 - If PVR is not reached during the contract term, including the possible extension thereof, the contract shall end on year 29 and the concessionaire will be compensated via payment for termination for the unmet portion of the PVR.
- vii. Payment for termination. Both the PPP Act as well as the Infrastructure Act contain formulas for terminating 4G contracts based on the reason for termination and the point in time when it occurs. The main objective is to cover payment of the debt in full before the anticipated termination of the concession contract.
- viii. Distribution of risk. The Infrastructure Act has brought about significant progress in regard to the distribution of risk between the private sector and the state. 4G contracts clearly establish the risks inherent in the project as well as the agents in charge of handling them. Even though the concessionaire assumes a major portion of risk, the state continues to be responsible for the most important ones—regulatory risk, change in tax law, risk of elusion, etc.—and shares with the concessionaire the cost overruns associated with other major risks during the construction stage (such as land, environmental and social management, relocation of basic services or geological risk in the construction of tunnels). With regard to cost overruns, the concession contract establishes specific amounts for expenses related to land acquisition, environmental licenses and relocation of networks. Any cost in excess of these values will be covered as follows:
 - Up to 20%, the concessionaire will cover the entire cost overrun.
 - Between 20-100%, the concessionaire will cover 30% and ANI will cover 70%.
 - ANI will cover all costs in excess of 100% of the initial budget.

16. In the case of private initiative projects, the contract finalizes when PVR is met or when the term initially agreed (up to 30 years) ends, whichever comes first.

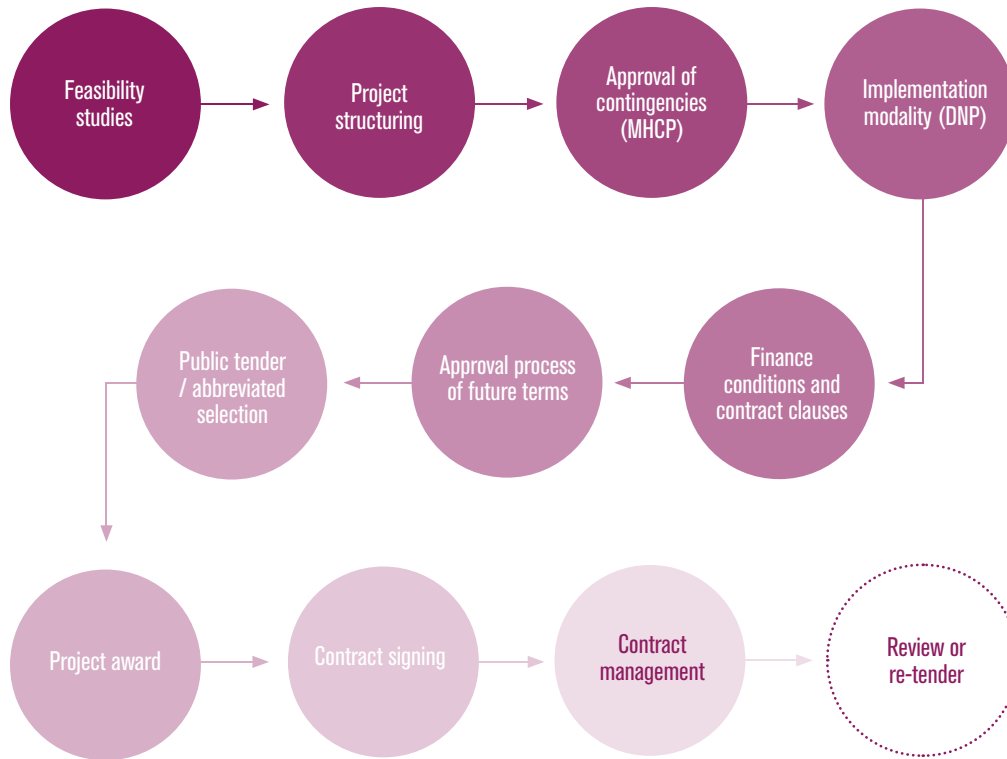
In terms of geological costs, the scheme for partial guarantee of cost overruns is as follows:

- Up to 10%, the concessionaire will cover the entire cost overrun.
 - Between 10-140%, the concessionaire and ANI will cover 50% each.
 - ANI will cover all costs in excess of 140% of the initial budget.
- ix. Additions. In projects from previous generations, it was common practice to extend the length of the original sections of roadway, leading to numerous renegotiations and high fiscal costs for the state. In public-initiative 4G projects, any additional public resources, either from the General National Budget, territorial entities or any public fund, are limited to 20% of the originally agreed contract value. If time extensions are sought in addition to more public resources, the sum of both is likewise limited to 20% of original contract value.
- x. Conflict resolution: The candidate can choose between the following alternatives in their offer: (i) Panel of Amiable Compositeur, composed of two professionals in economics, finance, engineering, architecture and related areas chosen by each of the parties and one legal professional chosen by the Center for Arbitration and Conciliation of the Bogota Chamber of Commerce; (ii) national arbitration, composed of three arbitrators designated by common accord between the parties; or (iii) international arbitration (as long as it complies with the law), to be designated by the parties based on a list prepared by the International Center for Dispute Resolution.
- xi. Value for Money and Public-Private Comparator Law 1508/2012 establishes that it is mandatory to justify why the PPP is the chosen modality for project execution.¹⁷ The DNP therefore applies a methodology (Public-Private Comparator) in order to compare costs for the public sector, adjusted by level of risk assumed, associated with project execution under the Public Project modality and the PPP modality and to choose the one that proves the best value for money.

¹⁷ Article 11, numeral 11.3, Law 1508/2012.

In summary, the general procedure that has been followed in 4G project implementation through PPP schemes is shown in the following graphic. In general, pre-feasibility studies are done before initiating detailed studies or project structuring, a structure is defined for mitigating and managing risks, a justification is provided for the modality of implementation, kicking off the tendering and award processes, along with all associated actions to bring the project to good term.

Figure 6. General procedure for PPP schemes.



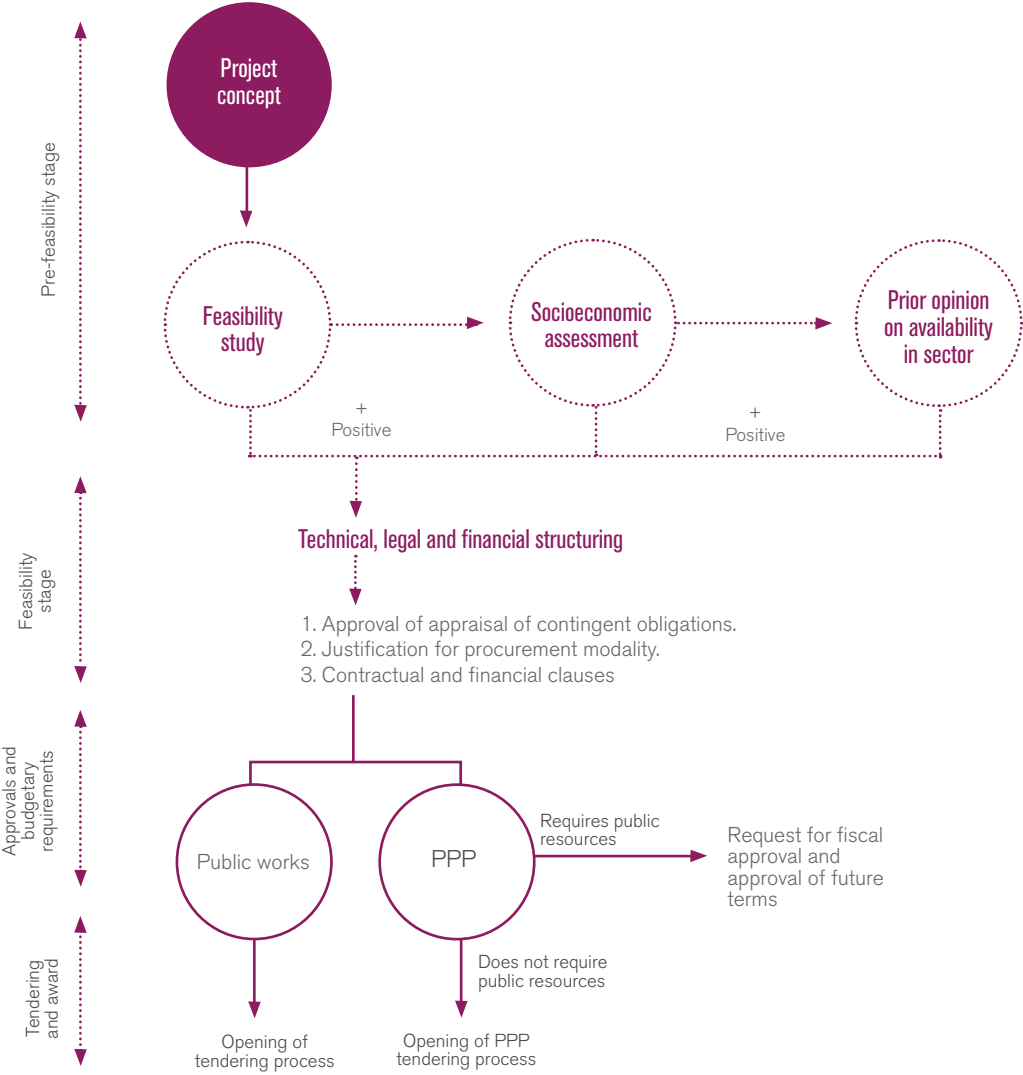
Source: Authors based on MHCP (2015).

There are particularities specific to private initiatives versus and private initiatives, and vice a versa; these are described in the sections on Specifics of Public Initiative Projects and Specifics of Private Initiative Projects in the context of the general implementation of PPP schemes at the national level.

Specifics of Public Initiative Projects

Projects in this modality are a product of state initiative and structured by the public sector, involving the private sector in later stages. Within this category, a distinction is made between public initiative projects with or without public resources based on whether they require disbursements from the state or not. Project management varies slightly per case. In order to facilitate the explanation, we will provide a general description of the procedure to follow for a public initiative project with public resources, highlighting those aspects that differ in the case of one without public resources. Figure 7 shows the general procedure for a PPP project of this nature.

Figure 7. Public initiative PPP Projects.



Source: Authors based on DNP (2013).

Pre-feasibility stage

At this stage, the project is registered in the DNP's information systems at the state and regional levels (BPIN and RUAPP records), and the implementing agency (ANI) undertakes the necessary preliminary studies for the project to justify its feasibility from the strategic, economic, financial, commercial and management points of view (Phase I Studies). Once the project's eligibility is established, ANI must consult with the Ministry of Transportation as to whether there is availability in the sector for the initiative within the limits set by CONPES.¹⁸

18. This request is not a public credit operation; it is budgeted as an investment expense. Therefore, the resources for PPP projects are included as mid-term expenses, whereby the Ministry of Transportation prioritizes the programming process (DNP, 2014).

Feasibility stage and project structuring

In this phase, ANI¹⁹ is in charge of carrying out the technical, legal and financial structuring of the project based on the studies done in the pre-feasibility stage. It must draw up the contractual documents and carry out the studies set forth in Law 1508/2012, article 11 and its regulatory decree, summed up below:

- i. All the necessary technical, socioeconomic, environmental, land, financial and legal studies for the project, including a detailed description of the all phases involved.
- ii. A cost-benefit analysis of the project, evaluating the social and economic impacts and benefits for the directly affected population.
- iii. Justification for use of PPP mechanism for project implementation instead of traditional public works modality.
- iv. Analysis of potential threats and vulnerability of project.
- v. Risk analysis, possible contingencies associated with project and creation of risk matrix.

Based on the above documentation, ANI is responsible for drafting the terms and conditions and model contract, which must be submitted, along with the previous studies, to the governing authorities for approval before opening the process to select contractors (MHCP, 2015).

Approvals and budgetary requirements

ANI must request a series of technical reviews, approvals and requirements from different governing agencies for approval before commencing the tendering process.

- i. The Ministry of Transportation is responsible for indicating whether there is availability for the initiative within the sector limits set by CONPES.
- ii. The MHCP is in charge of issuing the approval of the appraisal of the project's contingent obligations.
- iii. The DNP carries out the analysis of the implementation modality for the project using the public-private comparator methodology to verify whether the PPP procurement modality is more suitable for the project than traditional public works procurement.
- iv. The MHCP is responsible for evaluating and issuing the prior opinion on the financial conditions of the contract and its clauses.
- v. If the duration of the contract should exceed the 30 years permissible under Law 1508/2012, the project and timely justification of said term must be submitted to CONPES, the entity in charge of issuing approval in these cases.
- vi. Finally, the project is presented to CONFIS, which will authorize its approval to commit to any future terms established during the concession period for the project.²⁰

Tendering and award

Except in the cases described in Law No. 1150/2007, art. 2, numerals 2, 3 and 4, as a general rule contractor selection will occur as the result of a public tender, regardless of whether public initiative PPP projects require disbursement

19. Law 1508/2012 establishes the possibility to use a pre-qualifying system for projects with a complexity that requires additional studies before initiating the tendering stage. If ANI should choose to use a system of pre-qualification, the structuring of the project's feasibility must be done jointly between ANI and the private party. This option is only available for projects involving costs in excess of 70,000 current legal monthly minimum wages (MMW). The MMW in Colombia for 2017 is COP 737,717 (approximately USD 224).

20. In the case of public initiatives without public resources, this step does not apply since they do not require approval of future terms.

of public resources, or whether project structuring is done with pre-qualification or not. If there is a pre-qualification phase, the award process consists of the following steps:

- i. Pre-qualification. A public call is made; interested parties must prove they are eligible to participate in the process. The criteria are: legal and financial capacity and investment or project structuring expertise. Only pre-qualifying parties can participate in the award process.
- ii. Presentation of bids. The pre-qualified parties submit their bids, which are evaluated on three fronts: economic bid (each candidate requests the contributions the project would need from ANI); technical bid (each candidate specifies the scope of the works proposed, meeting the minimum requirements) and support for national industry. The points assigned to each economic and technical criterion depend on the project specifications, but revolve around the evaluation of levels of service, the present value of income from tolls (PVR), the quotes requested from ANI and the toll rates charged to users, among others. The proposal with the highest number of points will be awarded the project.

Within the modality described previously in this section (public initiative), Table 5 shows the groups of projects awarded during the first and second wave of 4G road concessions in the country. The table also shows the value of each contract.

Table 5: Public initiative projects awarded for 4G road concessions.

	Project	Contract Value (Trillions of Colombian pesos, 2016**)	State
First wave	Girardot-Honda-Puerto Salgar *	2.4	Awarded 06/03/14
	Mulalo-Loboguerrero	2.3	Awarded 12/05/14
	Cundinamarca Perimeter *	3.2	Awarded 07/23/14
	Cartagena- Barranquilla; La Prosperidad Perimeter *	3.0	Awarded 07/02/14
	Northern Connection Highway	2.6	Awarded 10/17/14
	Rio Magdalena 2	2.6	Awarded 10/22/14
	Pacific Connection Highway 1*	3.2	Awarded 09/15/14
	Pacific Connection Highway 2*	2.6	Awarded 09/11/14
	Pacific Connection Highway 3*	3.5	Awarded 09/10/14

Continued on next page...

	Project	Contract Value (Trillions of Colombian pesos, 2016**)	State
Second wave	Ocean Highway 1	3.4	Awarded 09/03/15
	Ocean Highway 2	3	Awarded 10/25/15
	Santana-Mocoa-Neiva Highway	3.8	Awarded 08/18/15
	Rumichaca—Pasto Highway	3	Awarded 07/24/15
	Popayan-Santander de Quilichao Highway	2.1	Awarded 08/11/15
	Sisga Crossing	1.4	Awarded 08/28/15
	Villavicencio—Yopal Highway	4.1	Awarded 07/23/15
	P/ta de Hierro- Palmar de Varela y Carreto - Cruz del Viso Highway	1.4	Awarded 07/03/15
	Yondo-Barrancabermeja- Bucaramanga Highway	3	Awarded 08/21/15

	Project	Contract Value (Trillions of Colombian pesos, 2016**)	State
Third wave	Bucaramanga-Pamplona	1.6	Awarded 04/22/16
	Pamplona- Cúcuta	2.2	Awarded 04/19/17

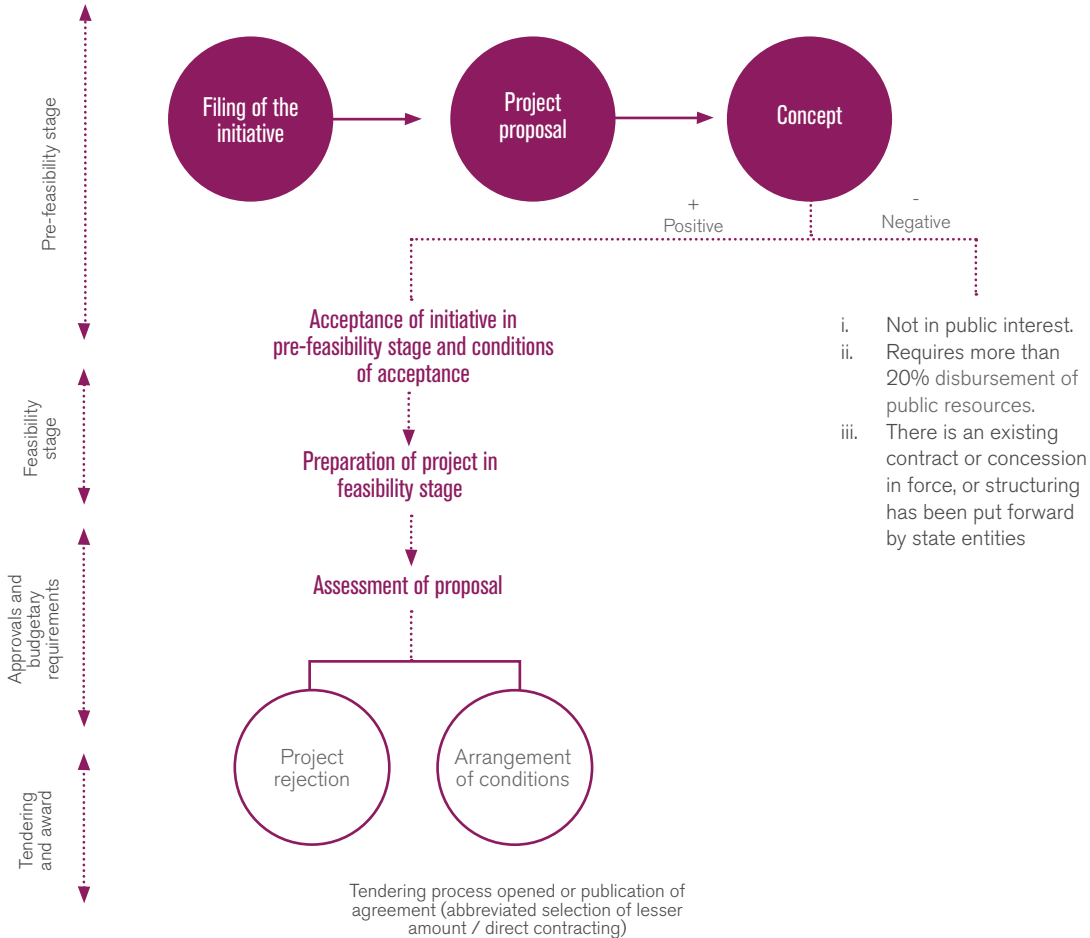
*Projects with definitive financial closing
 **COP 1 million is equivalent to USD 331.

Source: DNP (2017).

Specifics of private initiative projects

The PPP Act also establishes the option for private parties to be able to structure public infrastructure projects on their own and at their own risk. Private initiatives must be proposed in continuation of existing projects, i.e., they may not modify contracts in effect that may require state guarantees or for which structuring is being carried out. There are currently 159 private infrastructure projects presented at the national level, although to date only 11 have been structured (RUAPP data as of December 14, 2017). To present a private initiative, the private party must assume all structuring costs, submit the corresponding studies confidentially and submit the opening of a tendering process for consideration by the competent authorities, according to the process outlined in Figure 8 and described in detail in this section.

Figure 8. Private initiative PPP projects.



Source: Authors based on DNP data (2013).

Pre-feasibility stage

In order to propose an initiative in the pre-feasibility stage, the interested private party must conduct a study to determine the project’s feasibility and desirability in benefit of public interest. A pre-feasibility study must also contain a general description and scope of project, a minimum design at this stage, timetables for carrying out studies and designs, specifications, estimated cost and financing sources. Once the proposal is submitted, ANI will proceed to register the project with the Single Register of Public-Private Partnerships (RUAPP). Later, it will assess whether the project is of public interest or not, and thus either reject or approve the project to continue on to the next stage.

Feasibility stage

If the project is declared of public interest in the pre-feasibility stage, the private party must submit a more detailed study (feasibility study) within the established term. A feasibility study must include, in addition to a series of documents attesting to the candidate's experience and financial capacity: (i) project information, including a definitive diagnosis, identification of the affected population, project cost-benefit analysis, as well as other descriptions of the service to be provided under the PPP scheme; (ii) information on the risks involved, including estimate and assignment of said risks; a detailed financial analysis; (iv) the definitive design of the structure for the proposed transaction; and (v) other important documents, such as updated technical, economic, environmental, land, financial and legal feasibility studies, quantification of the value of these studies with details of costs and account of the contract, among others.

Once the private petitioner delivers the studies in the feasibility stage, ANI calls a public hearing for third parties potentially interested in executing the project, as well as competent authorities that could contribute suggestions and observations; it then proceeds to evaluate the proposal, whereby it may request that the originator provide further studies and any adjustments deemed necessary.

Approvals and budgetary requirements

The prior opinions required for this type of project are the same as for public initiatives that require public resources (numerals (i) to (iv) in the section on Approvals and budget requirements for public initiatives). If the estimated investment budget is greater than 70,000 monthly minimum wages (MMW) or annual income exceeds that amount, ANI must present the proposal with the conclusions from the feasibility study and comments received in the public hearing to the Ministry of Transportation in order for the Council of Ministers to issue an opinion on the feasibility. In addition, a favorable opinion from CONPES is required for any project execution term that exceeds 30 years, and the approval of future terms from CONFIS.²¹ Once all of these steps have been completed, a final response will be issued to the private party, informing them of the feasibility of the project, the amount accepted as the value of the studies done and form of payment, and a draft contract and annexes to bear in mind when drawing up the terms and conditions.

21. For private initiative projects that do not require disbursements of public resources, CONFIS approval of future terms is not required.

Tendering and award

If public disbursements are required, a public tendering process is opened to select the contractor that will execute the project proposed by the originator, with a bonus added to the originator's initial qualification. Said payment is calculated based on the project investment amount as follows:²²

- i. A 10% bonus for projects requiring between 6,000 and 40,000 MMW.²³
- ii. 6% for projects between 40,001-120,000 MMW.

22. Article 2.2.2.1.5.10. of Decree 1082/2015

23. The minimum monthly wage in Colombia for 2017 is COP 737,717 (approximately USD 224).

iii. Three percent for projects requiring amounts over 120,000 MMW.

When there are no public contributions, the contract is published in the SECOP system (Electronic System of Public Procurement) for a period of two to six months, stating the pre-qualifying requirements for potential candidates to bid on the project. If no interested third-parties present bids, the project is awarded to the originator. Otherwise, an abbreviated selection process is initiated for a lesser amount among pre-qualifiers. In the event that the originator of the proposal does not end up first in order of eligibility,²⁴ it has 10 days to improve its bid. If the party does not make use of this option, the cost of the studies undertaken by that party will be acknowledged.

For the private initiative modality described in this section, the table below shows some of the principal private initiatives structured as PPPs, specifically in the case of 4G road concessions. Contract values are also listed in the table.

24. As long as 80% of score obtained by best qualified proposal.

Table 6: Private initiative projects awarded for 4G road concessions.

Project	Contract value (Trillions of Colombian pesos, 2016**)	State
IP Ibagué—Cajamarca	2.52	Awarded 01/15/2015
IP Malla vial del Meta	3,78	Awarded 04/09/2015
IP Chirajara—Fundadores / Bogotá Villavicencio	6.58	Awarded 04/23/2015
IP Departamentos del Cesar y la Guajira	1.95	Awarded 05/19/2015
IP Cambao—Manizales	1.58	Awarded 05/19/2015
IP Vías del NUS	3.23	Awarded 12/01/2015
IP Neiva—Girardot*	2.32	Awarded 09/15/2015
IP Antioquia—Bolívar	3.35	Awarded 09/17/2015
IP Buga—Buenaventura	3.24	Awarded 05/19/2016
IP Northern access routes, City of Bogotá D.C.	1.42	Awarded 07/22/2016
IP Third Lane, Bogota Girardot	4.74	Awarded 08/18/2016

*Projects with final financial closing in November 2017

**COP 1 million is equivalent to USD 331.

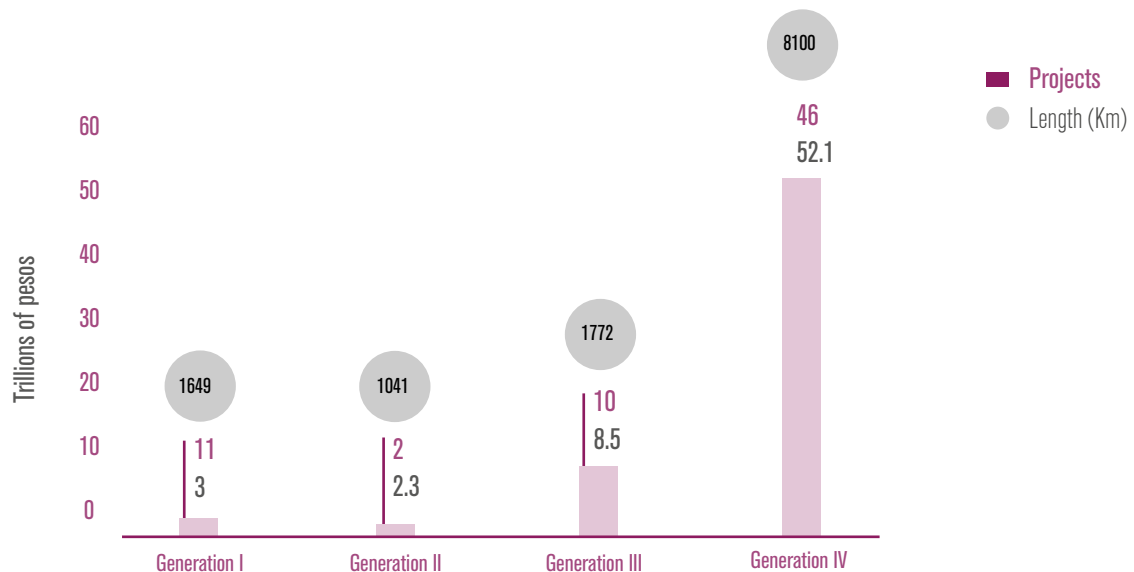
Source: DNP (2017) and FDN (2017).

Financing new PPP projects

Development of the 4G program in Colombia has transformed traditional views on tying private investment to infrastructure projects. With the fourth generation of road concessions, the goal was to learn from past mistakes and implement projects structured in accordance with international standards of project finance. Under this structure, income generated by the project is the main source of revenues supporting the repayment of the debt, as well as the main guarantee to cover risk exposure. This allowed stakeholders to begin to understand the long-term finance model that had scarcely existed in any sector until then.

The new system added greater complexity to contract structuring, finance and management in comparison to contracts granted in Colombia before. In addition, the magnitude of the projects arising from this program required unprecedented fiscal efforts. Figure 9 shows the dimension of the financial challenge posed by an investment of nearly COP 52 trillion (approximately USD 17.2 billion) in projects to be implemented over an eight-year period as of award, not including other types of infrastructure projects. Given these characteristics, the issue of financing poses one of the main challenges to successfully take on this package of projects and close the gap in the existing transportation infrastructure.

Figure 9. Dimension of road concession projects in Colombia.



Source: Authors based on FDN (2010).

Despite the required investment volumes and the new conditions established for the PPP roads program, it has raised the minimum amounts of debt resources for a high number of first and second wave 4G concession projects, as well as private initiatives. Foreign and local banks, capital markets, debt funds, multilateral entities and the FDN have all participated in financial closings.

Nevertheless, the remaining projects will require major investments. This, in addition to the fact that some sources will be more restricted and even longer long-term financing will be required, poses the need to identify other sources of financing to undertake this huge challenge. These points will be explained in further detail in the upcoming sub-sections.

Problems with contract financing

Various problems and challenges have come to light with the launching of fourth generation projects. In general, one problem detected in projects in the first wave was limited private sector participation. For instance, in some projects, even when there were 10 pre-qualified candidates, only two managed to submit a firm proposal. This is attributable fundamentally to several causes:

- i. The high level of required investment made it hard for companies to obtain the *equity*²⁵ needed to carry out different projects at the same time.
- ii. The fact that an entire package of projects was offered all at once for tendering complicated financing for companies, mainly for those vying for various projects. This was true even though the concessionaires were allowed partial payment in US dollars to facilitate financing.
- iii. The technical complexity of projects, most of which included tunnel sections, with the high levels of geological risk involved.
- iv. Many companies submitted proposals and prequalified for different projects before knowing their technical requirements in detail, to then ultimately decide to only present a bid for the ones they considered the most advantageous.
- v. As projects were awarded, many companies chose not to submit bids for other projects that they had already prequalified for.

In addition, the changes introduced in this generation of projects compared to the previous ones increased the private sector's perception of risk, making loans more expensive as a consequence. In this sense, the establishment of new rules related to socio-environmental aspects, studies and prior consultations, as well as the new system of payment for functional units, increased risk for the private sector in the construction phase.

One of the main challenges of all this right now is the private sector's need for support from the public sector in tasks related to land acquisition, environmental licenses and consultation processes with communities, and proper payment. The timetables for 4G projects have been seriously affected, mainly by consultations with the communities. And in addition to this, there is the growing legal uncertainty with regard to environmental

25. In some cases, concessionaires have sold their shares in older projects to be able to take on the equity requirements for the new ones.

licensing, since the Constitutional Court ruling restored environmental authority over mining activities to the territorial entities. This situation could spill over to the road sector, potentially undermining permits granted at the national level (ANIF, 2017).

Difficulties to reach financial closing have led some projects to experience delays with regard to initial projections. The increased complexity introduced under the new system has in practice caused excessive delays in loan negotiations, since the financial entities set the prior acquisition of all land as a requirement. Establishing clear, efficient procedures and regulations to govern them can guarantee the equity and rights of participation by citizens and minorities, as well as reduce the costly risks and delays caused at present.

Furthermore, the size and simultaneous scheduling of projects overburdens both the local finance market and state budget capacity. In this sense, the capacity for future terms committed through 2021 required a reduction in the number of projects originally contained in the third wave of concessions from nine to two. The state has facilitated the long-term financing of 4G projects, assuming part of the construction risks (cost overruns for licenses, land, networks and geological) and operational risks (commercial and exchange) by establishing partial state guarantees covered by the Contingency Fund. A study done by ANIF (2017) shows the heightened sensitivity of future terms “of a contingent nature,” in light of potential scenarios of economic stress that may negatively affect traffic levels on road concessions. It also questions the probability criteria applied in the use estimates for these guarantees and, consequentially, the existence of sufficient resources assigned to the Contingency Fund. Similar opinions were obtained in conversations between the author of this report and representatives from the Colombian financial sector, who expressed doubts about the liquidity of the guarantees.

The new generation of concession projects would thus pose an issue of uncertainty as to commitments by the Colombian government. And furthermore, it is important to add that income from different road concessions is interrelated.²⁶ This would constitute a major systemic risk if the government had to implement the guarantees undertaken.

The national banking system has traditionally played an important role in project finance in Colombia. Nevertheless, with the new generation of concessions, the outlook has changed radically for Colombian banks, which must learn and adapt to the new model of project financing. The projects of previous generations were heavily backed by the state, whereby it wasn't necessary to do an itemized study of the associated risks. Consequentially, local banks had no experience in project finance, nor did they have broad knowledge regarding contracts, the public sector or infrastructure. One of the major issues facing 4G projects is caused by adjustments to bank financing terms, which have shifted from 6–8 years to 10–15 years required under the new model (ANIF, 2017). All this has led to delays in financial closing in some cases.

26. The country's economic situation has proven to be a factor in traffic demand and, therefore, on the associated revenue. See Gómez, J. (2016).

The fact that the investment volumes required for new 4G projects are higher and require longer long-term financing has prompted the search for financing from international banks, although this has been less successful than anticipated. Local banks, as a result, have continued to play a key role, since they are, so far, not subject to the financial regulations imposed under Basel III. Their level of interest in projects, nonetheless, has fluctuated substantially on a project-by-project basis due to the specific characteristics of each tender, as well as to differences in the capacity of sponsors.

Finally, another potential problem caused by the extensive financing required for 4G projects is high levels of participation by local banking. An ANIF report (2017) delves into the potential effects on the solvency, long-term finance capacity and sector concentration of local banking to maintain its levels of participation in the second and third waves, as well as in 4G private initiatives. The results indicate the need for greater diversification of finance sources to avoid excessive exposure of the banking sector to road infrastructure and maintain its financial soundness.

Financing sources

In light of the magnitude of the 4G roads program, local banking in Colombia does not have sufficient capacity to meet the needs to finance and execute all the projects. For this reason, the need to pursue other financing sources has been clear from the beginning, not only to supplement funds from Colombian banks but also to diversify the risk assumed by the different financial institutions.

In terms of the initially proposed financing structure to undertake the first projects, participation from different sources was viewed as follows: (i) local banking, with 30% of all financing; (ii) international banking, 26%; (iii) equity from concessions, set at 20%; (iv) funding from private capital, 14%; and (v) multilateral banks and the FDN would contribute 10% in subordinated debt (ANIF, 2014).

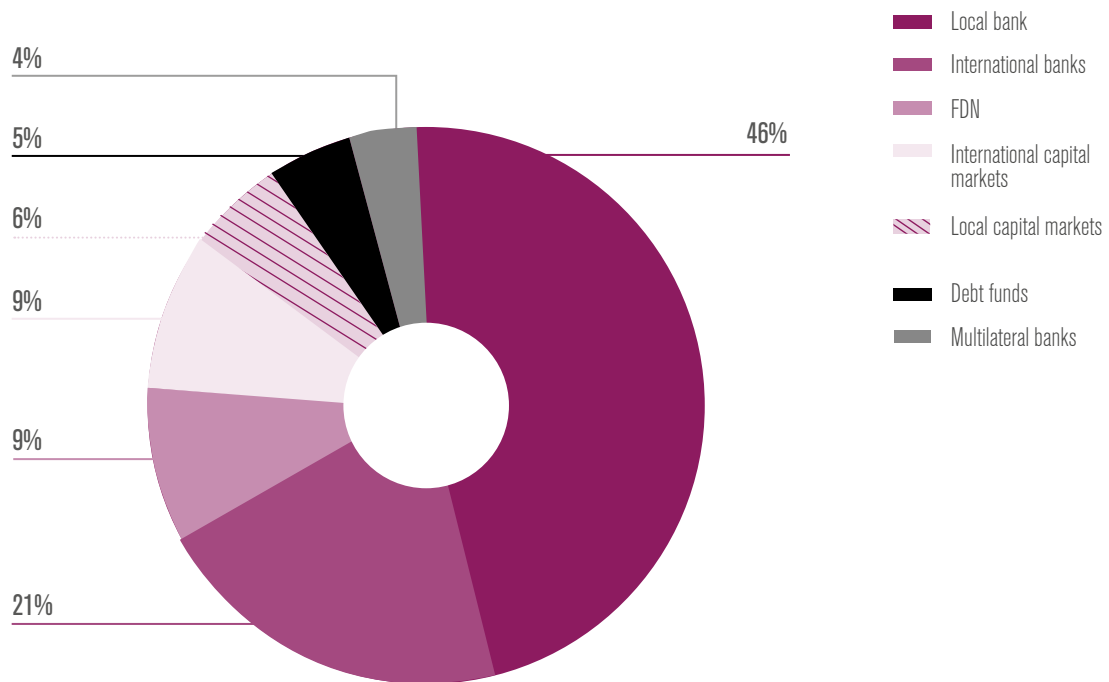
In accordance with the principles of project finance, the debt undertaken would be repaid based on resources arising from: (i) toll payments collected by the concessionaire; (ii) public resources from future terms; and (iii) the issuance of infrastructure bonds.

As shown in Figure 10, participation relative to financing sources involved in the final closing of the first wave of 4G projects²⁷ has varied from initial projections to a certain extent. According to the graph, the seven local banks²⁸ involved in the eight first-wave projects have taken on nearly 50% of the financing. The other stakeholders involved in the financial closings for these projects were eight international (21%) and two multilateral (4%) banks, the FDN (9%), various local and international investment institutions through two debt funds (5%) and capital markets (15%).

27. For lack of definitive data on the Mulalo-Lobo-Guerreo concession, which at the time of ANIF (2017) report, was still pending financial closing.

28. Bancolombia, Banco de Bogotá, Banco Popular, Banco de Occidente, Banco AV Villas, Banco Davivienda and Corbanca.

Figure 10. Financing sources for eight 4G projects with final financial closing in March 2017.



Source: ANIF (2017)

The FDN has played a very important role in mobilizing financial resources for 4G projects in this scenario. The institution has not only put its own resources toward the financing process, it has also worked actively to improve the standards, expertise and technical capacities of the agents involved in infrastructure financing, and in the promotion of regulatory changes aimed at expanding financing sources for PPPs. In this sense, Decree 816/2014 increased the limit for credit operations for 4G projects by banks and the FDN to 25% and 40% of their technical wealth, respectively, and made it possible for institutional investors to invest in PPP projects through private debt capital funds.

This financial institution mobilizes resources in a variety of ways, either through financial products that improve credit ratings, contributing debt to the financial structuring of projects, or offering guarantees that diminish different risks associated with their financing. Noteworthy among the different products it offers:

- i. The Multi-purpose Subordinated Facility (FSM), which works as an additional contingent debt fund available throughout the project lifecycle to provide coverage in the event of any cash shortfall, either to pay off debt or for advance payments guaranteed by ANI, such as cost overruns or toll collection entitlements.

- ii. The DR Line of Credit, a liquidity line aimed at covering cash shortfalls for the project arising from lower than estimated demand during the operation and maintenance phases.
- iii. The Partial Guarantee of Liquidity, a liquidity source that improves the project's risk profile in the construction phase (liquidity risk) or in the operation and maintenance phase (traffic risk), depending on the type of guarantee.

The FDN also contributes to the financing of 4G projects by granting both senior and subordinated debt. In the case of senior debt, the institution has been granting mini-term senior loans in order for concessionaires to refinance through debt or securities funds once the construction stage is completed. In the case of subordinated debt, this has been identified as a very important financing instrument because it reduces the existing pressure on equity, improves the risk profile of senior debt, mitigates liquidity risks, aligns cashflows for the project with debt payment flows, and improves project financing structure.

Finally, the institution puts exchange coverage schemes at the disposal of projects, facilitating access to derivative instruments for the concessionaire to mitigate exchange risk. This coverage allows 4G projects to acquire debt in foreign currency, in this case US dollars, regardless of the currency in which they receive income, thus increasing the sources of international financing. This instrument is especially important in private initiative projects, considering that they lack exchange coverage in any case. In this same vein, the FDN has launched a line of funding in Colombian pesos to involve a greater number of foreign institutions in the financing of 4G projects. The bank could grant loans in Colombian pesos to international banks and multilateral entities, thus allowing them to finance projects in Colombia in that currency. At present, the FDN has approved two lines of funding in pesos valued at USD 208 million with the IDB Group, and a third for USD 104 million with CAF (FDN, 2017).

The financial instruments created by the FDN are intended to optimize the debt structure in order for the promoters to be able offer financiers attractive alternatives at different interest rates. On one hand, it offers institutional investors the possibility to make long-term investments at low risk during the operation and maintenance stages. On the other, it allows international banks—more willing to take on construction risks but with some long-term commitments subject to Basel III requirements—to get involved in the short-term financing of projects.

As mentioned previously, the FDN has also played a fundamental role in the search for alternative financing sources for 4G projects. Proof of this is its role in the mobilization of international capital markets and the creation of debt funds for infrastructure financing. Such is the case with products like the FSM, designed by the FDN to improve credit ratings, which have acted as catalysts in the issuance of bonds abroad and in the participation of debt funds in the financing of 4G projects. These products are managing to link the capital market to the different stages of projects, including the initial phase, in which the construction risk has tended to dissuade participation by institutional investors in project financing.

The FDN has been working with multilateral entities to design different financing strategies to provide incentives to mobilize institutional investors in the different project stages. In order to foster this participation in the construction

phase, two instruments with the capacity to cover construction risk are suggested: a bond issued in the construction phase (day-zero bond) with partial guarantees or full-wrap guarantee syndicated between the FDN, banks and multilaterals, or financing via specialized debt funds. To promote the refinancing of projects in the operation and maintenance stages, a line of deferred credit is suggested, along with refinancing guarantees or a bond or securitization issued in this phase (O&M Bond) with partial guarantees (FDN, 2014b).

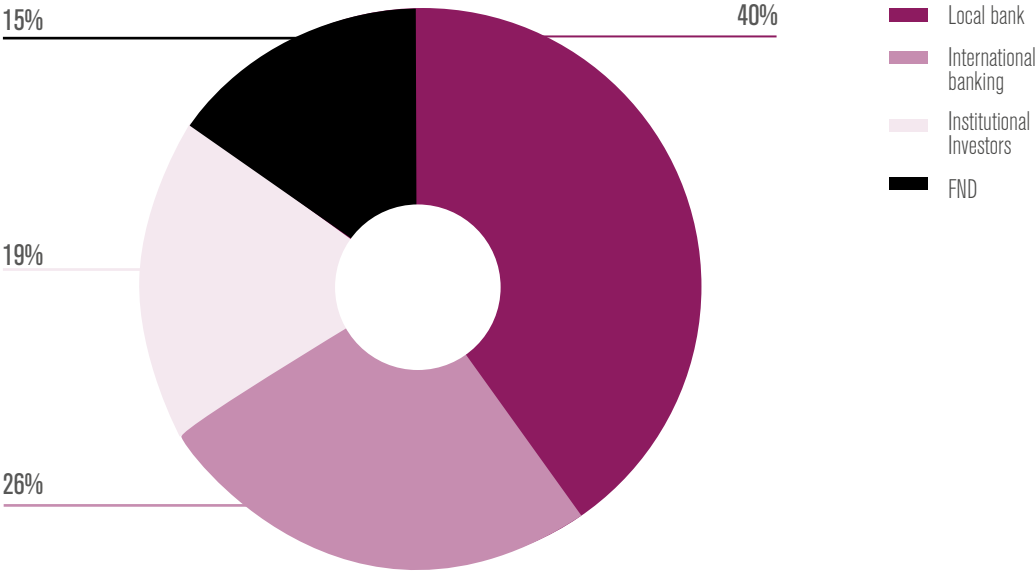
Another aspect of interest for project finance in Colombia is the creation of private capital debt funds, which were designed to attract capital from institutional investors—pension and insurance funds, among others—to invest in infrastructure in the construction phase. The participation of the FDN in the creation of these funds and in the mobilization of resources has followed two directives. First, the FDN promoted a series of changes in finance regulation to enable institutional investors to invest in debt funds. Furthermore, participation by the FDN itself as an initial investor acted as a catalyst, ensuring the participation of other entities in the funds.

CAF – the Latin American Development Bank has also played an important role as a catalyst in the promotion and support for the creation of debt funds for developing infrastructure in Colombia. CAF structured the first fund of this type in Colombia: the CAF – Ashmore Senior Debt Fund for Infrastructure. This private capital fund was created to respond to the growing demand for senior debt in the country's infrastructure sector, especially in the roads sector, where projects in the 4G concessions program are a priority. Moreover, CAF has contributed its own capital toward strengthening the financing capacity of the FDN—with a capitalization of USD 50 million—and participates as an investor in the CAF-Ashmore and Ashmore Andino II funds—where it has invested USD 50 million and USD 5 million, respectively.

Up until recently, there were two debt funds in Colombia: those created by CAF, Ashmore, and Sumatoria-Banco de Crédito del Perú. These have achieved commitments of nearly COP 3 trillion (approximately USD 1 billion) from different pension funds, COP 600 billion of which were invested in financing the first wave (5% of the total financing) (ANIF, 2016). Blackrock recently created the Colombia Infrastructure Private Capital Fund, which has raised USD 283.16 million, and an investment of USD 20 million by the FDN.

Aside from creating a new asset class for infrastructure within the investment regime to incentivize participation by institutional investors in PPP financing, their participation has been relatively low, because it is limited to 5% of their portfolio and to debt funds that put at least two-thirds of their investments toward infrastructure projects under the PPP scheme (Decree 816/2014). According to ANIF (2016), looking forward, the possibility of increasing this participation is being analyzed with a view to reducing the exposure of the banking system, which is currently partially saturated due to its heavy involvement in financing 4G projects. Furthermore, its financial capacity is expected to deteriorate, given the country's macroeconomic situation and the application of the capital requirements established under Basel III. In this sense, the FDN expects the participation per source in upcoming closings to be as follows:

Figure 11. Participation expected from different financing sources for upcoming financial closings.



Source: FND (2017)

Lessons learned

Analysis of this case study shows that, in general terms, the institutional change in PPP project management that is taking place in Colombia can be considered a success. Although, at the time this book was written, many concessions had still not achieved financial closing or were still in the construction phase, the country has inarguably undergone a radical change in its capacity to put infrastructure in motion in comparison to previous years. Proof of this is that the country has managed to tender a record number of projects with a much lower level of conflict than the first three generations of road concessions. In addition, the strengthening of private initiatives has prompted a significant number of new ideas that could bring radical change to the country's infrastructure resources over the upcoming years.

This case study may prove to be a source of inspiration for other countries and regions that are thinking about changing their model in the future. There are numerous lessons of success to be learned from this experience as well as potential improvements. First, the principal reasons why the change in the institutional framework can be considered a general success:

- The first lesson is that, for public infrastructure policies to be successful, clear political will backed by the president's team and congress is essential.

The mere goodwill of political officials, for as much technical capacity as they might have, is insufficient to carry out a project on this scale.

- The second lesson is that institutional change, the subsequent allocation of the necessary economic resources, and the application of timely legislative reforms are vital to the success of large-scale initiatives in this sector. While this statement may seem obvious, this case adds an interesting nuance which is that the institutional change does not require the complete elimination of the existing framework, but rather building the necessary changes on its foundations. In Colombia, ANI was the natural outcome of the correction of INCO's problems. Likewise, the new legislation approved was developed using the existing legislation as its point of reference.
- The third lesson is that an institutional framework in and of itself does not guarantee success if it is not accompanied by the right people in the right job positions, and always with backing from the highest authorities. In the case of ANI, its direct relationship with the vice president's office has helped to clear any obstacles arising in Colombia's administrative or institutional apparatus.
- The fourth lesson is that a clear strategy to provide good officials with the incentives to stay in the institution is essential in order to benefit from their know-how over time, and to take measures to rectify any mistakes committed in some projects so they are not repeated. ANI has established a policy of salaries and incentives that are higher than those of other public institutions, and this is working to motivate and keep personnel for a longer period of time.
- The fifth lesson is that an efficient system of conflict-resolution can facilitate project development tremendously, avoiding the delays of the ordinary justice system and subsequent shutdowns that usually hold up project completion. Nevertheless, to date the system has not operated smoothly in alignment with the different project stages.

Despite the points mentioned above, there are potential future improvements still pending. These aspects may also be of interest to other countries or regions.

- As pointed out throughout this case study, ANI's internal organizational structure for taking on projects was on target. However, the increased workload resulting from the huge number of projects, both public and private initiatives, has rendered ANI's capacity too small for the workload it faces, causing paperwork delays. Another problem is the limited decision-making capacity at ANI's mid-management levels, which has generated project management bottlenecks in some cases.
- ANI was created as an entity with solid technical capacity, but solely devoted to national transportation projects. Taking advantage of its experience in project structuring, it would be interesting to study the possibility of applying its know-how to other PPP projects—social infrastructure, for instance—or projects at the sub-national level with greater added value from a social standpoint, but in which the territorial authorities have little expertise.

- Another problem identified was that the program was launched on such a large scale but in such a short time period that the national financial system was not sufficiently prepared to take on this new model due to lack of capacity, and in many cases, lack of expertise as well. The national banking system had little experience with project finance, given that the three previous generations of projects, in practice, posed little risk to the private sector and the loans were very short-term. This aspect shows that the success of a program like this one hinges not only on the public sector doing things right, but also sufficient preparation of the private sector—the financial sector in this case.
- In the case of 4G highway structuring, the Colombian government decided to put all it had into guaranteeing the feasibility of projects by providing significant guarantees to mitigate the risks of demand and facilitate project financing. For example, in the first wave of concessions, concessionaires were given the option of requesting a percentage of their income in USD to be able to bring in international financing. While it is true that the Colombian government's strategy to facilitate the financing of projects seems sensible, it is also true that the government—and behind it, all of Colombian society—is taking on a risk that could end up at odds with the country's public budget. The devaluation of the peso in USD terms was the first warning that led the government to eliminate the option of USD income in later projects. Another pending matter in this sense is whether the government will be able, over the long term, to cover the significant future terms to which it has committed. Most of the parties interviewed from the private sector indicated that this is a significant risk due to the high correlation between the behavior of Colombia's infrastructure assets and the low volume of reserves in the National Contingency Fund to cover potential future problems.
- Another aspect of 4G project management is the delays in land acquisition due to existing problems with local communities over nonexistent property titles. Acquiring the land is an essential requirement for final financial closing to take place and thus access the necessary resources to get project works underway. The longer these delays, the greater the risk of changing financial conditions, which could seriously put the ultimate feasibility of projects at risk. With future concession initiatives in mind, it is vital that Colombia put legal and administrative management measures in place to substantially reduce the current uncertainty involved in acquiring land titles.
- Finally, it should be mentioned that private initiatives are not fully working properly for a number of reasons. First, the government does not have the capacity to sufficiently study them and analyze them in detail. Furthermore, financiers have little confidence when it comes to lending resources to these projects, especially Greenfield projects, because unlike public initiatives, the government does not offer any guarantees of traffic for these. Although it is foreseeable that the market will gain confidence over the long term to the extent that projects are successful, all parties must work together to put contractual measures in place that help to provide greater assurance to investors, without affecting the public budget.



Urban Highways
in Santiago

Introduction

Origin and description of urban highways in Santiago

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- Urban toll highways in the international context
- Santiago transport system
- Historical reference and network development
 - Santiago's Intercommunal Land-Use Plan
 - Urban trunk highway system
 - Other highway projects in the urban setting

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- Toll rate system
- Risk management and contract modification

Interoperable *free-flow* system

- System characteristics
- Reporting of offenders

Contract evolution: revenue forecasts and changes

- Highway traffic and revenue
- Contract changes

Integration with the road and urban transport system

Impact on public opinion

- Service level and tolling
- Acceptability of toll rates
- Other aspects

Project financing

Conclusions and lessons learned

Introduction

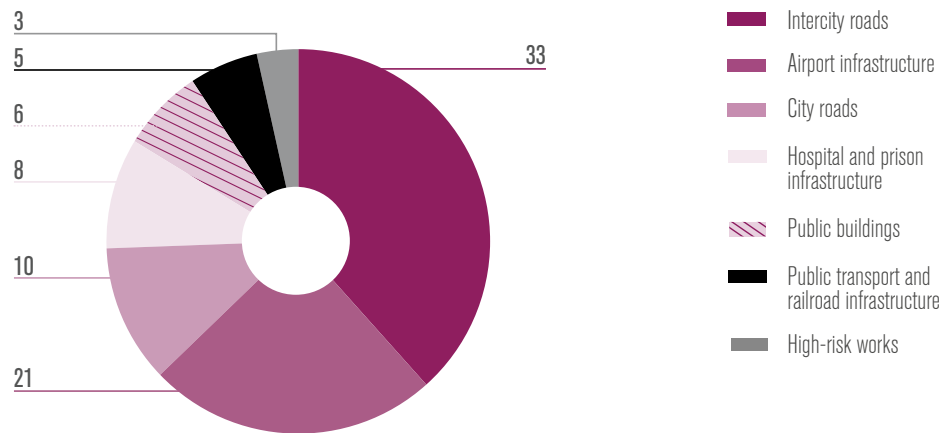
Chile has accumulated 25 years of experience developing infrastructure concessions, including different types of projects such as intercity highways, urban roads, airports, ports, railroads, public buildings and prison facilities, among others. This investment thrust catapulted Chile into the first place ranking in infrastructure quality in Latin America (IDB, 2017). Investments have increased fourfold over the past two decades. Until now, 86 projects have been awarded in Chile under the Concessions Act (Ley de Concesiones), 65 of which remain active (a new tender has already been issued for several of these) with USD 21.93 billion in committed investments and USD 17.75 billion in investments already made, respectively. In addition, 47 projects are in a preliminary stage, either under development and undergoing a feasibility study, or under a tender process or about to be tendered, totaling an approximate investment of USD 24 billion (Coordinación de Concesiones de Obras Públicas, 2017).

Implementing these projects under a concession model has largely narrowed existing gaps through infrastructure modernization and expansion, boosting the country's productive development and, therefore, its competitiveness. This mechanism triggered the first participation of the private sector in the investment, maintenance and operation processes of large public works: private firms financed economically profitable projects to then recover the investment either through direct collection mechanisms from users or through subsidies or payments by the state.

Under this concession model, not only has the state been able to release resources and optimize government investments in public infrastructure, but the country benefitted from the experience and technological innovation provided by private partners. For example, the first interoperable free-flow cross-concession collection system in the world was implemented. The concession system has also brought about great benefits in terms of quality of service for users through the application of new standards and explicit service level indicators geared toward improving service provision.

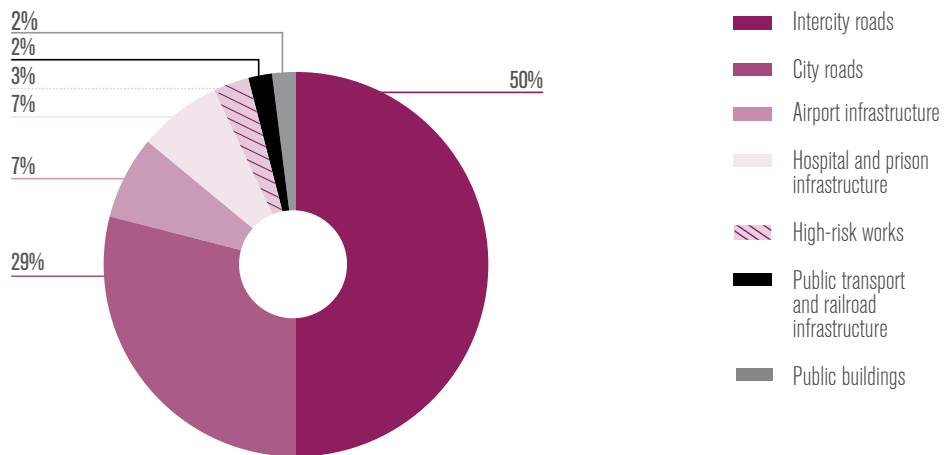
The public-private partnership model has been mostly used for road infrastructure projects. As shown in Figures 1 and 2, road works account for 50% of the concessioned projects in Chile, totaling over 2,500 km of city and intercity highways and almost 80% of total concession investments made. Even though intercity road infrastructure makes up the largest portion of the projects executed so far, we have found the most interesting study case in the city [of Santiago].

Figure 1. PPP projects per type of project.



Source: Authors based on data from Coordinación de Concesiones de Obras Públicas, July 31, 2017.

Figure 2. Investment in PPP projects per type of project.



Source: Authors based on data from Coordinación de Concesiones de Obras Públicas, July 31, 2017

Urban highways in Santiago are a world-class benchmark of successful public-private partnerships for infrastructure provision. It is also a very interesting study case as it is the only urban highway system featuring interoperability between the different concessionaires, understanding as such the capacity to access any concessioned section irrespective of the company managing the section thanks to a single device installed on the vehicle (tag). This aspect should be thoughtfully addressed as it has strong potential for application in other Latin American countries. After several years of project implementation, this chapter focuses on the system of urban highways in Santiago from the point of view of contract management, the collection and enforcement systems operation, works financing and the evolution of public opinion.

This chapter will be divided into the following sections. First, reference will be made to the system of urban highways in Santiago, briefly reviewing the region's context, the Chilean transport system and the network's historical development. The next sections will delve into contract design and management, the characteristics of this novel interoperability system and how the highways integrate with the city's transport system. The discussion will next address contract evolution from the moment contracts were awarded, including the impact of highways on public opinion. These topics will represent the lion's share of this chapter. The remaining sections will address system financing and the role played by the different actors involved. The last section will focus on the conclusions and lessons learned, which should be useful for meeting similar infrastructure needs in other Latin American countries.

Origin and description of urban highways in Santiago

Regional and Chilean context

In the past decade, the Latin American region experienced high economic and social development, which led to economic growth and improved wealth distribution, helping middle classes grow. This cycle was characterized by high-priced commodities such as minerals, e.g., coal, oil, or soybean, which had a large impact on trip generation rates and motorization.

The large burden represented by urban population is one of the main features of the region. In Chile, this burden is as high as 89.5%, according to World Bank data. This figure is similar to levels found in neighboring countries such as Argentina, at 91.8%; Brazil, 85.7%; and Uruguay, 95.3%. In this regard, it is important to note that the Metropolitan Region in Santiago harbors more than 7.3 million inhabitants, based on data from the Chilean statistics agency (Instituto Nacional de Estadísticas, INE), which is roughly equivalent to 40% of the total population in the Chilean Republic, making Santiago the seventh most populated city in the region.

Latin America as a whole displays big differences between its countries, as shown by their GDP per capita index. Chile features a high GDP per capita compared to its neighbors, USD 23 thousand current dollars per person per year (OCDE, 2016). In addition, the Ministry of Public Works has set the goal of developing any infrastructure necessary to achieve a USD 30 thousand per-capita GDP by 2030. Regarding the Human Development Index, Chile has also surpassed the average value attained by similar regional countries such as Argentina, Uruguay or Panama (PNUD, 2016).

Therefore, Santiago appears to lead Latin American economic, social and environmental development. It is the second most competitive city in

Latin America, only second to São Paulo, and it offers one of the highest levels of quality of life in the Southern Cone, according to different international studies.

In the 1990s, Chile experienced strong economic growth. However, from the beginning of this development stage, important limitations were clearly imposed by a marked infrastructure deficit (Engel et al., 2001). While higher salaries led to an increase in the number of vehicles and a drop in the vehicle occupancy rate, the capacity and quality of transport systems improved only slightly. Among other consequences, these two factors resulted in increased urban traffic congestion. A plan was called for to put an end to the problem.

In this context, by the end of the 1990s, the Urban Road Concession Program was launched to develop a high-capacity highway network in Santiago thanks to an investment of around USD 1.3 billion and the construction and operation of four urban express highways: Sistema Oriente-Poniente (informally known as Costanera Norte); Sistema Norte-Sur; Americo Vespucio Sur; and Americo Vespucio Norte.

In general terms, the goals of urban concessions were to increase highway capacity, attract private financing and recover highway investment and operation costs with tolls paid by users.

Urban toll highways in the international context

Urban rates involve the payment of road and highway tolls in the metropolitan setting. Their main objective is to reduce the number of vehicles, secure resources to fund investments and pay for the necessary maintenance costs, and internalize external costs generated by private car circulation in urban environments. Cities have addressed the issue of urban tolls in many different ways.

The four most common types of toll rates in urban settings are cordon tolls or tolls paid to access an area, as in Oslo or Stockholm; zonal tolls or toll paid to circulate within an area, as in London or Singapore; managed lanes, also known as variable management lanes, used in many metropolitan roads and highways in the US; and urban concessions, as in the case of Santiago, Chile.

A cordon toll is a charge on the entry to and/or exit from a zone, although in practice it is collected only at the entry point. Toll collection can be a fixed amount throughout the day or can vary between off-peak and peak hours. It is implemented by means of barriers or gantries at the intersection of the restricted area and the radial roads. This type of toll usually covers large urban areas not fully consolidated. A zonal toll could be viewed as an evolution of the cordon toll. In this case, the toll paid by the driver depends on the use of the vehicle inside a predefined area in terms of, for example, the time of permanence in the zone, the kilometers covered in the zone or the time of the day. This model is generally applied to downtown urban areas.

Congestion pricing or dynamic tolls fall under the concept of *managed lanes*. Toll rates vary according to the time of day and traffic status on the alternative toll-free highway so as to improve transport system performance. The major difference between this system and a regular toll scheme is that toll rates are designed to optimize the transport system. In addition, this *pricing* strategy involves an incentive to travel on other transport modes with higher vehicle occupancy during peak hours; make the trip in off-peak hours or on less congested transport modes; or even eliminate some trips. Changes are then introduced to user behaviors that increase speed on roadways and vehicle performance.

Finally, there are urban tolls through concessions, as in the case of Santiago. Their main purpose is to allocate resources to finance infrastructure to meet demand evolution, rather than optimize mobility management. However, as will be seen in the next sections, even though the implemented toll system considered demand management, it was not enough to avoid highway congestion over the years.

Santiago's transport system

According to data from the last survey on trip origin-destination conducted in Santiago (SECTRA, 2012), a comparison of urban passenger transport modes reveals a 38.5% market share for non-motorized trips, 29.1% for public transport and 28% for private transport. Private vehicles in Santiago are less used than in other cities in Latin America thanks to Santiago's extensive metro network. For example, in São Paulo, private vehicle use reaches 31%; this figure rises to 43% in Montevideo (GLOBAL BRT Data, 2018).

Table 1. Evolution of modal market share in the city of Santiago on a business day during regular season.

	1991	2001**	2008	2012**
Public transport	55.6%	33.8%	32.9%	29.1%
Private transport	16.7%	22.2%	22.1%	28%
Bicycle	*	2.1%	2.9%	3.9%
Walking	19.8%	38.3%	36.8%	34.6%
Other	7.9%	3.6%	5.3%	4.4%
Total trips	8,366,531	16,284,000	17,333,023	17,543,900

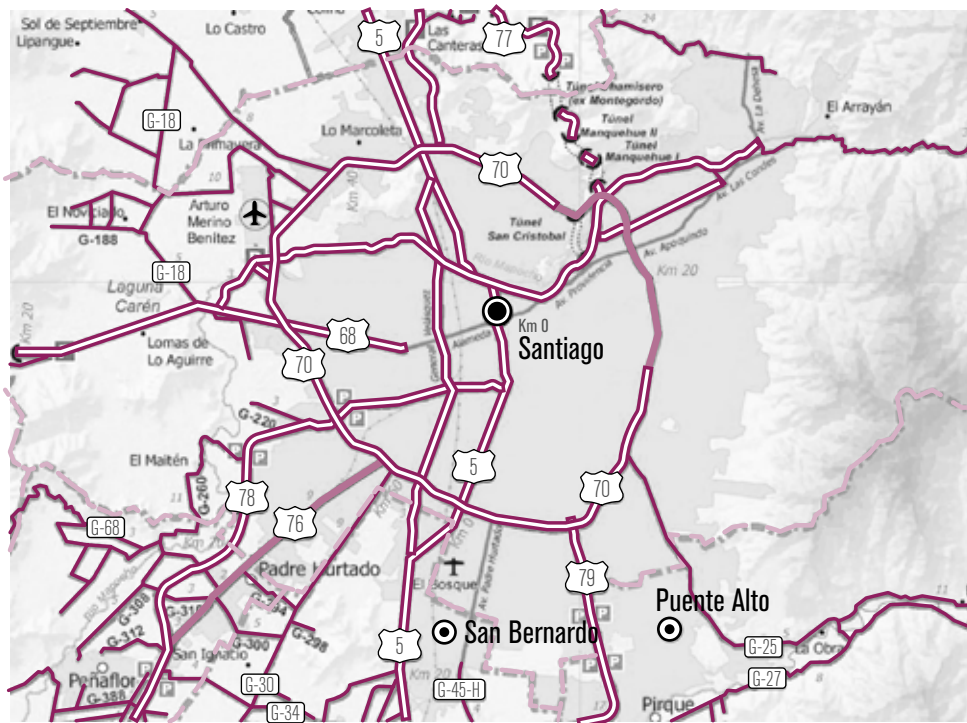
*In this survey, the use of the bicycle mode was negligible and was integrated in the category.

**Comparable trip data on 2001 and 2012 databases were used to compute the market share of transport modes, i.e., 15,585,600 and 17,543,900 trips, respectively. Therefore, percentages vary slightly compared to the same calculation applicable to the total numbers of trips made.

Source: SECTRA (2012, 2001, 1991), CEPAL based on *El transporte público urbano bajo en carbono en América Latina* Farias (2012)

Another aspect to be highlighted is the relation between urban growth and mobility. In the past decades, cities have been expanding toward peri-urban areas. Santiago has not escaped this new reality, and expansion has been strong in large low-density areas. As seen in other urban zones, jobs are concentrated in the city's downtown area, which increases travel distances and gradually unbalances trip flows. In some cases, the trend toward a context of spatial dispersion has made it difficult for public transport to be available across the whole city, which has favored the use of private vehicles. According to data from INE's 2016 annual report on the fleet of motor vehicles in use, 44% of automobiles in Chile and practically half the national fleet of motorcycles are concentrated in Santiago metropolitan region. To make room for this large vehicle fleet, the Santiago metropolitan area has a large network of avenues and streets where Santiago's urban highways play a key role.

Figure 3. Santiago metropolitan region road map (2013).



Source: Ministry of Public Works (MOP).

Following the series of infrastructure improvements undertaken during the 1990s, different plans have been drafted for the enhancement of public transport in Santiago metropolitan region. This development has basically been covered by Transantiago, the first integrated urban public transport system in Latin America, including buses, metro and commuter trains.

Transantiago uses an integrated fare scheme for passengers who make connections between different transport modes without the enforcement of high price penalties, implementing different fares in low, off-peak and peak hours.

Transantiago has been one of the most controversial projects in the past years in Chile, for several reasons. First, because it was implemented overnight, creating uncertainty among users. Second, because the government's original idea that the system would be financially self-sustainable led to insufficient frequencies and higher network congestion, especially on the metro (which went from a well-known, high-quality system to a crowded and uncomfortable one). Transantiago's initial failure made many people turn to the use of private vehicles. As an anecdote, it was common to see companies offering financing plans for the purchase of private cars at crowded bus stops in Santiago.

Transantiago has gradually improved over the years. Of particular note are the expansion of the metro network and improved quality of bus services, although this advance has been achieved at the expense of a higher public subsidy. In addition, Transantiago has become one of the systems with the highest levels of offenders (users who do not pay) in the world. This problem originates from the first-generation concession contracts, under which system operators were not required to control fare payment and evasion by users. Different measures have been adopted to fight evasion, e.g., a strong rise in penalties and changes to the new contracts with system operators, which no longer receive payments per travelled kilometer, but per validated carried passenger. Since 2012, a new operation scenario has been unfolding, whose main purpose is to reduce the system's economic deficit and improve the quality of service. This led to the creation of operation units: seven for urban buses, one for the metro and one for Metrotram, each with its own operation program.

Historical reference and network development

Santiago's Intercommunal Land-Use Plan (Plan Regulador Intercomunal, PRI)

Santiago urban highways were first introduced in Santiago's Intercommunal Land-Use Plan in 1960. This plan was developed as a guideline for the city's future growth and became the main urban-regional planning instrument at a time when the metropolitan area was fast developing. It set out the limits of urban and suburban areas, and the status of residential, green, and industrial facilities areas. It included a strip dedicated to farming, forestry or natural reserve activities (river beds, gorges, etc.) making up a green belt in line with the urbanistic trends of the time. The aim of the plan was to constrain urban expansion to prevent conurbation with neighboring urban centers (San Bernardo, Puente Alto, Maipu, Quilicura) and reserve part of the land to meet recreational, cultural and landscaping needs in Greater Santiago.

One of the key aspects addressed by the 1960's plan was the road and transport problem faced by the Chilean capital city at the time as a

result of Santiago's large physical and demographic expansion. Different solutions were discussed, such as street widening and the construction of high-speed avenues for cars, including underpasses.

In this context, the decision was made to create a high-capacity surface road network. With this in mind, the necessary land plots were expropriated and reserved until technical, social and economic conditions permitted road work construction. The roads that later occupied these spaces are:

- A ring road for outlying communes, which led to the creation of the ring road known as Americo Vespuccio.
- An intermediate traffic flow distribution system, which was the foundation of axes such as the Sistema Oriente-Poniente highway.
- Intercommunal radial roads.
- A central traffic flow distribution system, originating the Sistema Norte-Sur highway.

Figure 4. Santiago's Intercommunal Land-Use Plan, 1960.



Source: Squella, Germán. *Lecturas urbanas: la otra forma de la ciudad*. *Lectura de las claves estructurales de la morfología de los tejidos de la ciudad*. ETSAB PhD Dissertation, Barcelona, 2006.

As per the Intercommunal Land-Use Plan, during the 1970's land plots were expropriated where Vespucio and Kennedy Avenues were later constructed. In 1994, the paving of Americo Vespucio beltway was concluded, including street lights and level crossings like any regular city street, with green boulevards in some sections, especially in communes with the highest per capita income.

Urban trunk highway system

From 1994 to 1997, Santiago's urban trunk highway system was designed mostly taking account of the land plots that had been reserved under the 1960's plan. The idea was for the major highways to come into service at the start of the new millennium (Ministries of Public Works, Transports and Telecommunications, 2003). When these infrastructure works were concessioned, all highways came under MOP's management. The concessions currently in operation that make up the urban trunk highway system (see Figure 5) are the following:

- Sistema Oriente-Poniente, including the Costanera Norte and Presidente Kennedy road axes.
- Sistema Norte-Sur (or Autopista Central), formed by the northern-southern and General Velasquez axes.
- Sistema Americo Vespucio Norte.
- Sistema Americo Vespucio Sur, which forms Santiago's beltway along with Sistema Americo Vespucio Norte and Sistema Americo Vespucio Oriente (AVO I and AVO II, under construction and being tendered, respectively).

Figure 5. Concessioned urban highways in Santiago.



Source: Ministry of Public Works (MOP)

The construction of some of the roads that were included in the urban concessions was mostly concluded, but these roads were incorporated to the system and a toll rate was set for their use to provide continuity to concessions and avoid direct competition between corridors. This was the case of the Kennedy axis, incorporated to Sistema Oriente-Poniente; and the Northern-Southern stretch of Ruta 5, that was added to the Autopista Central concession.

Works started in 2002 after highway award. The first concession to be commissioned was Sistema Norte-Sur (Autopista Central) in 2004, followed by Sistema Oriente-Poniente (Costanera Norte) in April 2005. In November 2005, Autopista Vespucio Sur was opened. The last of the four large highways, Vespucio Norte, started operations in January 2006.

From the beginning, it was decided that toll payment would be made under a “*free flow*” system to have no barriers in place at highway access points. The vehicles using the highways would need to install an active *tag* or purchase a daily pass in advance. A requirement that was imposed from the start of the process was that the toll tag system should be interoperable on all highways. As will be explained in more detail in the interoperable *free-flow* system section, interoperability has been one of the major milestones of the Santiago urban highway system.

Sistema Oriente-Poniente was the first highway to be tendered. It joins the two ends of Santiago at the busiest economic activity area in the city, interconnecting eleven communes. The project covers 42.7 km in length and to date has received investments for USD 1 billion. It was expected to attain a mean daily traffic of 50,000 vehicles a few years after the start of operations. The first tender for this highway, including the Kennedy axis, was issued in 1997, but it failed because only one bidder exceeded the minimum requirements established for the tender. The project was finally awarded after a second call in 1999 to a consortium controlled by the Italian group Impregilo. The concession term was 30 years.

Sistema Norte-Sur was the second tendered project in the context of the first Ministry of Public Works’ urban concessions program. The Norte-Sur axis runs along the stretch extending from the Maipo river in the south and Americo Vespucio in the north. This project ran 38.5 km along on the Norte-Sur axis and 21 km along the General Velasquez axis. It received investments for USD 1 billion. Both axes, running in parallel, were included in the concession to create an integral system and avoid direct competition between corridors. Some sections in the central portion of the highway are toll-free so as not to penalize urban movements.

At present, some highway areas present big saturation problems, so by late 2016 the construction of large additional works were being evaluated to reduce traffic congestion, such as the improvement of the Quilicura interchange, where the Norte-Sur axis and Americo

Vespucio Norte highway intersect. Similarly, additional works are being performed on Ruta 5 Santiago-Los Vilos, in the Santiago-Lampa section, and at the northern city exit to make the route an urban highway. Finally, contracting for the construction of third lanes on Ruta 78 from the starting point of the concession up to Talagante is under way in an attempt to solve the high current traffic congestion level at the Santiago access point.

The Sistema Americo Vespucio beltway, 67 km in length, runs through 20 communes in Santiago. It is the third project of the first urban concessions program and the largest project of all (for which a total investment of USD 2 billion has already been made). This highway was initially divided into two concessions, but a final stretch at the eastern part of the city was unconcluded because of the high cost of avoiding environmental and noise impacts. At present, of the 67 km and seven sections that had been initially projected, 52.5 km in all are in operation. The two concessions that were active at the time of writing this book were:

- Vespucio Sur highway, which began operating in November 2005, covering 23.5 km in length. USD 983 million have already been invested.
- Vespucio Nor Poniente highway, which began operating in January 2006, covering 29 km in length. USD 1 billion has already been invested.

As has just been explained, the Americo Vespucio stretch running from Costanera Norte to Rotonda de Grecia remained unconcluded for many years because of its complexity. The project crosses green areas in high-income communes, which used their power to pressure by means of strong political and social protest. From among the different options considered by the MOP, the involved communes favored the construction of underground solutions, such as a mined road tunnel or a cut-and-cover tunnel. However, all these options were extremely costly and required public subsidy, which was not acceptable to some people from high purchasing power areas. As a result of the large investment required, Vespucio Oriente was divided into two concession contracts. When this book was being written, one of the concessions was under construction and the other one was being tendered, with one recommended tenderer for award, which had not included public subsidies in its proposal.

Other highway projects in the urban setting

In addition to the three large highways that make up the trunk urban highway network in Santiago, other highways constructed under other private initiatives were incorporated to the system, such as Salto Kennedy (San Cristóbal tunnel) and the northeastern access to Santiago (which is not yet part of the free-flow system; however, an improvement is underway to integrate one of the highest-traffic toll stations into the system). Rebid highway projects were also incorporated to the highway network, such as the access to Comodoro Arturo Merino Benítez

International Airport. Similarly, discussions are underway to incorporate the most urban portion of Ruta 5 Santiago–Talca and Southern access concessions, the latter being specifically the southern access to Santiago, to the free-flow system.

The San Cristóbal tunnel joins Providencia and Huechuraba communes, improving the connection between the Vespucio Norte highway and the Kennedy axis. The 4 km-long highway has a tunneled stretch of 1,825 km. The project required an investment of USD 190 million and was concessioned for 32 years.

The northeastern access highway to Santiago is 22 km long. Total investment was USD 354 million and it was developed to improve accessibility to the northeastern sector of the city and provide service to new housing projects. The concession has a variable duration based on the present value of revenues with a maximum term of 40 years. It was opened to traffic in two phases. The first one comprised 7.7 km and connected El Valle avenue with Aconcagua highway. The second phase covers the remaining 14 km and comprises the eastern section, having more complex orographic characteristics that required the execution of Montegordo and Manquehue tunneling works.

The road access to the AMB airport is 2.2 km long. The main purpose of this highway is to offer quality access points to Santiago's international airport, which is the main entry to the country. The first concession of this highway started in 1996 and, after 12 and a half years of operation, the concession was rebid and newly awarded in 2008. It restarted operations in 2010 after completion of improvement works on the existing section. The concession term is variable until attainment of the present value of revenues requested by the concessionaire.

At present, a second access highway to Arturo Moreno Benítez airport is being planned, in the northern airport sector. This highway is still to be constructed. It will be about 7.7 km long and will also use a *free-flow* collection system, like the remaining network highways. In addition, the MOP is examining additional projects to complete the urban highway system in Santiago, such as a private initiative to connect Puente Alto and Ruta 68. Contrary to the first highway projects, however, there are no land plots reserved for these new initiatives, as was the case under the land use plan in force in Santiago in 1960.

The table below shows a summary of the main characteristics of Santiago urban highway system:

Table 2. Summary of concessions.

Highway	Concession	Concessionaire	Length (km)	Investment (in millions of USD)	In operation	Award Decree	Concession term	Type of initiative
Costanera Norte Kennedy Avenue	Sistema Oriente-Poniente	Costanera Norte SA	42.7	Invested: 1,204 Yet to be invested: 156	June, 2005	D.S. MOP No.375 dated February 24, 2000	Start: July 1, 2003 - Concession term: - 30 renewable years up to June 30, 2036 under CAR 2 No. 5.12	Public
Norte- Sur Axis General Velásquez Axis	Sistema Norte-Sur Autopista	Autopista Central S.A.	61.2	Invested: 1,387 Yet to be invested: 36	November, 2005	D.S. MOP No.4153 dated September 14, 2000	Start: July 3, 2001 - Concession term: 30 years	Public
Sistema Americo Vespucio beltway	Sistema Americo Vespucio nor-Poniente	Vespucio Norte Express S.A.	29	Invested: 1,002	April 23, 2003	D.S. MOP No. 493 dated March 2, 2002	Start: April 23, 2003 - Concession term: 30 years	Public
	Sistema Vespucio Sur	Autopista Vespucio Sur S.A.	24	Invested: 983	August, 2006	D.S. MOP No. 1209 dated August 20, 2001	Start: December 6, 2002 - Concession term: 30 years	Public
2nd concession of road access to AMB airport		Sociedad Concesionaria AMB	Section A: Built 2.3 - Future Section B: 7.7	Invested 320 Yet to be invested: 37	TC*: Phase 1: October 22, 2008 Phase 2: February 17, 2012 Phase 3: Not Defined	D.S. MOP No. No. 495 dated July 21, 2008	Start: September 12, 2008 - Concession term: 40 years or Present Value (VPI) >= Total Concession Revenues (ITC)	Private
Northeastern access to Santiago		Sociedad Concesionaria Autopista Nororiente S.A.	21.5	Invested 354	TC: February 6, 2008 FC**: October 21, 2009	D.S. MOP No.1253 dated October 30, 2003	Start: January 7, 2004 - Concession term: 40 years or VPI >= ITC	Public
Americo El Vespucio Oriente	El Salto - Príncipe de Gales stretch	Sociedad Concesionaria Vespucio Oriente S.A.	9	Official budget: USD 1,007 million	TC: December 12, 2020 FD: June 12, 2021	D.S. MOP No. 133 January 31, 2014	Concession term: 5 years or VPI >=ITC	Public
	Príncipe de Gales - Los Presidentes stretch		5	Official budget: USD 733 million		Currently out to tender	Estimated concession term: 45 years	Public
Vespucio El Salto Kennedy variation		Sociedad Concesionaria Túnel San Cristóbal S.A.	4.1	Invested 190	TC: July 4, 2008 FC: June 3, 2009	D.S. MOP No. 1129 dated November 26, 2004	32 years originally; 32.5 yearsas amended under Res. No. 1402.	Public

*TC: Temporary commissioning.

**FC: Final commissioning.

Source: General Concession Coordinating Unit – MOP.

Concession contracts and tender calls

Legal and institutional framework

The Concessions Act and its Regulatory Decree (MOP Decree No. 900), the last major amendment of which was made in 2010 (Ibarra-Coronado, 2011; Camacho, 2014) sets forth the legal rules that govern public infrastructure provision under the Concessions Program, including both the award and the execution, repair and conservation of public works.

As the public administration is highly centralized in Chile, the central government was the competent body to issue the call for tenders for public infrastructure concessions. Municipal and regional governments did not play any major part in infrastructure planning, although in theory communes are empowered to do that. The Santiago urban toll highway project was basically managed by these key government agencies (Toro Cepeda, 2009):

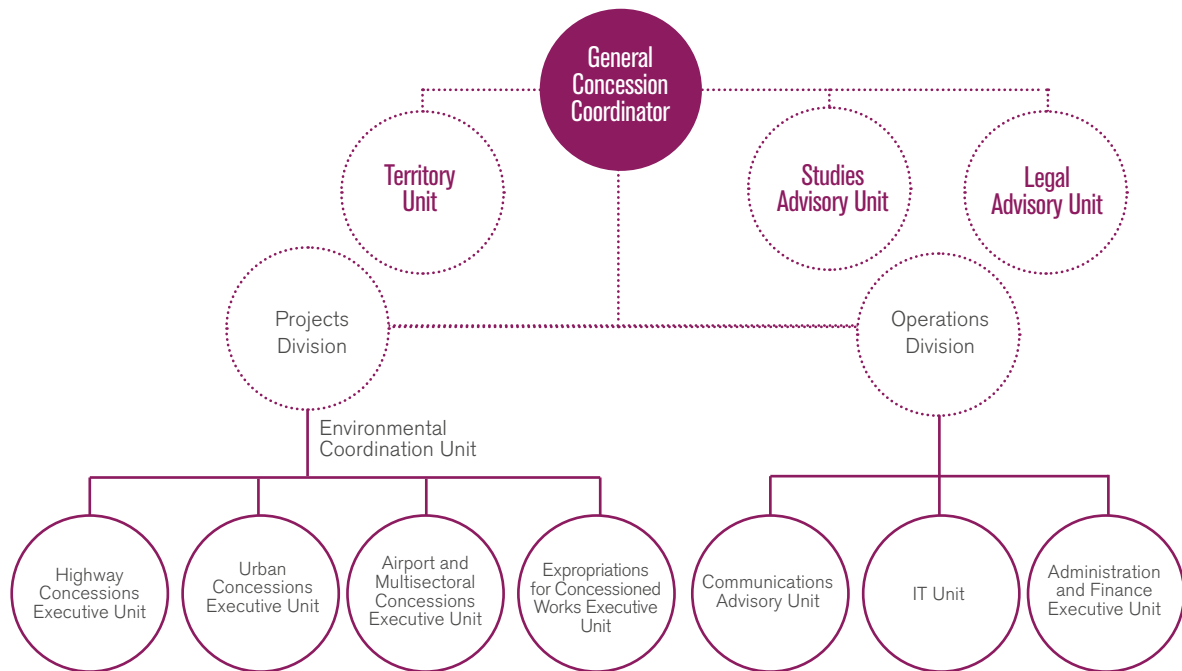
- The Ministry of Public Works (MOP), which is the highway owner; and the MOP's Public Works Concession Coordinating Unit (Coordinación de Concesiones de Obras Públicas, CCOP), whose principal mission is to generate public infrastructure works to contribute to the national development within the framework of a public-private partnership to preserve and improve the quality of life of Chileans and their environment.
- The Ministry of Housing and Urbanism, which is commissioned to develop Santiago's metropolitan planning.
- The communes where projects were executed, which have the role of conducting municipal planning and coordinating the project territorial issues.
- The National Environmental Commission (CONAMA), charged with approving the environmental project components. In 2010, the law creating the Ministry of the Environment was passed. Since then, this ministry has replaced CONAMA.
- The Ministry of Finance, which approves both the tender documents, especially in regard to the state's firm and contingent liabilities resulting from concession contracts, and financial contract provisions applicable to interest rates, subsidy installments and service rates, among others.
- The National General Comptroller Department, which oversees the legitimacy of administrative actions.
- The Ministry of Social Development, charged with assessing the social benefit of investment projects that apply for state's financing during the pre-investment stage.
- The conciliation commission, solving the concession contracts' interpretation or enforcement problems.

One of the Concessions Act amendments introduced in 2010 was the creation of a technical board to address any technical or economic conflicts arising between the parties during contract performance in a non-binding manner.

The MOP is charged with concessioning the public works under its competence. Other government bodies can delegate the power to grant public works under concession to the MOP under an agency agreement (Chilean Ministry of Public Works, 2010). In 1995, the MOP established a special unit to implement the concession program, called General Concession Coordinating Unit (Coordinación General de Concesiones, CGC), currently the Public Works Concessions Coordinating Unit (Coordinación de Concesiones de Obras Públicas, CCOP), under the administrative sphere of the General Public Works Directorate (Dirección General de Obras Públicas, DGOP). This unit structures and oversees concession contracts.

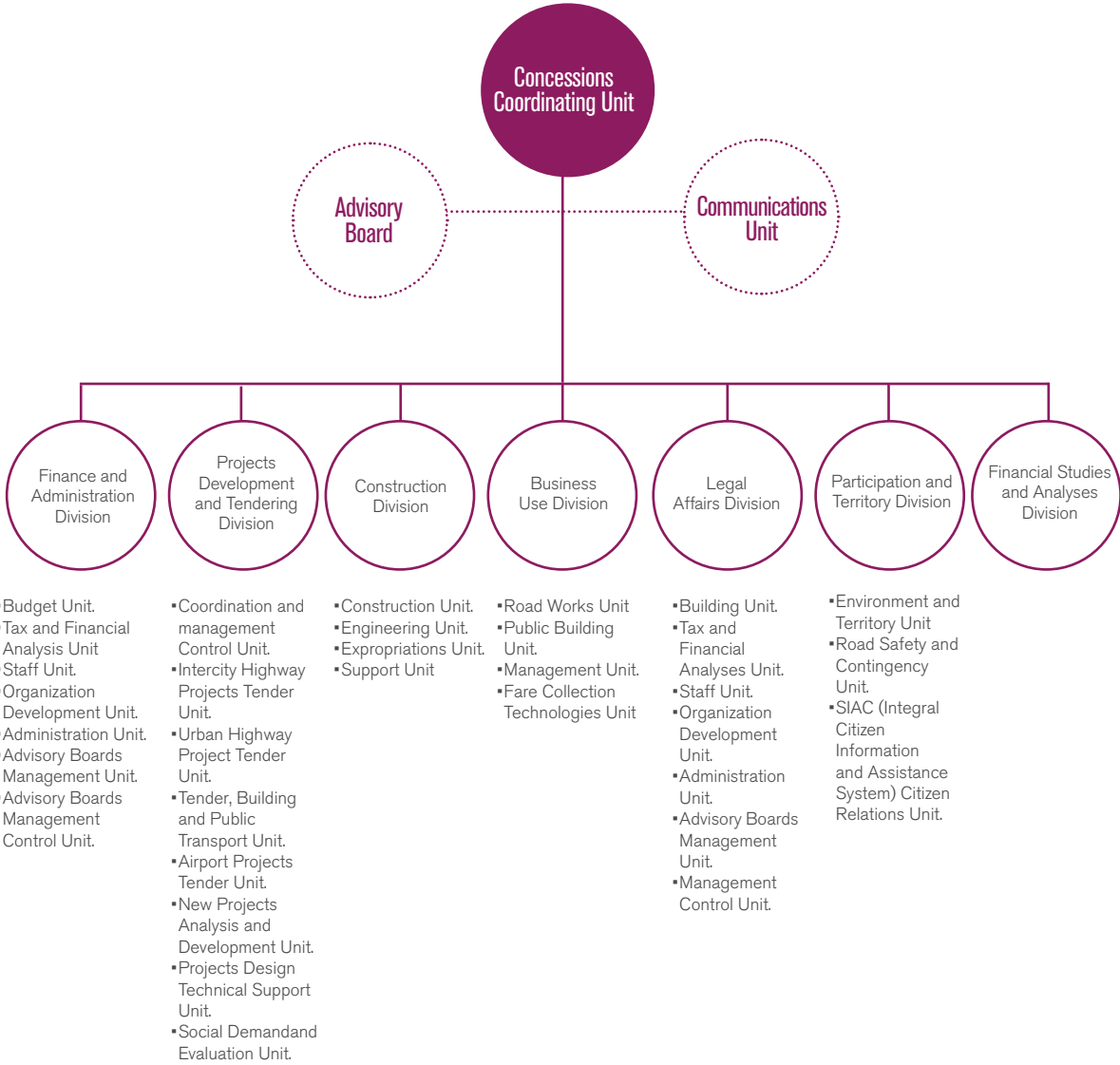
CCOP's organization and roles have evolved over time. At its inception, the CCOP was an agency organized into executive units per type of project (see Figure 6), while it became a much more centralized and flexible body later on (excluding port and railroad projects, which are covered under a different law). As can be observed in Figure 7, this concession unit has presently seven divisions associated with the different processes that are inherent to project implementation under a concession system.

Figure 6. CCOP's functional structure at the time of urban highways concessioning



Source: Coordinación de Concesiones de Obras Públicas.

Figure 7. CCOP's current organization structure.



Source: Coordinación de Concesiones de Obras Públicas.

At present, Congress is discussing a bill drafted by the government to establish a Public Work Concessions General Directorate (DGCOP) as a centralized agency under the sphere of the MOP with the mission to develop the infrastructure concession process, from proposal or initiative evaluation up to the end of the operation phase, including the promotion of required investments, transaction structure, project tendering and the monitoring of contract compliance during the construction and operation stages.

In terms of institutional strengthening, the bill includes guidelines for the obligation by the Ministry to develop permanent planning with a five-year horizon, implement new and stronger strategic management, define the operation and process models for the new law, and reinforce the organization's capacities and systems (Official Gazette 10126).

Other changes have occurred in the past years, although with no impact on urban highways: first, the establishment of a Concession Council, formed by at least two independent advisors whose main responsibility is to assess proposed complementary agreements and monitor tender processes; second, the creation of a technical board, whose members are selected by a public competitive process every six years, with the aim to issue non-binding recommendations about technical or economic conflicts or discrepancies between the parties during contract performance. Since then, all technical and economic issues must be submitted to the technical board for analysis and recommendations before being referred to the arbitration committee.

At the time of writing this book, a very important amendment to the institutional concession framework in Chile was approved:¹ the establishment of an infrastructure public fund called Fondo de Infraestructura S.A., to which the rights paid by future concessions will be allocated. The aim of this fund, whose detailed description exceeds the scope of this study case, is to use the future payment rights of the country's concession system to leverage financing for the development of new public works.

1. Bill 10647-09

Contract design and tender

The context in which these tenders were prepared was quite complex. On one hand, this model was innovative in terms of toll collection technology, which increased the risk as compared to concessions tendered until that time. In addition, these were urban concessions and, as such, had inherent risks: there were alternative toll-free routes, which hindered demand forecasts and made them very sensitive to the setting of an optimum toll rate as the political measures that may be adopted during the concession term could impact traffic flows (Engel et al., 2001). On the other hand, the Asian crisis brought economic uncertainty to Chile. Finally, the failed Costanera Norte tender revealed the need for more guarantees to attract private investors and provide enough support to financiers for urban works projects.

In the case of urban highways, a social assessment of the program was made, along with a preliminary business viability study to find whether the project was attractive for private investors and suitable to be financed by user payments against state subsidies. Similarly, and according to the legal framework in force, the MOP drafted the necessary preparatory documentation for the tender, such as engineering draft projects, demand studies, and territorial and environmental assessments, which were presented to tenderers.

The tender process comprised seven stages: (i) study and designs by the MOP, (ii) call for tenders, (iii) shortlisting, (iv) clarifications and questions by tenderers, (v) tender preparation, (vi) submission of technical and price tenders and (vii) contract award (Gómez and Ruiz- Cámara, 2009). About five years elapsed from the time the prefeasibility and business studies were carried out until the first contract was awarded. Table 3 shows a detailed description of the periods covered by the main tender and award stages of several urban highway contracts.

Table 3. Timeline of the urban highway contract tender and award processes.

	Presentation of Initiative	Call for tender	Award	TC
Americo Vespucio Nor-Poniente	December 1994. Americo Vespucio (Norte and Sur) was presented as a Private Initiative and was then divided into two stretches.	July 2001	March 2002	June 30, 2005 (Stretches 5 and 6); January 04, 2006 (Stretches 1 and 2); Dec. 28, 2005 (Stretch 3) and Dec. 29, 2004 (Stretch 4)
Americo Vespucio Sur		September 2000	August 2001	April 2006
Sistema Oriente-Poniente	Presented as a private initiative. Declared deserted. Presented again as a public initiative.	July 1999	April 2000	October 2007
El Salto-Kennedy tunnel	November 1997	April 2004	November 2004	July 2008

Source: Ministry of Public Works

The tender was issued as an international call, inviting national and foreign natural or legal persons to participate, either individually or as members of a business consortium. Tenderers had to show proof of minimum financial capacity in order to be accepted in the tender process, i.e., to be prequalified. Specifically, interested parties should demonstrate that their minimum equity book value was USD 26 million in the last fiscal year prior to the request date.

Tenderers had to submit a technical and a price bid. A committee was set up to evaluate the technical tenders and rate the documents below on a scale from 1 to 7:

Table 4. Technical bid documents for evaluation and weight.

Document	Document description	Weight
N° 5	Estimated financing structure	10%
N° 6	Acceptance of reference projects	15%
N° 7	Self-audit plan	20%
N° 8	Operation regime	20%
N° 9	Detailed investment and operation budget	5%
N° 10	Works program Gantt chart	5%
N° 11	Proposed toll rate collection system	25%

Source: Tender documents for urban highways.

The final result of the evaluation of each tender was the average of the qualifications received for the seven documents above, weighted as shown in Table 4.

Technical tenders would not qualify in the following cases:

1. When one or more submitted items did not meet the requirements under the Concessions Rules of Procedure and the Tender Documents.
2. When the final qualification of any of the evaluated documents, except for document 11, was lower than 3.0.
3. When the average final qualification of document 11 was lower than 5.0.
4. When the average final qualification of the technical bid was lower than 4.0.

Document 11 on the proposed toll rate collection system was particularly important in the program's first project, Sistema Oriente-Poniente, because the toll collection technology implemented for all projects was defined.

The successful technical tenders passed to the price bid stage qualification. The criterion used for the evaluation of the price bid was the payment for assets and rights, i.e., the amount offered to the state by the consortium (i.e., the project shareholder) for the right to operate the concession. Different price bid evaluation criteria were used in the concessions awarded thereafter. For example, for the Americo Vesputio Oriente tender (both AVO I and AVO II), the mechanism considering the least present value of revenue was used, while for the Salto-Kennedy tunnel tender, the lowest toll rate proposed was the implemented criterion.

The main contract characteristics will be described below, along with the rights and obligations of the different parties involved—in this case, the MOP and the concessionaire—the resolution mechanism for any potential

controversy, the penalties for non-compliance or contract violations by the concessionaire, and the regulation measuring concessionaire's performance.

As has already been mentioned, works will not become the concessionaire's property, but will always be owned by the state. The awardee will construct the works provided for under the contract and will provide the service for the concession term. Then, the state is required to issue a new call for tenders to grant a new concession, unless, based on well-founded grounds, this went against the fiscal interest, in which case the state could manage the concession. The concession term for most urban road infrastructure projects was 30 years. However, the concession could terminate in advance by mutual agreement between the MOP and the concessionaire or on grounds of a material breach of the concessionaire's obligations under the contract. In this case, if the conciliation commission granted the request to declare that the event of default was a material breach of the concession contract as required by the MOP, the Ministry would issue a public call for tenders for the remaining term of the concession contract. Any enforceable loans and those secured with a special pledge on public work concessions would be paid as a result of the tender, having priority over any other loan, and the remaining portion, if any, would be owned by the concessionaire whose contract had just been terminated.

The concessionaire has the obligation to furnish construction and operation guarantees, and to make the payments to the MOP as provided for in the contract, grant free access to the state inspector to any necessary information to perform their duties, and ensure the permanent use of the works under concession, among other obligations. Failure to comply with any of the obligations under the contract or any infringement of these obligations by the concessionaire will be grounds for the enforcement of the penalties and fines established in the tender documents. Breach of contracts entered into by the concessionaire with third parties is included as well. The MOP, in turn, is required keep the concessionaire informed during the expropriation process and, when the MOP is responsible for a delay in the construction stage, the MOP will indemnify the concessionaire by extending the construction term and providing economic compensation if applicable.

On the other hand, the concessionaire will be entitled to collect tolls from highway users as soon as the MOP authorizes highway commissioning. The MOP, in turn, will also be entitled to change the contract as it may deem necessary on grounds of public interest, and to pay any applicable indemnities or compensations; it will further accept or reject any revision of the toll system, its adjustment formula or the concession term for reasons that would so justify it; and, in general, the MOP will have all the powers that may apply under the concession contract.

The contract set forth the establishment of a conciliation commission formed by one MOP representative, one concessionaire representative and one president jointly appointed by both parties. The commission was

responsible for addressing any controversies that arose between the MOP and the concessionaire from the interpretation or performance of the concession contract. Once the commission's intervention was requested by either one of the parties, the commission attempted to reach conciliation between the parties. If no conciliation was reached within 30 days, the requesting party could, within five days, either request that the commission act as an Arbitration Commission or resort to the Court of Appeals from Santiago. In the first case, the Commission acted under the norms governing arbiters and had 30 days to issue an arbitration award, which may not be appealed. This conflict resolution system experienced critical failures (Barrales and Vargas, 2012), which weakened its effectiveness and motivated the reform introduced under the Concessions Act in 2010. Under this reform, the three members of the arbitration commission are selected jointly by the two parties based on lists made by other state agencies that guarantee their aptitude. In addition, as has already been said, a technical board was created to replace, to a certain extent, the old conciliation commission.

During the contract operation term, the requested technical requirements basically cover infrastructure conservation and the operation of related services. The aim of infrastructure conservation is to ensure the highways uphold a certain service standard in line with conservation programs developed annually by the concessionaires, to be approved by the MOP. The most recent contracts have added service requirements for the contract operation stage associated with explicit quality indicators.

The conservation program should include, among other items, the selected conservation policy and the technical grounds for its selection, showing compliance with the service standards required by the MOP, and a timeline of scheduled conservation operations. In regard to service operation, contracts provide for the concessionaire to expedite highway circulation at all times and report any unforeseen circumstances to users in a timely manner. Penalties are associated with infringements detected by the MOP and are enforced as fines in line with contract provisions.

Contracts did not require the concessionaire to start works for capacity expansion in the event of system congestion. This was partly due to the difficulty of enlarging tunnels or expropriating land plots in addition to the land strip that had originally been reserved. However, several concessions have been required by the MOP to perform additional works as requested by the government, such as the inclusion of storm drains, part of the infrastructure of line 4 of the Santiago Metro (Americo Vesputio Sur), among others.

Toll rate system

For the establishment of the toll rate system, the Urban Highway Concession Program used the concession model that had been earlier applied by the MOP for intercity highways, with some major changes intended to manage congestion.

Santiago's urban highway system tolling was established based on the following variables, taken from the tender documents (Engel et al., 1996):

- Approximate traveled length between entries and exits.
- Type of vehicle in order to distinguish the structural damage caused by vehicles on the roadway. The tender documents set three different categories, according to the vehicle's weight and number of axes.
- Time of day, to regulate transport demand and reduce congestion. From the start of urban highways, three types of tolls are distinguished: a base toll for off-peak hours (TBFP), a base toll for peak hours (TBP), and a traffic saturation toll for peak hours (TS). Therefore, three situations can be distinguished: off-peak, peak and saturation, respectively. The tender documents establish a series of hourly intervals for each highway stretch, when the concessionaire can enforce peak hour and saturation tolls. Enforcement of the saturation toll in a certain direction in a specific sector requires that the operation speed of vehicles be less than 50 km/h moving in that direction at any of the segments that comprise that sector during at least four running weeks at the effective time lapse. If these conditions are met, the saturation toll will remain valid for the following time period.
- Traffic direction: this variable identifies the points where congestion takes place and the flows that originate congestion, more precisely. These routes can be penalized so that congestion is reduced and the costs produced by congestion can be internalized.

Therefore, the base toll was conceived to finance infrastructure based on perception studies about a change in the level of service and the will to pay. The congestion-based toll system, which increases the toll value at congestion and saturation hours, aims to optimize infrastructure and discourage the use of infrastructure when the number of vehicles is high. Tolls can be reviewed every 180 days to change the intervals (off-peak, peak and saturation) according to speed and congestion per segment and time band, based on contract provisions.

Toll adjustment is regulated by the tender documents. Contrary to intercity highways, this model set an annual growth equal to 3.5% plus the increase in the general price index to control the congestion arising from the foreseeable evolution of demand over time, the rise in people's income and a growing system acceptance. This decision was based on two factors. On one hand, the toll initially defined as most favorable from a social perspective by government's technical agencies was so high that it would have been fiercely rejected and the concession program could not have been initiated. On the other hand, the progressive toll started at a very low value to ensure users' acceptance of the program, increasing gradually for a significant rise in prices staged over the years as a result of both a toll adjustment formula and the generalization of the saturation toll. For example, the average toll at Autopista Norte Sur started at 20 CLP/km in 2004; by 2016, it reached 64 CLP/km. The average cost for Autopista Norte Sur users in 2016 was around USD 20

per month, which is a considerably good amount considering that this is just one highway. Table 5 and Figure 8 below show toll evolution and the relative percentage increase in the toll for the period 2005-2017.

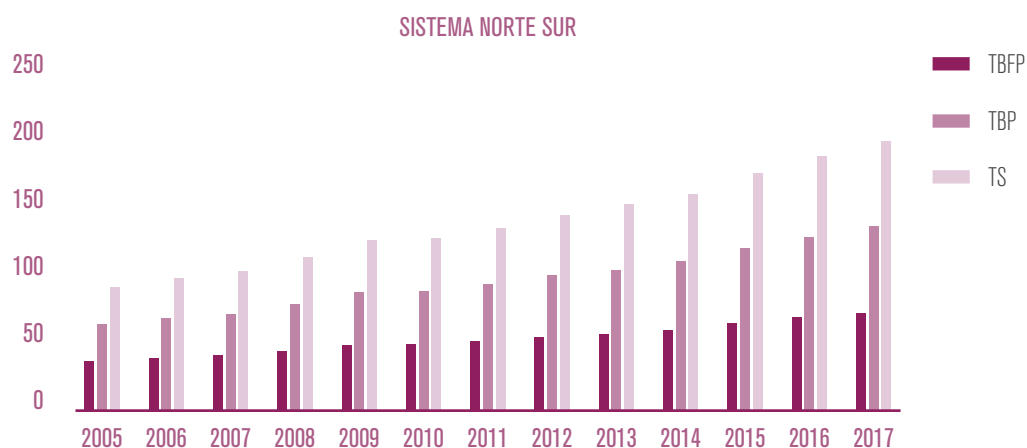
Contrary to the first urban concessions, the contract for Vespucio Oriente, tendered in 2014, only established two types of tolls: off-peak and peak, the latter at a higher price than the former saturation toll, subject to a 1% adjustment vs. the 3.5% under earlier contracts.

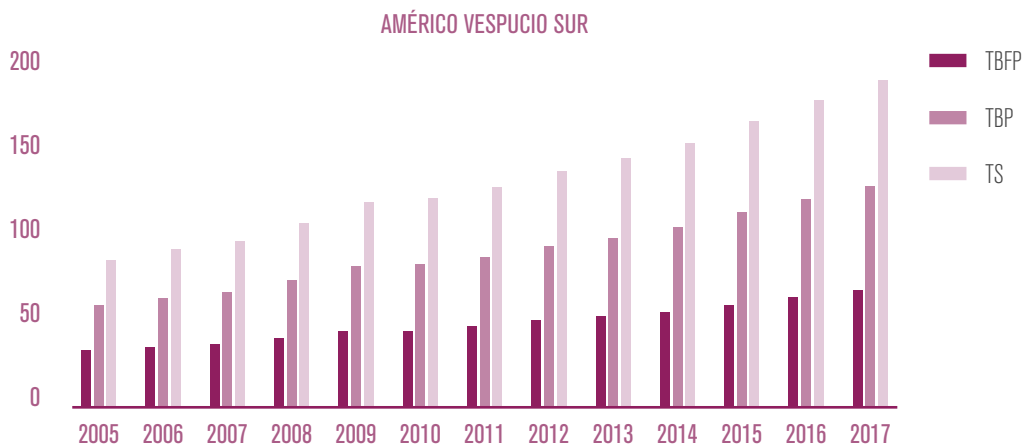
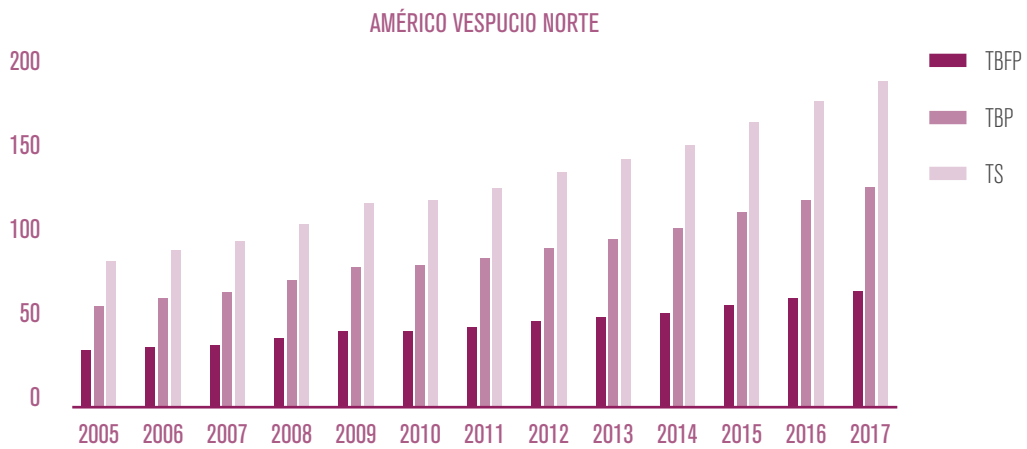
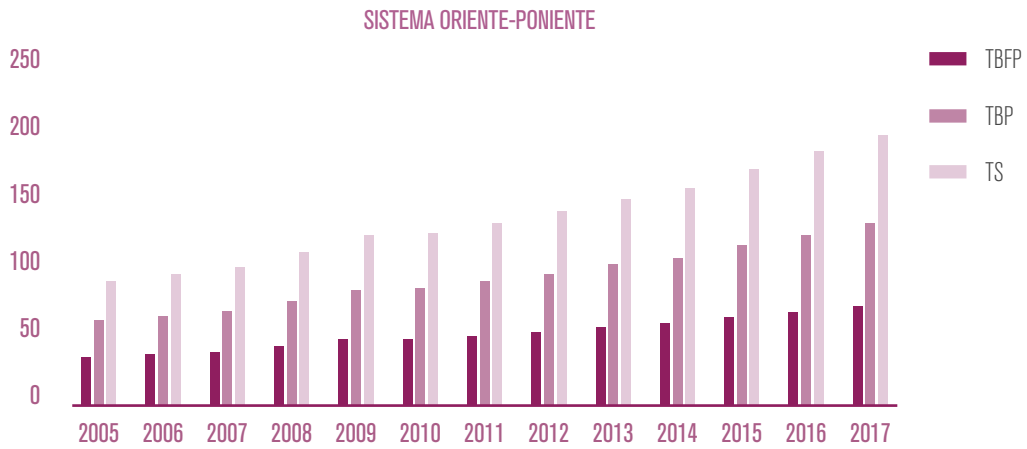
Table 5. Percentage increase of urban highway tolls for the term 2005-2017.

	Increase % / 2017		
	Base toll, off-peak hours (TBFP)	Base toll, peak hours (TBP)	Saturation toll (TS)
Sistema Norte Sur	130.19%	130.19%	130.19%
Sistema Oriente-Poniente	135.71%	130.91%	129.76%
Americo Vespucio Norte	131.26%	131.27%	131.26%
Americo Vespucio Sur	131.26%	131.27%	131.26%
Inflation		44.19%	

Source: Ministry of Public Works, World Bank.

Figure 8. Toll evolution in urban concessions, in current Chilean pesos (CLP) for each year, for the term 2005-2017





Source: Ministry of Public Works.

Risk management and contract modification

A clear definition of how risks are allocated to the different actors involved is critical with any concession contract. In general, the concession program implemented in Chile has established that the risks that can be reasonably met by the market should be transferred to the private sector. Therefore, the state will assume the risks that cannot be diversified or transferred to the market. According to the social market economy current in Chile, instead of offering subsidies, the state prefers to mitigate risks by granting compensations, guarantees and insurance, as in the case of foreign exchange insurance, minimum revenue guarantees, among others. In addition, in the case of urban highways, the state has contributed to reducing the collection risk through legislative measures oriented to offering stronger legal certainty to the concessionaire. Table 6 shows the risk matrix used for urban highways.

Table 6. Risk matrix used for urban highways.

	Type of risk	Stakeholder assuming the risk
Construction stage	Design and planning risk	Concessionaire
	Expropriation risk	State
	Construction risk	Concessionaire
	Demand and revenue risk	Concessionaire, mitigated by the government in some cases
	Operation and maintenance	Concessionaire
	Technology risk	Concessionaire
O&M stage	Regulation and legislation risk	State
	Catastrophe, force majeure, third-party liability	State, only for uninsurable cases
	Foreign exchange hedge risk	Shared
	Collection risk	Shared
	Service change risk	State

Source: Cepeda (2009)

For Sistema Oriente-Poniente, the demand and revenue risk was shared between the concessionaire and the state as the awardee accepted the minimum revenue guarantee (MRG) proposed by the state. In subsequent calls, the tender documents offered the option to purchase this guarantee by making a payment to the state. As a result, no other awardee requested this type of guarantee. The MRG insurance sets a lower band for the revenue guaranteed by the state and an over-profitability equation (upper band), over which the concessionaire is required to share its revenues.

The foreign exchange risk is shared between the state and the concessionaires. The foreign exchange hedge mechanism is designed to cover concessionaires that secure foreign currency borrowing by granting a compensation if the USD/UF rate of exchange shows adverse variations in excess of a 10% margin band against the foreign exchange rate at which

the loan was received. In return, concessionaires will pay for extraordinary revenues when foreign exchange rate favorable variations occur in excess of 10% compared to the original rate of exchange. The first concessions offered this option to concessionaires. At present, the mechanisms offered by financial markets are used, such as currency swaps.

The introduction of an electronic toll collection system created an important risk that had not been considered until then: the billing and collection risk. It originates in the potential use of the highway by vehicles that do not have an authorized tag or that, even if they do, they do not pay their debt to the concession. Two mechanisms were adopted to mitigate this risk. On one hand, section 42 of the Concessions Act set forth monetary penalties for people in violation of the system. On the other, the Traffic Act was amended to allow the MOP to report vehicles that use the highway without a tag to the relevant police courts, from which penalties could be enforced equivalent to a material infraction. The next section will analyze the implications of electronic collection systems in greater depth.

Finally, it is interesting to highlight how the proposed risk allocation structure allows losses and earnings to be shared for a more balanced risk transfer.

Interoperable *free-flow* system

System characteristics

The toll used on urban highways in Santiago is an open system. At the toll gantry, vehicles are charged an amount resulting from multiplying the kilometer rate applicable to the distance associated with this gantry, regardless of the distance actually run by the vehicle. At the beginning, a closed system to accurately identify the kilometers traveled by each vehicle was ruled out because it required a much more complex and costly gantry system. However, at present, it is unclear as to whether this would not have been a better solution. Along these lines, the new Americo Vespucio Oriente (AVO I y AVO II) concessions are assessing a system of effective use—i.e., based on actual traveled distance—that would set up register gantries at entry and exit points.

The decision to implement a free-flow system—a fully automated collection system that does not require the vehicle to stop—was very complicated because never before had a valid interoperable system been used for multiple different concession in the same city. This is one of the most interesting traits of Santiago's urban highway case.

Implementing an electronic collection system required making some important decisions. The first of which was the use of simple and low-cost technology not linked to patents requiring exclusivity so all concessionaires could adopt it mandatorily under the tender documents. The purpose was to ensure interoperability among the different collection operators and the concessionaires. Therefore, the tag (i.e., the payment device placed inside the vehicle) had to work at all concessions with a 99% minimum reliability.

It was decided to implement collection management using a public tag register. The government centralizes the matching information about the tags and the vehicle's license plate (RNUT) associated with each tag. It was also decided that concessionaires should deliver the tag for free to the first users that requested them in the first years. A total of 1.5 million free tags were delivered, whose cost had been included as an additional line in the concessionaire's budget, later recovered by the concessionaire through the toll. After this initial time period, concessionaires started to sell the tags directly to the public.

Each concessionaire is free to set up the toll gantries wherever it chooses, but it needs authorization granted by the MOP. They can also charge the associated average distance according to the km rate. The situation of the toll gantries may lead to users not paying for some stretched along the highway because the expected additional revenue may not compensate the private party for the marginal cost of installing the gantry. The purpose of the concessionaire should be maximizing revenue taking gantry management into consideration (the higher the number of gantries, the higher the associated maintenance costs).

Dedicated Short-Range Communication (DSCRC) technology was used, transmitting data along microwaves between a device installed inside the vehicle (*tag*) and the highway toll infrastructure, comprising mainly the toll gantries along the toll highways. This has been the most widely used technology in the world to implement an electronic toll collection system since the late 1980s (Heras-Molina et al., 2016).

The *tag* communicates with the different toll gantries installed along the trunk highway through short-range waves. These gantries, in turn, are fitted with electronic units that can detect the vehicle. When the vehicle runs under a gantry, the *tag* is identified by the antenna and the *tag* code is read and checked. After the vehicle is detected, a debt becomes effective and is sent to the central data system to process the transaction. The system then makes an automatic payment as the *tag* contains the vehicle data (license plate number, vehicle type, among others).

Occasional users and foreign drivers can purchase a daily pass to use the urban highway network. In 2005, urban highway concessionaires reached an agreement with the MOP to start selling a single daily pass (Pase Diario Único, PDU) as an alternative means of collection allowing clients to use the four urban highways during one calendar day. The selling of a late ticket was also implemented (Boleto de Habilitación Tardía, BHT), using the same system as the PDU, but allowing clients to pay for infractions within a limited timeframe. The daily pass can be purchased at different authorized selling points, such as gas stations, or on the Internet.

Therefore, non-frequent users have two possibilities: prepayment and post payment. If drivers use prepayment, they pay and register their vehicle data along with the day when the pass will be used so that this information is entered on the system. The prepaid pass can be purchased up to 30 days in advance of the day of use. After this term, the pass will expire. The post payment modality lets drivers pay up to 20 days after using the highway network. Both methods have different toll values, with the post payment modality being up to 40% more expensive than prepayment.

Using a free-flow electronic system has significantly reduced travel times. This toll collection infrastructure performs flawlessly up to 160 km/h, so it is not necessary for users to slow down when they pass the overhead gantries. In addition, the system's reliability rates are very high. System availability and accuracy for the performance of electronic transactions is around 99.9%. License plate capture rates by control units are also high, although in the past years quality has decreased as a result of the creative measures taken by violators to avoid license plate identification.

The collection system operates on three hierarchical levels: collection points, operations center and customer service. The collection point is the core component and has the necessary devices to detect vehicles, identify violations, perform transactions, etc. The information gathered at the different collection points is transmitted to the operations center, where transactions are validated. Similarly, the operations center computers feed the collection points with the information they need to work. Finally, the customer service system bills, promotes and distributes tags; tracks and collects the debts from highway use violators, among other functions. Information flows among these three hierarchical levels thanks to a communications system that also handles other features, such as emergency telephone calls operation and traffic management.

One of the things that was not initially taken into consideration was the establishment of a centralized billing system. Therefore, each company issues the bill to the users of their concession, which is a significant drawback for drivers who have to pay monthly as many bills as there are concessionaire companies on the network. Concessionaires have worked on an initiative called *TAG-Red* to integrate billing on a single platform. However, no agreement had been reached.

The reason why business interoperability has not been reached spontaneously is that each company has its own business policy and integrating themselves into a common system requires them to reveal a strategic aspect of their business and share information with competitors. At present, a project is being developed so that each company can provide service to the rest for users to interact with a single operator. The goal is to reduce the burden on users of paying multiple bills.

In regard to the payment mode, contrary to other countries, most users receive the bill and pay the company directly either in cash or at special payment portals. These have specifically been designed for cultural reasons, as the use of this type of payment means is not so common in Chile. Only 20% to 25% of users have linked a credit card or a checking account for automatic payment.

Reporting of offenders

One of the main problems of the *free-flow* system is that service for users who fail to pay cannot be discontinued as there are no barriers to block vehicle access to the highways. Therefore, there are many forms in which toll payment can be eluded, such as not having the teletoll device in the car or disconnecting the *tag*. In these cases, users are classified as system violators.

A key element for the good performance of the *free flow* system is a legal and administrative framework that is effective for reporting offenders. This requires involvement and suitable coordination of the state, the judiciary and law enforcement and security powers in Chile. This country, however, has an important advantage compared to others in the sense that foreign vehicles, which are the most difficult to report, represent just two out of 1000 vehicles that use the urban highways. This makes it easier for the *enforcement* policy to focus on vehicles with a Chilean license plate.

Violators who do not have a tag or a daily pass can in turn be divided into vehicles whose license plate is not identifiable—it is estimated that a large portion of this type of fraud is committed by cabs and buses—and identified users who fail to pay. For example, on Sistema Norte-Sur, these violators account for approximately 3.5% of total vehicles. Identified users who fail to pay (3.5%-4%) are easier to track down because the concessionaire can deactivate their *tag*.

Under the current enforcement system, failure to pay triggers a penalty equivalent to five times the owed amount, which increases 15 times in case of recidivism. In addition, the concessionaire can charge a higher toll up to a maximum value of 20 UTM (1UTM = CLP 46,693.00). These mechanisms seek to discourage toll payment evasion. Of note is the fact that income from penalties does not form part of the concessionaire's income but are tax-deductible.

The procedure to enforce the penalty calls for inter-administrative collaboration. First of all, the toll highway concessionaire reports the violation to the MOP, which, in turn, reports it to the police court of the municipality where the violation took place. The municipalities crossed by the urban highways have their own tag offices to manage free-flow tolling and penalty enforcement.

In the event of non-payment, the information is reported to a local court, which will forward it to the register of unpaid penalties. Municipalities are not authorized to renew the vehicular circulation permits of the license plates entered on this register. As this permit needs to be renewed on an annual basis, this measure should be an important incentive for penalty payment because the permit will not be renewed to defaulting vehicles.

The enforcement system designed, although strong, has not worked as expected, for several reasons. First, courts have reached a saturation point that causes long process delays. Second, some municipalities turn a blind eye to unpaid penalty registries as they do not want to lose the income represented by the renovation of motor vehicular circulation permits. On top of this, each vehicle is free to renew its permit in the municipality of its choice. The third weak point is that enforcement authorities in Chile pay less attention to these problems at present because of the increased crime rate recorded in the country in the past years. The fourth cause is that no centralized database exists with all motor vehicle circulation permits already issued to help identify the vehicles whose license plate should not be renewed. This is due to the existence of more than 30 communes in Santiago metropolitan region, and to the distribution of competencies among the different public administrations and highway concessionaires. Another problem is that the current Act allows

new vehicles to circulate up to five days without a license plate, rendering them unidentifiable to enforcement systems during that time period.

It is clear then that for a free-flow system to work properly all stakeholders need to feel involved and act in sync. In the case of Chile, stakeholder involvement was very strong at first, but now it has weakened as a result of the circumstances described. Over the years, this has prevented the improvement of enforcement efficacy, although fraud growth has been successfully deterred to make the system sustainable.

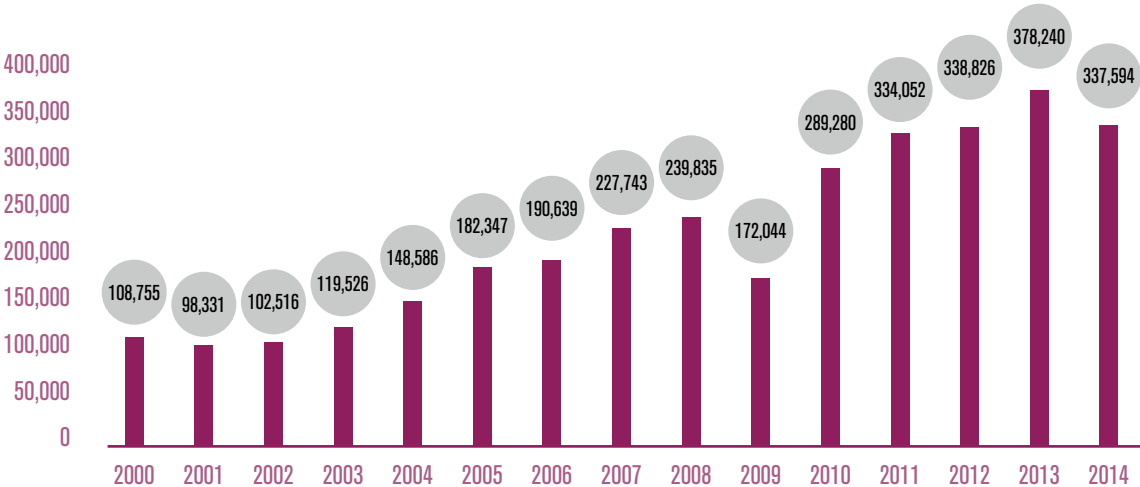
Contract evolution: revenue forecast and changes

Highway traffic and revenue

Since their inauguration, urban highways have shown a sustained upward trend in terms of traffic that peaked in 2007 as a result of the negative impact of Transantiago on public transport mobility and a rise in family income. This was accompanied by a growth in the motorization index, as shown in Figure 9.

In the third quarter of 2008 and throughout 2009, vehicle flow decreased as a result of the world crisis, which also originated an abrupt drop in car sales (see Figure 9). However, it was heavy-duty vehicle traffic, much more sensitive to the country's industrial activity, which fell most sharply. Although the recession caused by the economic crisis in 2008 and 2009 had a certain impact on concessionaires' revenues, the upward traffic trend recovered quite quickly.

Figure 9. Evolution of car sales.



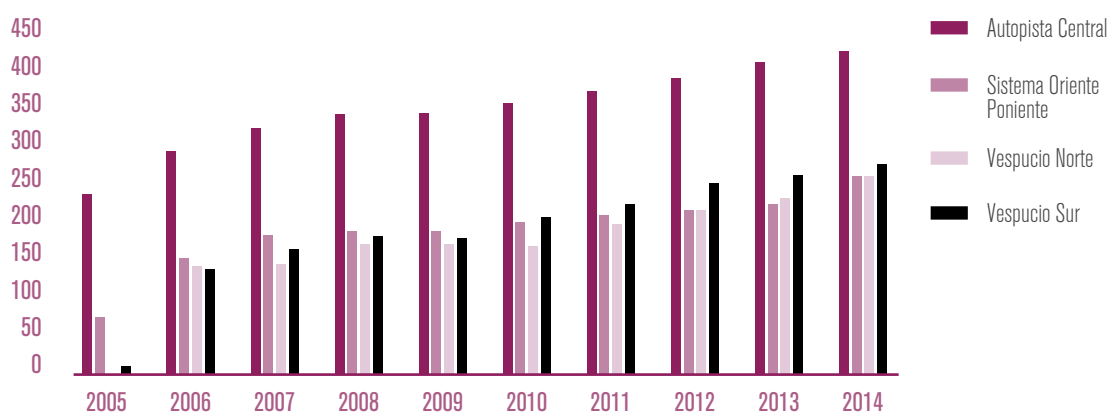
Source: ANA Report – December 2013. Vehicles include passenger vehicles, SUVs and business vehicles.

Urban highway results were similar after the earthquake in February 2010. Although transportation infrastructure was fairly resilient, the Vespucio Norte highway sustained detachments and four bridges were damaged.

According to MOP data, the cost of repair works, including infrastructure reinforcement jobs, was USD 15.5 million, taking about eight months to complete. In addition to investing in bridges, the concessionaire had to invest around 1 million UF, roughly equivalent to USD 44 million, to adapt and improve infrastructure to pre-earthquake levels.

The earthquake impacted traffic over the second quarter of the year, mainly because of closed highway points. However, during the following months this process ended and the growth pace recorded in prior years was gradually regained.

Figure 10. Chilean urban concessions' annual transactions.



Source: Urban Highways' Reports

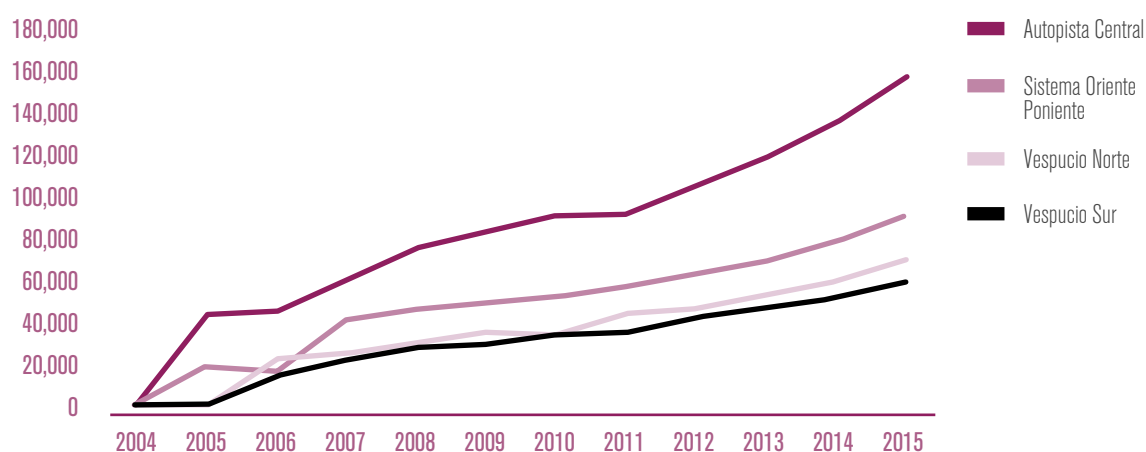
Concession revenues are associated with traffic growth and toll rates, although revenue is also collected from lost or damaged tags and supplementary business authorized by the MOP. From the start of the concession, revenues have been rising more than traffic as a result of a growing toll rate review system. In addition, concessionaires have been adjusting the location of overhead gantries to increase revenues and the saturation rate has been enforced more frequently over the years because of increased traffic congestion. In general, demand elasticity to the saturation rate has been lower than originally expected.²

The economic crisis in late 2008 and 2009 did not have a significant impact on revenues thanks to the toll rate review system in place and the fact that the recession hit hardest the goods traffic, which accounts for a small percentage of urban highway traffic. After the earthquake in 2010, the abandonment rate of regular highway users was high because of repair works and service problems on multiple roadway sectors in both directions.

2. The study conducted by de Grange et al. (2015) analyzes demand elasticity to Santiago urban highway toll rate increase levels from January 2009 to December 2011. Although estimates differ significantly between highways (from 0.044 for Vespucio Sur to 0.47 for Autopista Central), in all cases values can be considered to be highly inelastic.

This situation, along with the temporary suspension of toll collections in the damaged areas, led to a drop in income in 2010 compared to original estimates. However, the final overall impact was smaller (see Figure 11) thanks to the ongoing support provided by the special insurance policies taken out to cover for these circumstances.

Figure 11. Urban highways' operating income in M\$ (thousands of Chilean pesos).



Source: Urban Highways' Reports

Figure 11 shows that Autopista Central records the highest level of income, followed by Sistema Oriente-Poniente. Vespucio Norte ranks third and Vespucio Sur is the last highway on the table. This income includes not only revenues from tolls, but also from the collection of system violation penalties and other operating income.

Mean income rose 8.2% for the period 2010-2015, from 6.7% to 12.2% according to the impact sustained after the 2010 earthquake. However, mean traffic growth was 5.8%, ranging from 5.1% to 8.1%. These figures match quite closely the original estimates by concessionaire companies.

Contract changes

This section will describe some of the most important changes to urban highways' contracts in Chile. In all Chilean road concessions as a whole, the average renegotiated amount of additional investments with respect to the total investment is much higher for urban highways than for the rest of the roads, accounting for 35% against 23% for Ruta 5 and 17% for other intercity roads, (Engel et al., 2009). In general, changes to Chilean urban highway contracts relate to:

- Infrastructure improvements over the original project
- Additional works not planned in the original contract
- Changes to contract toll rates or provisions
- Revisions to the works schedule or commissioning dates.

In some cases, the cost of infrastructure improvement works was offset by additional income generated by these improvements. However, for these cases the MOP established an account that, according to actually collected revenues, created the possibility of extending the contract for up to three more years. MOP paid for other additional works with limited potential for increased income generation, such as the construction of storm drains.

Some scholars criticized the way in which these contract changes and revisions were implemented. According to a study by Engel et al. (2009), 35% of investments in urban highway construction and extension works were agreed upon by bilateral negotiations without any independent third-party review and without the renegotiated amount being the result of competitive bidding. The CCOP, in turn, contends that there are institutional screening mechanisms in place that require approval by the Ministry of Finance and the National General Comptroller Department.

It is worth noting that these criticisms were heard by the Executive Power. As a result, the amendment to the Concessions Act in 2010 included a new framework for calculating the value of additional investments in excess of either 5% of the official works budget or 100,000 UDF, using competitive bidding, and a methodology to determine economic compensation for the concessionaire. After this, concessionaires have been required to tender for additional works both under new and existing contracts, as in the case of the improvement works program called “Programa Santiago Centro-Oriente” on the Sistema Oriente-Poniente concession.

Contract changes to the Sistema Oriente-Poniente project started shortly after the final contract award. The opposition from Pedro de Valdivia Norte neighborhood inhabitants, who would sustain a significant impact, gave rise to a change in the route approved in 2001, under which the tunnel under the Mapocho River was extended from 4 km to 7 km.

Similarly, by late 2003, before final project commissioning, and at the request of Las Condes and Vitacura municipalities, a modification to vehicle and pedestrian connections was implemented under a new project called “Enlace Estoril-Tabancura-Las Condes.” Extraordinary costs to be incurred by the concessionaire would be borne by the MOP and the municipalities.

Other important revisions to the Sistema Oriente-Poniente project were the change to the system route through Bellavista and Costanera Sur works. These were included in the “Programa Santiago Centro-Oriente” to enhance the quality of the highway connectivity with the rest of the city center and eastern sectors and increase the capacity and safety of the existing connection works. In 2007, additional works were commissioned for the Sistema Oriente-Poniente to improve concession safety and its location in a strategic urban environment. These works included a change to Tabancura Norte, San Francisco and La Dehesa road junctions; improving the San Francisco Axis; cleaning the Mapocho River bed; river embankment works between San Enrique and Tabancura; reopening the Lo Saldes bridge; changes to river embankment works at Sector Walter Martinez, Ribera Norte and Caletera Sur Cerro Navia for an approximate amount of USD 18.4 million.

The most significant modification, valued at USD 500 million, were the works to improve the Perez Zujovic roundabout and surrounding connectivity. This project was introduced as an add-on to Sistema Oriente-Poniente (Costanera Norte) to address a bottleneck at the roundabout created by traffic growth at the Kennedy Axis, which was generating lower capacity of nearby roads and up to 40% longer travel times according to MOP data.

This process started in 2009 with Kennedy Avenue tunneling and the subsequent elimination of the roundabout, giving continuity to Vitacura. In 2012, work was started on a tunnel along the Kennedy Axis roadway, and its surface space was used as an urban road for the area inhabitants. The new Perez Zujovic bridge was opened to vehicle traffic in October 2015.

During the construction of Americo Vespucio Norte, the concessionaire was required to implement modifications to the original project's works and services, along with new investments, including: modifications and improvements to road junctions, introduction of footbridges, service roads, local roadway improvements, new rainwater drain and canal designs, for an estimated value of USD 104.1 million.

The major modifications to Americo Vespucio Sur originated in the decision to transform plans for a BRT located along the highway median strip into a metro line. Proposed changes to the original project aimed to make room at a subgrade level for metro works and lanes for the Santiago Metro lines 4 and 4A along the median strip for the public transport corridor.

During the construction of Sistema Norte-Sur, modifications and improvements to road junctions and overpasses, enhancements to footbridges, introduction of storm drains as part of Santiago's Rainwater Sanitation Master Plan, among others, were established, for an estimated value of USD 137.1 million.

In addition, several studies were developed. They included: "Improvement to the exit to Ruta 5 at Viceta junction" ("Mejoramiento de Salida a Ruta 5 Sur en Enlace Viceta") to improve connectivity, road safety and service standards at Sistema Norte-Sur; and "Improvement to Sistema Oriente-Poniente's connections with Avenida General Velasquez" ("Mejoramiento de las conexiones del Sistema Oriente-Poniente con Avenida General Velasquez"). Similarly, the concessionaire was commissioned to provide construction, preservation, maintenance, operation and exploitation services for two new structures to the west of the Maipo Bridge, and their northern and southern access points. It was also commissioned to draft and develop the final engineering project for a road solution to Quilicura Interchange to increase its capacity and improve the connectivity of the highways intersecting at the junction.

Integration with the road and urban transport system

Integrating the different urban highways in Santiago with public roads is another challenge that was identified after several years of service. One of the main successful actions was reserving the necessary land strips well ahead of time to construct the highways. As a result, it was possible to plan the access points to the urban network in a timely manner with sufficient resources.

Urban highways cannot be considered to be detached from the rest of the urban roads or the public transport system, but rather they should work as an integrated whole. One of the main problems detected in this regard is traffic congestion at the highway trunk caused by lines at the exit lanes, making the city's urban roads collapse. In many cases, this is caused by traffic lights on highway exits and the lower capacity of urban roads compared to highways. Some solutions that have been proposed for this problem are ensuring continuity and preference for highways over other urban roads, especially during peak hours, along with adopting any necessary measures to avoid congestion on side roads with access to the highway.

Another problem is that urban integration standards used to design some projects do not meet the levels of quality currently acceptable to society. Ideally, highways preserve the continuity of the urban scene, reducing as much as possible the barrier effect and enabling the city to connect on either side of the highway. However, some projects worked differently. For example, Costanera Norte isolated the Independencia commune, a medium-to-low income municipality at the center of Santiago, creating more traffic congestion on the bridges that cross the Mapocho River and cutting off this commune from the rest of the city.

Achieving good urban integration poses another problem, which is the inadequacy of existing space, especially in areas of higher building density. When the author of this work spoke with Independencia municipality officials, they recognized that the negative effects of Costanera Norte on Independencia were not attributable to MOP's failure to ask for their advice, but because those responsible for commune planning and transport were not well prepared to understand the potential impact of the project on their municipality.

Communes have also used public consultation procedures to propose ideas or modifications to projects, although the final decision was always made by the MOP. In some cases, the MOP decided to include the modifications; in others, it did not. Upon works completion, some initial problems concerning urban integration were also solved. In general, high-income communes, such as Las Condes and Vitacura, were the most active in terms of reaching an agreement with concessionaires to implement environmental and integration improvements.

Santiago's urban development is the result of the city's large extension. However, this was a chaotic process deployed at individual city sites, which did not facilitate the use of public transport and was an additional factor with an impact on mobility along highways.

Despite regulations supporting densification, Santiago, like many cities in the world, continues to expand across low population-density neighborhoods without coordination with other sector policies, such as mobility. In addition, the city has not struck a balance between land use and the economic activity to harmonize transport flows. Jobs continue to concentrate in the center and northeast city areas, while the majority of the population lives in the city's south and west regions.

Mobility should be managed with the aim to integrate public and private transport in the most reasonable manner possible and create synergies between these two modalities. From the beginning, highways and public transport systems lacked coordination. A dissuasive parking site at Domínicos

(the first metro line 1 station) so that a portion of drivers could make a combined trip between their private vehicle and the metro was evaluated, but the estimated financial return did not meet expectations and the idea was rejected in the end. However, this could have been a very interesting initiative from an economic and social perspective.

Santiago's public transport system has not performed its original function in full and this has also contributed to traffic congestion on highways. Some metro lines are near to collapse, so people are not willing to use them and many individuals have turned gradually to private vehicles to the detriment of public transport. Although it may seem paradoxical, the best ally of urban highways is a good public transport system that can attract users and allows those individuals without any other option the possibility of driving on highways free of traffic congestion.

In regard to road safety, one of the main problems identified is the disparity of speeds between the different vehicles that use the highways, leading to a very large number of vehicle collisions. The idea of enforcing a minimum speed limit is being considered in order to solve this problem. In addition, more passive safety features should be in place, especially on public transport vehicles, such as urban buses traveling on highways that are not equipped with safety belts and carry many standing passengers.

One of the main questions for the future is how to solve traffic congestion and bottlenecks when highways collapse. The solution should cover a combination of measures geared toward improving infrastructure and current public transport services, including a reasonable extension of the metro system; the promotion of actions to increase traffic flow at highway bottlenecks; the establishment of a more rational toll rate system; and the encouragement of greater city densification and a higher activity balance across the urban territory, for example, by changing the location of certain services, such as health care and education, which generate a large number of trips. Another measure that could tackle the gradual rise of the vehicle fleet in Santiago is the concessioning of other urban roads or even the implementation of zonal tolls in the city's downtown area.

Impact on public opinion

Up until 2006, public works concessions enjoyed a very positive perception by society, as a model ensuring progress and improvement for quality of life of the Chilean people. This perception, however, changed over time as a result of some situations that came to light, such as CGC's public officers receiving extra money in the form of salary overpayments (the GATE case) and overpriced projects, like the prison program. Moreover, the Chilean society started to criticize Michelle Bachelet's second government, which was her second term as the Concertación's social democratic party leader, for implementing policies some considered too liberal.

One of the criticized policies was the promotion of public works concessions, particularly urban highways. The main reason for this gradual decline in favorable public opinion was that these concessions started to experience high levels of traffic congestion caused by traffic growth, which coincided with rising toll rates resulting from the above described in the overview of the toll system and the progressive generalization of saturation rates. Contrary to original expectations, these rates did not guarantee the free flow of vehicles, which led to a rise in criticism from society against a system which, ten years after being commissioned, could mean a threat to its future acceptance.

Service level and tolling

Toll highways initially succeeded in attracting traffic without decreasing the expected service level. Traffic congestion occurred at specific times, normally associated with bottlenecks at some access points. However, traffic levels skyrocketed in 2007 because of the negative initial impact of the Transantiago project's implementation, leading a significant portion of potential public transport users turn to private vehicles for their trips. The rise in family income levels, which increased the number of people who could buy a car, aggravated this situation.

When urban highways were inaugurated, the government claimed that one of the reasons for the granting of these concessions was high service levels. Unfortunately, these could not be sustained over time. No clause in the contracts, however, provided for any government obligation to guarantee fluid traffic flows. Concessions awarded after the passing of Act 20410 are required to meet service levels and technical standards as set forth by the tender documents over the full concession term. In spite of this, required service levels apply mainly to standards that impact infrastructure maintenance (lighting, pavements, among others) and operation (emergency rescue, telephone customer service, among others) and not highway congestion levels.

The MOP has been addressing congestion problems in part by commissioning additional works to help alleviate bottlenecks, such as the junction improvement at the Pérez Zujovic roundabout, and better integrating highways with urban roads. Despite these efforts, improvements have always lagged behind city traffic growth.

One of the main lessons learned from the urban highway case is that urban mobility management cannot be solved just by building highways without improving public transport supply and quality at the same time. The experience of mixed public-private transport concessions on the same corridor, along with the search for synergies with public transport, are essential components to ensure good system operation over time.

Acceptability of toll rates

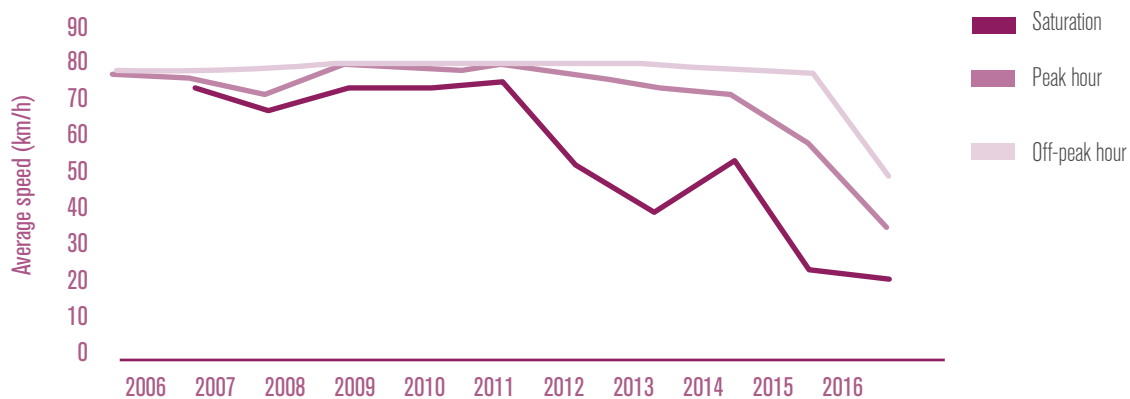
When urban highways came into service, tolls were enforced on existing corridors which, although they were toll-free at the time, had awful service levels at peak hours. Despite the introduction of toll rates, public

opinion was positive because the new works substantially improved travel times. In addition, the price of initial toll rates was reasonable compared to the advantages offered in terms of road safety, travel-time savings and comfort (MOP, 2016).

When urban highways were inaugurated, the time-saving value for users was higher than the price they had to pay. The problem was that, over the years, this price rose (see Table 5 and Figure 8), while the added value perception weakened, in line with an increasing level of congestion at peak hours, when the toll rate is more expensive.³ As described in previous sections, the urban highway toll rate system includes three rate bands (off-peak, peak and saturation) based on congestion levels. The peak hour toll costs about 1.9 times the value of the off-peak toll. This ratio increases to 2.9 times vis-à-vis saturation conditions. The purpose of this pricing scheme was to optimize infrastructure use. However, owing to small amounts being invested in alternative infrastructure, the willingness to pay increased, but, in practice, the expected effects of congestion rate management could not be seen. The enforcement of high rates that cannot mitigate congestion is being strongly criticized by society (Fazio, 2016; Vergara-Novoa and Sepúlveda-Rojas, 2017). For example, Figure 12 shows how the average speed of category 1 vehicles (cars and vans) decreased over 10 years at different intervals (off-peak, peak, saturation) in the morning of a business day at the entrance of the tunnel that runs beneath the river (gantry P4 collection point) in west-east direction. It should be noted that the saturation rate started to be enforced in 2007 on Sistema Oriente-Poniente.

3. During the second survey conducted to measure satisfaction with urban concessions (2012), users' perception of the quality of service compared to the toll price paid in the previous month was assessed. For all highways, except for Vespucio Sur, which showed 29%, from 40% to 45% of users perceived a lower quality of service relative to the amount they paid, while a similar percentage considered that service quality was in line with the toll price.

Figure 12. Evolution of average speed of light vehicles at different intervals on Sistema Oriente-Poniente for the period 2006-2016



Source: Ministry of Public Works

In addition, this conflict sparked heated debate on social networks in the recent years, bringing the issue to the forefront of political and mass media news.⁴ This state of affairs reflects the loss of a significant amount of the social support for concessions. This situation could lead to a social collapse of the system exasperated by the long concession term still ahead and the expected continued upward trend in toll prices. On the other hand, improving public opinion has not been one of the main priorities of concessionaires. At first, when projects were popular, they did not need it; later, when they did need it, it was already too late.

Other aspects

From 2009 to 2012, the MOP conducted surveys to measure the drivers' satisfaction index. However, the surveys were not performed after that, probably due to the decline in social perception.

The survey conducted in 2012 already showed a decreased average satisfaction level among urban highway users, who rated traffic congestion levels and travel times as poor. Other attributes that received negative ratings were the billing process and the insufficient payment points; user information about highway risks and traffic congestion levels; and lateral and central safety barriers in risk areas.

In regard to satisfaction assessment based on the reason for making the trip, the worst rated trips were round trips to and from work, while trips showing a more positive rating were those connected with tourism, leisure time or social visits. This suggests that user rates are the lowest when travel times due to traffic congestion and highway usage are the highest.

4. See CNN Chile March 19, 2018: Protests against tag and toll collection stall Santiago urban highways (<http://www.cnnchile.com/noticia/2018/03/19/protestas-por-co-bro-de-tag-y-peajes-pa-ralizaron-autopistas-urbanas-de-santiago>); La Nacion March 19, 2018: Protest against TAG system caused havoc on urban highways (<http://lanacion.cl/2018/03/19/videos-protesta-contra-sistema-tag-causo-estragos-en-autopistas-urbanas/>); and ElMostrador, April 17, 2018: Furious car drivers: the fight against tolls and the Tag (<http://www.elmostrador.cl/noticias/pais/2018/04/17/auto-movilistas-furiosos-la-lu-cha-contra-los-peajes-y-el-tag/>).

Project financing

Private financing fostered by the Concessions Act has had a very important impact on the public infrastructure volume that could be developed in Chile. Since the passing of the Public Works Concessions Act, investment importance has grown to reach 4.5% of GDP. Concessions have been financed mainly with debt, of which 70% consists of a public offering of securities. The financial liabilities of Santiago urban concessions accounted for 43% of the total.

Urban concessions were financed through project finance schemes with special purpose vehicles that received capital from sponsors and bank debt, or issued bonds mostly purchased by pension funds. Originally, highway concessionaire companies' shareholders were construction companies, mostly international. After constructing and commissioning the highways, they sold their share to different types of investment funds. The main shareholders of the first concessions awarded were Skanska-Dragados for Norte Sur Axis, Hotchief for Autopista Vespucio Norte; Sacyr and Acciona for Vespucio Sur, and the Italian Impregilo for Costanera Norte.

The financial structure has changed as projects were being completed and the uncertainty as to traffic evolution disappeared. On Costanera Norte, Impregilo sold an important portion of its share to Atlantia, another Italian company, which later sold an important percentage of its share to a Canadian fund. Abertis, in turn, acquired an increasingly large share of Autopista Central. First it purchased Dragados ACS's share after which it acquired Skanska's share. Some years later, Abertis sold its 20% share in its Chilean branch to a sovereign fund from Abu Dhabi.

Most urban highway projects were financed with bridge loans that were later refinanced through bond issues guaranteed by monoline insurers. According to data from a report developed by Humphreys (2011), the Vespucio Norte Express highway had an A-rated priced debt stock of CLP 305 billion. The monoline that secured the bonds was MBIA, whose rating subsequently dropped to B3. The Vespucio Sur highway's rating was A- and its priced debt stock was CLP 102 billion. The insurer was XL Capital Assurance Inc., rated as A2. Autopista del Eje Central was rated AA- and its volume of priced debt was CLP 345 billion, guaranteed by MBIA like in the case Vespucio Norte. Finally, Costanera Norte was rated AA+ and its debt stock was CLP 225 billion. In this concession, the Interamerican Development Bank (IDB) guaranteed 15% of the debt. The concession term, normally 30 years, is longer than bond duration, which gives room for refinancing capacity in the event of need for liquid assets.

Although monoline insurers have witnessed a fall in their rating as a result of the financial crisis—in many cases below the unsecured original issue rating—they still retain control over the debt, which, in many cases, has prevented refinancing. For example, the MBIA monoline has not allowed a secured bond issued by Autopista Norte-Sur to be refinanced because the insurance contract granted MBIA the possibility of vetoing the renegotiation.

Until now, concessionaire companies have shown a good capacity to meet debt service. In 2014, the EBITDA of these companies generated on average 7.5 times their outstanding financial liabilities, ranging from at least 4.0 times up to 15.8 times. In addition, the repayment capacity of concessionaire companies is reinforced by the requirements by bond insurers for these companies to keep reserve funds to meet the closest coupon payment maturities. This is how in 2014 their cash accounts averaged close to five times their respective outstanding financial liabilities, as a maximum ratio 5.4 times in 2009 and a minimum ratio 3.2 times in 2012, according to Humphreys (2015).

Conclusions and lessons learned

Overall, the urban highway program should be considered highly successful from different standpoints. The development and standard of living experienced in the past years in Santiago would not be conceivable without the investments made in transport infrastructure, of which the urban

highway system is one of the fundamental building blocks. From the point of view of financial viability, concessions have been a total success, providing society with infrastructure in a very short time with little monetary contribution.

Important lessons can be learned from this study case, both from what has worked and what can still be improved. One of the most interesting lessons is that citizens' sensitivity to paying for infrastructure use depends on the service level they are given. When toll rates were implemented on free infrastructure there was no social protest because users enjoyed time-saving benefits in return. Over the years, however, increasing traffic congestion, accompanied by higher and higher toll rates, has led to strong social protests, which is threatening the system's prestige and even its future viability.

Another lesson is that constructing highways in a big city is never a solution to mobility in the long term if it is not supported by public transport promotion policies, private-public transport integration, urban densification and a balanced distribution of land use across the territory. The Santiago case shows that it is key that all these policies be coordinated to attain good mobility. In this framework, it is necessary to highlight the importance of the role of public and non-motorized transport in improving mobility. Incentives need to be aligned to ensure that any trips that can be made using these alternative modes of transport do so. In addition, better road connections between highways and secondary roads should be developed, efforts to reduce the barrier effect of highways should be made. Moreover, dissuasive parking sites connected with the metro lines should be created.

It also seems reasonable to issue joint call for tenders for public and private transport to facilitate integration between these two modes, allowing for cross-subsidies. In this regard, it seems fair that the government sets urban concession rates and the concessionaire provides the service using the infrastructure and receives payment in return. The Metropolitan Region mobility policies would then be harmonized and managed by a single authority covering all stakeholders. This authority could also channel cross investments from transport systems with greater externalities toward more sustainable systems for overall system improvements.

Another very important element that will be acquiring more and more relevance is the environment. Any new action and modification to existing roads need not only be subject to applicable environmental assessment processes, but should be accompanied by policies intended to reduce atmospheric and noise pollution, which are particularly problematic in Santiago, but also affect large cities in general. In order to meet citizens' demands in this regard, public participation and satisfaction survey procedures play a fundamental role and should be conducted by public authorities and concessionaire companies. Any urban concession design should include a system that enables early citizen participation and strong interaction with the community from the very start of the concession.

The electronic collection system in place is one of the program strengths. Santiago has shown that different concessions can coexist with a common interoperable collection system. The achievement of business interoperability

among concessions, however, is still pending. An interesting lesson in this respect for other countries is that business interoperability should be a requirement in the tender documents from the start.

In spite of the above, the electronic collection system is highly sensitive to the fraud reporting system, in terms of a procedure that discourages fraud and works smoothly. In this sense, the success of urban concessions in Santiago is not necessarily replicable in other countries with a high percentage of foreign vehicles, especially because Santiago enjoys the advantages of the island effect. When developing urban highways in other metropolitan areas, the local city characteristics must be analyzed to adjust the lessons learned from this case to the particulars of that area.

In terms of surveillance and enforcement, although Chile has a strong and well-structured legal framework, there are still weaknesses in practice. Operational feasibility is flawed because the different systems involved, such as courts and the police, lack adequate technical and human resources. A key element for enforcement to work is providing the state and the judiciary with a clear support incentive. In addition, the need to improve coordination between public agencies to resolve existing differences mainly in the enforcement domain, especially between the communes and the MOP, should be emphasized.

Another significant element to promote urban concessions is the fact that in a city setting changes occur very quickly, so it is extremely difficult to take into account unknown contracts that may be signed in the future. One clear example is rate policies. Urban highways have shown that it is inefficient to set a rigid pricing system and that it may originate strong social protest. Another example is the need to introduce additional works for mobility improvements after the contract has been awarded. In addition, regarding highway capacity, the potential scenario posed by collaborative economy and autonomous vehicles makes the future even more uncertain. Based on all these circumstances, contracts should be more flexible and separate rate policies for users from service payment to concessionaires. Moreover, rather than attempting to anticipate uncertainty, contracts should focus more on how to manage uncertainty—rise in demand, technological change, new city requirements, among others—in the fairest and most efficient possible manner.



National Fiber
Optic Backbone
Network

General project framework

- Regional context
- Evolution of the telecommunications sector in Peru
- Regulatory and institutional framework
 - Public-private partnerships (PPP)
 - Telecommunications systems
 - Stakeholder institutions

The project: National Fiber Optic Backbone Network (Red Dorsal Nacional de Fibra Óptica, RDNFO)

Contract tender and award

- Pre-existing studies
- Access to the tender and bidder's prequalification processes
- Tender award and valuation mechanism

Income sources and allocation of risks

- Income, rate structure and demand risk
- Other project risks

Contract management

- From high- to medium-voltage
- Rules applicable to property and real estate
- Setting of payments to access complementary facilities

Project funding

- Partners that drove the project forward
- Debt structure
- Trading bonds on the New York Stock Exchange (NYSE)

Conclusions and lessons learned

General project framework

Regional context

Peru is the third largest country in South America, after Brazil and Argentina. It covers 1,285,215 sq. km and ranks among the 20 largest countries in the world. In the past years, Peru has become the fourth most populated country in Latin America, with just above 31 million inhabitants. The major factors favoring this situation are, on one hand, a high rate of natural increase and, on the other, a marked predominance of young population in its demographic composition.

Figure 1. Total population growth; Latin America and the Caribbean; Peru; 2000-2016



Source: World Bank

Peru is divided into 24 departments and one Constitutional Province. Despite this large fragmentation, 61.4% of the population was distributed across only seven departments in 2015: Lima, La Libertad, Piura, Cajamarca, Puno, Junin and Cusco. The largest departments are located in the Peruvian Amazon—Loreto, Ucayali and Madre de Dios—and cover almost 50% of the country's area. However, only 9.4% of the country's total population live there. Given the lack of opportunities for the people in Peru's rural areas, the country has experienced a mass migratory movement from the countryside to the city, and from the jungle and Sierra to the coast. Consequently, human concentration increased in urban areas, particularly in Lima, the capital city, where 28% of the population lived in 2015.

Table 1. Main cities in Peru.

City	Department	Population
Lima	Lima	8,890,792
Arequipa	Arequipa	869,351
Trujillo	La Libertad	799,550
Chiclayo	Lambayeque	600,440
Iquitos	Loreto	437,376

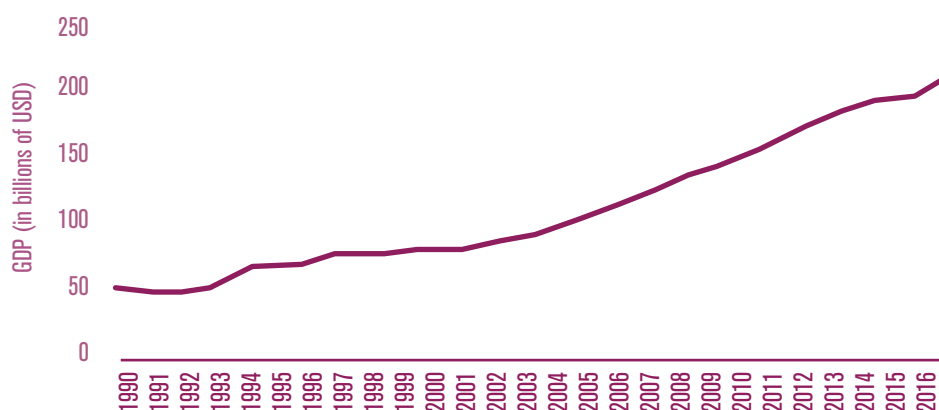
Source: Estimates for 2015. INEI.

Over the past decade, the Peruvian economy showed a remarkable growth potential, the GDP almost doubled from 2005 to 2016 in a low-inflation context. This economic thrust led to a large reduction in poverty indices (moderate¹ poverty fell from 43% in 2004 to 20% in 2014), along with strong employment and income growth. At the same time, however, the foreign economic crisis began, leading to a 2.4% growth rate in 2014, the lowest recorded since 2009. In 2015, Peru's GDP recovered slightly thanks to increased inventory and a boom of exports, in turn resulting mainly from a rise in the primary and service sectors. In spite of this, investments continued to shrink because of the persistent foreign economic crisis and slow project executions. In 2016, however, growth seemed to regain strength mostly by the start of operations of large mining projects distributed across the country.

1. Individuals are above the extreme poverty line because they can access the basic food basket, but below the poverty line as they cannot meet some basic needs, such as clothes, footwear, house rentals, fuel use, furniture, belongings, health care, transportation, communications, entertainment, education, culture and others.

According to IMF forecasts, of all the countries in South America, Peru will record the greatest economic growth in 2017 as a result of two main factors: rising mining exports and a recovery of public and private investment in infrastructure projects.

Figure 2. Peru's GDP for 2000-2016 (USD at 2010 constant prices)



Source: World Bank.

Evolution of the telecommunications sector in Peru

In 2011, the UN General Assembly declared Internet access a universal right because it is a tool that favors the growth and progress of society as a whole. Peru has been working in line with this statement since the 1990s, when a group of entrepreneurs created the scientific Peruvian network (*Red Científica Peruana*, RCP) as an association oriented to Internet promotion and development. This network grouped different universities and academic institutions from Lima and the rest of the country.

Based on the low penetration of telephone lines and computers in the households, the RCP strived to promote a community access model, contrary to the rest of Latin American countries, known as “public Internet booths.” The first one was set up in 1994 at the Ricardo Palma library in the municipality of Miraflores and had 40 computers. This concept quickly became very popular in the country and was adopted by many others in the region and the world.

Until 1995, the Internet was used almost exclusively as an electronic mail tool. In this year, however, the RCP succeeded in establishing a satellite connection to US servers, which provided Peru with real-time access to the rest of digital tools (e.g., www, chatting, FTP). This triggered a large technological expansion in the business world. According to OSIPTEL,² telephone density and Internet-dedicated lines rose significantly in the country at the time.

In 2000, hundreds of public booths opened, which increased the rate of Peruvian population enjoying Internet access from 17% in 2005 to 40% by late 2014. In spite of all the efforts to render Internet popular, in this same year, according to data from INEI, the national statistics and IT institute, household access to the Internet was just 23%. A report by BBVA Research³ put the blame on infrastructure on the grounds of being insufficient, lacking adequate coverage and good signal quality. However, in the past years, this gap has narrowed as household incomes rose, a larger number of competitors appeared in the market and public-private projects were developed, as the case of the National Fiber Optic Backbone Network, which reduced the cost of Internet access and improved service for all Peruvians.

In addition, technology has not improved evenly in all country regions, but has flourished mainly in the city of Lima and the coast, where services are more profitable. In 2013, after one and a half year of negotiations, the contract under which Telefonica⁴ had entered the country years before was renewed. The terms and conditions that governed this contract extension set forth:⁵

- The need to introduce a mobile telephony social rate;
- The coverage of the mobile telephony network, which should reach 409 capital cities in the district and 1918 towns (70 of which were dairy farms), where there was no service coverage;

2. Oversight agency for private investments in telecommunications.

3. Perú: El sector de telecomunicaciones móvil. (Velapatiño and Perea, 2016)

4. Telefonica entered Peru in 1994, when it was awarded the tender to buy a portion of Compañía Peruana de Teléfonos S.A. and Empresa Nacional de Telecomunicaciones S.A.'s capital stock. These companies provided local telephony, and national and international long-distance services, respectively.

5. For more information, please visit: https://www.mtc.gob.pe/comunicaciones/concesiones/documentos/Adenda_Telefonica_Renovacion.pdf

- Free cable Internet connection for some state agencies; and
- Telecommunications transport infrastructure deployment with a minimum capacity of 10STM-1 along the Rioja-Moyobamba-Yurimaguas-Iquitos stretch. In addition, 559 social (free) Internet access permits were granted to benefit 259 towns.

In this context, in July 2012, Law N° 29904 had already been passed to promote broadband and the construction of the national fiber optic backbone network. The main purpose of this law was to provide broadband services to the country's inland areas, which seemed to be less attractive for private companies. This far-reaching project was intended to guarantee Internet expansion based on its multiple social and economic benefits, then meeting the recommendations suggested by the UN.

Several studies conducted by CAF have showed that, despite the important digitization progress achieved, Peru faces big challenges in terms of telecommunications infrastructure. The aggregate investment (taken at purchasing power parity) for the period 2004-2015 ranged from USD 120 to USD 370, one of the lowest in the region. Although telecommunications investments have increased significantly since 2010, USD 1.703 billion had been invested in 2016, which is not enough to support the deployment of new telecommunication network generations (e.g., 4G or regional broadband).

Similarly, the broadband download speed measured in percentage of connections above 10 Mbps reveals that Peru was lagging behind more developed economies in the region at the time and in a significantly lower position than the average for OECD countries. By the same token, the deployment of Internet interconnection infrastructure in Peru was sluggish compared to other Latin American countries, such as Argentina and Brazil.

Regulatory and institutional framework

This section will describe the regulatory and institutional framework of this study case.

Public-private partnerships (PPP)

Peru has become the first non-OECD country to adhere to international quality standards for the evaluation of PPP projects. However, reaching this point of legislative maturity has been a long and costly process. The first cooperation actions between public and private entities took place in the early 90s thanks to the private investment thrust brought about by the structural reforms implemented by legislative decrees No. 662,⁶ 674⁷ and 757.⁸

In 1991, Legislative Decree No. 758⁹ was passed. This was the first regulation to recognize the concession model as a means to construct, preserve and use public infrastructure. This model, however, boomed after the approval of Legislative Decree No. 839¹⁰ in 1996 and the setup of a commission for the promotion of private concessions (Comisión de Promoción de Concesiones Privadas, PROMCEPRI). In this same year,

6. Law on the regime of regulatory stability for foreign investments through the recognition of certain guarantees (September 1991).

7. Law for the promotion of private investments in state-owned companies (September 1991).

8. Framework law for the promotion of private investments (November 1991).

9. Norms for the promotion of private investment in public service infrastructure.

Supreme Decree N° 059-96-PCM¹¹ came into force to compile all the rules governing concessions into a single norm. This decree regulated the concession procedure for public works infrastructure and their associated public services.

Until then, under the regulations in force, the only contract modality accepted to implement private investment was the concession model. This changed on May 13, 2008 after the publication of Legislative Decree N° 1012 approving a framework law for public-private partnerships (PPP). This law considered different contract models as alternatives to the concession model, which entailed a significant improvement to contract options for project performance.

In order to reduce the existing infrastructure investment gap and take advantage of improvement opportunities in the context of the regulatory framework in force, Legislative Decree N° 1224 about PPPs was published in 2015.¹² The aim of this decree was to establish a unified regulatory framework for the promotion of private investment through PPPs, solve the difficulties identified during PPP phases and become aligned with international standards.

Telecommunications systems

The study co-financed by CAF entitled *El Ecosistema y la Economía Digital en América Latina* [The ecosystem and the digital economy in Latin America] describes how the development and competitiveness of the regional economies have been largely bolstered by investments in broadband networks and digital innovation capacity. The digitization process has mobilized close to USD 195 billion in the past 10 years and helped create about 900 thousand jobs in the same period. In this context, in March 2010, Peru issued Supreme Resolution N°063-2010-PCM to set up a multisectoral commission formed by representatives of public agencies commissioned to draft a national plan for broadband development.

It is worth highlighting that in July 2010 Supreme Decree N° 034-2010-MTC established that new infrastructure projects (to provide electricity, hydrocarbon and transport services) should install optical fiber and/or ducts and chambers for optical fiber installation.

The national plan was published in May 2011. It aimed to assess broadband development in the country and identify barriers to growth so that strategies could be developed targeted to increasing broadband access across the country. The plan set out several goals to be attained within 6 years:

- All municipalities, education centers, health care centers, police stations and other state agencies should have at least a 2Mbps operative broadband connection in place.
- Four million broadband connections should be installed across the country.
- Half a million broadband connections should be above 4Mbps.

These goals were materialized into Law No. 29904¹³ and its Regulations.¹⁴ These regulations helped boost the telecommunications sector in Peru

10. Law for the promotion of private investment in public works for infrastructure and services (August 1996). Amendment to Legislative Decree N° 757

11. Consolidated text in effect containing norms with the rank of laws.

12. It should be noted that this decree was amended by Legislative Decree N° 1251 in November 2016.

13. Law No. 29904 on broadband promotion and national fiber optic backbone network construction (July 2012).

14. Regulations created under Supreme Decree No. 014-2013-mtc (2013).

as their main objective was to achieve broadband expansion throughout the territory. To do this, the law set out the necessity and public interest initiatives below:

- Construction of the national fiber optic backbone network (Red Dorsal Nacional de Fibra Óptica, RDNFO). This law placed at the disposal of the RDNFO the infrastructure owned by the state and established the obligation that electricity and hydrocarbon public service concessionaires allow access to and use of their infrastructure.
- Creation of the national state network (Red Nacional del Estado, REDNACE) as a non-commercial network to be used primarily for education, health care, national defense, culture, among others.
- Financing the telecommunications universal service fund (Fondo de Inversión en Telecomunicaciones, FITEL).

Finally, the Peruvian government passed Emergency Order No. 001-2011 on January 17, 2011 to speed up the process. This Order was the final thrust received by the project, called Broadband development and massification of fiber optics in rural areas and places of preferred social interest in the country: Universal Southern Coverage, Universal Northern Coverage, and Universal Center Coverage. This project would later be known as the National Fiber Optic Backbone Network and was declared as a national necessity to allow priority execution by PROINVERSION.

Stakeholder institutions

In Peru, public private partnerships are supported by an institutional mesh where different entities take part, each charged with very specific responsibilities. A description of the agents that have taken part in the process to launch the RDNFO is presented below:

Ministry of Transport and Communications (MTC). It is the project owner. Its main role is to decide which projects will be implemented and, if applicable, which ones are suitable for concession. To do this, the MTC conducts the engineering and demand studies that are used by PROINVERSIÓN as a basis to structure PPP projects. In addition, for the RDNFO project, the MTC defined the technical, economic and legal conditions for project design, construction, concession, operation and financing. Similarly, the MTC, through its concession division, supervises and manages contracts on a day-to-day basis. In 2014, the MTC awarded Magtel, a Spanish company, a USD 7 million contract to supervise the deployment phase of the RDNFO project.

- Telecommunications Investment Fund (Fondo de Inversión en Telecomunicaciones, FITEL). This fund, ancillary to the MTC, is designed to promote access and use of telecommunications services in areas where the private sector is not primarily interested in investing because of low profitability forecasts. Therefore, this agency, financed through contributions by telecommunications companies, disseminates, plans and drafts projects for rural areas and zones with a preferred social interest, helping socioeconomic development. Its role in the launching of RDNFO was to create interest in the private sector, along with formulating and

coordinating pre-tender activities, specifically, drafting the projects for the universal center, southern and northern coverage initiatives. These were later merged into a single project as a result of the conclusions of a report commissioned from the Inter-American Development Bank (IADB), which was known as the RDNFO.

- National Public Investment System (Sistema Nacional de Inversión Pública, SNIP). SNIP is an administrative system that certifies the quality of public investments in projects using a set of technical principles, methods and procedures. The ultimate goal of this group of entities is to guarantee that public investments are consistent with national economic and social growth strategies and policies, as in the case of the RDNFO. However, on February 24, 2017, a national multiannual investment planning and management system came into force (Invierte.pe). Therefore, the national public investment system, SNIP, was repealed.
- PROINVERSION is a decentralized public agency in the economics and finance sector, with its own legal personality, having technical, functional, administrative, economic and financial self-governance. Its principal mission is to promote private sector investment in infrastructure and state-run companies to boost competitiveness and sustainable development in Peru, improving the well-being of the population. In 2013, PROINVERSION received a request to draft a project for the connection of 22 regional capital cities (22 aggregation nodes), 180 provincial capital cities (180 distribution nodes), and 136 population centers (136 connection nodes). This project originated in the merging of 3 other projects (universal center, southern and northern coverage initiatives) outlined by FTEL. A committee was appointed for project development, which drafted a promotion plan. It then designed the award procedure and wrote the tender conditions. Along this process, one of the most important tasks was formulating the right definition for the risk allocation scheme as it was crucial for successful project management.
- Oversight telecommunications private investment agency (Organismo Supervisor de Inversión Privada en Telecomunicaciones, OSIPTEL). The mission of this agency is to regulate and monitor the telecommunications utility market, along with protecting user interests from a noble perspective: prevent the private sector to abuse its monopolistic position and make sure it provides a satisfactory quality of service. In addition, OSIPTEL sets up mechanisms to oversee the private sector, such as information, quality of service, and accountability obligations to avoid anticompetitive conduct and potential non-compete agreements. In regard to RDNFO, OSIPTEL's participation is restricted only as provided for in the concession contract, the establishment of the rate structure being one of its main competencies.

Table 2. Institutions involved in RDNFO development.

	MTC	FITEL	SNIP	PROINVERSION	OSIPTEL
Project conception	X				
Pre-tender tasks (drafting of center, southern and northern coverage initiatives)		X			
Project structuring 15 (economic, technical and legal design)	X			X ¹⁵	
Study of project suitability in the public interest			X		
Project promotion and tender development				X	
PPP contract with the concessionaire	X				
PPP contract follow-up	X				
Service regulation (mainly rate structure)					X

15. In this phase, PROINVERSION participated to a much lesser extent than the MTC.

Source: Authors.

The project: National Fiber Optic Backbone Network (Red Dorsal Nacional de Fibra Óptica, RDNFO)

Before the launching of the RDNFO, three smaller projects were implemented with the aim to provide a similar Internet service.

The first one was a broadband network in Juliaca and Puerto Maldonado developed by América Móvil using the electricity transmission grid. It only included the infrastructure deployment phase and it was a success thanks to the cooperation of electricity companies.

The second one was the commissioning of telecommunications services between Buenos Aires and Canchaque (PIURA region). For the installation of the required 220 km of optical fiber, in some stretches the medium- and high-voltage grid was used, while, in others, the optical fiber

was placed inside ducts specially deployed along the new highway joining Buenos Aires and Canchaque. This project showed that PVC ducts are not as good an option as power lines. As a consequence, a lesson was learned that ducts need to be located inside buried concrete structures to guarantee good optical fiber maintenance.

The third one was the use of information and communication technologies for the integral development of the communities in Candarave. The project was implemented by the OPTICAL S.A.C. consortium in cooperation with the regional government within eight months.

The Peruvian government took advantage of the lessons learned from these experiences and launched a major project. In 2013, after the implementation of the above initiatives and the publication of Law No. 29904, the MTC launched the National Fiber Optic Backbone Network project to offer a high-capacity network in exchange for a rate regulated by the state in areas that were not primarily attractive for the private sector. The initially expected benefit of this network was the provision of telecommunications services at a lower rate than what the private sector charged, significantly improving the quality of life of Peruvians. In addition to the social benefits deriving from this initiative, the state reserved a percentage of the network capacity to be used by REDNACE with the aim to connect all public institutions and help the information and knowledge society move forward.

Figure 3. National Fiber Optic Network in Peru.



TYPE OF INFRASTRUCTURE	CURRENT FIBER OPTIC NETWORK
--- High voltage	■ Current fiber optic network
--- Medium voltage	■ Private expansion
--- Road network	■ FIDEL - FO projects

RDNFO was conceived as a way to confer telecommunications service operators access to many areas in Peru that were not connected. The original project idea was that the rates to be charged by telecommunications companies would be more affordable to clients because the signal would cost USD 27 per month (inclusive of the general sales tax, *impuesto general de ventas*, IGV) by megabit/sec (this rate was set under the concession contract between Azteca and the Peruvian state). As will be explained later, this rate, regulated by OSIPTEL, decreased as data demand increased, favoring client attraction.

Within this context, RDNFO was planned as a far-reaching 20-yearlong project for the deployment, operation and maintenance of approximately 13,000 km of optical fiber across the country. This infrastructure system was designed to connect Lima with 22 regional capital cities, 180 provincial capital cities, and 136 population centers; in addition, it included international connection points in Bolivia, Chile and Ecuador.

The project was organized into six installation stages, each to be delivered at a different country region, connecting the entire country to the network upon completion of the last stage. Table 4 shows the deployment schedule of each installation stage.

Table 3. International interconnection points.

Interconnection points	Region	Districts to be connected in Peru Region Province	District
To Brazil	Madre de Dios	Tahuamanu	Iñapari
To Chile	Tacna	Tacna	Tacna
To Bolivia	Puno	Chucuito	Desaguadero
To Ecuador	Piura	Ayabaca	Suyo

Source: Ministry of Transport and Communications

Table 4. RDNFO deployment timeframe.

	Stages (maximum term)	Capital cities	Delivery timeframe
Start of installations (01/01/2015)	First calendar day of month seven		
Stage 1: Huancavelica region, including interconnection with Peru NAP and Lurin	Month 9 – March 2015	7	Month 5
Stage 2: Ayacucho, Apurimac, Ica regions	Month 12 - June 2015	23	Month 7
Stage 3: Huanuco, Pasco regions.	Month 15 – September 2015	14	Month 10
Stage 4: Cusco, Arequipa, Junin, Ancash, Lima, Callao, Moquegua, Tacna, Ucayali regions	Month 18 - December 2015	70	Month 13
Stage 5: Puno, Madre de Dios, La Libertad, Lambayeque, Piura, Cajamarca regions	Month 21 - March 2016	46	Month 16
Stage 6: San Marin, Amazonas, Loreto and full RDNFO commissioning (operation)	Month 24 - June 2016	17	Month 19

Source: Ministry of Transport and Communications

It is important to note that, at first, FTEL drafted three independent projects: universal northern coverage, universal center coverage and universal southern coverage. After SNIP approved these projects, the MTC requested PROINVERSION to organize a public tender process that was attractive to private companies under the PPP model .

Along with this procedure and because of the complexity of the project, the MTC and PROINVERSION asked the IDB to produce two reports to clarify the procedure to be followed. The first one explained the union of these three projects into one on technical and economic grounds.¹⁶

16. Merger of the three projects: universal northern, center and southern coverage initiatives.

Table 5. RDNFO.

Service/Project	Universal Southern coverage	Universal Northern coverage	Universal Center coverage	Total
Optical fiber	7,000 km	3,295 km	3,100 km	13,395 km

Source: Ministry of Transport and Communications

The IDB's second report¹⁷ valued the benefits of issuing a separate call for the transportation network (long distance) and the access network tenders under a public-private partnership. The report determined that a unified tender would be riskier because the awardee would have to focus on two completely different business activities.

The transportation network would connect Lima with the regional capital cities and these with their provincial capital cities through optical fiber. This infrastructure would be installed in a ring configuration to guarantee network safety and redundancy so that any optical fiber failure or cutoff would be remedied swiftly by shifting the traffic to other sections until the service was reestablished.

The access network's design consisted of a set of wireless and microwave systems in population centers close to the optical fiber network route to provide landline telephone, telephony subscription and Internet access services for their inhabitants through a radio link network.

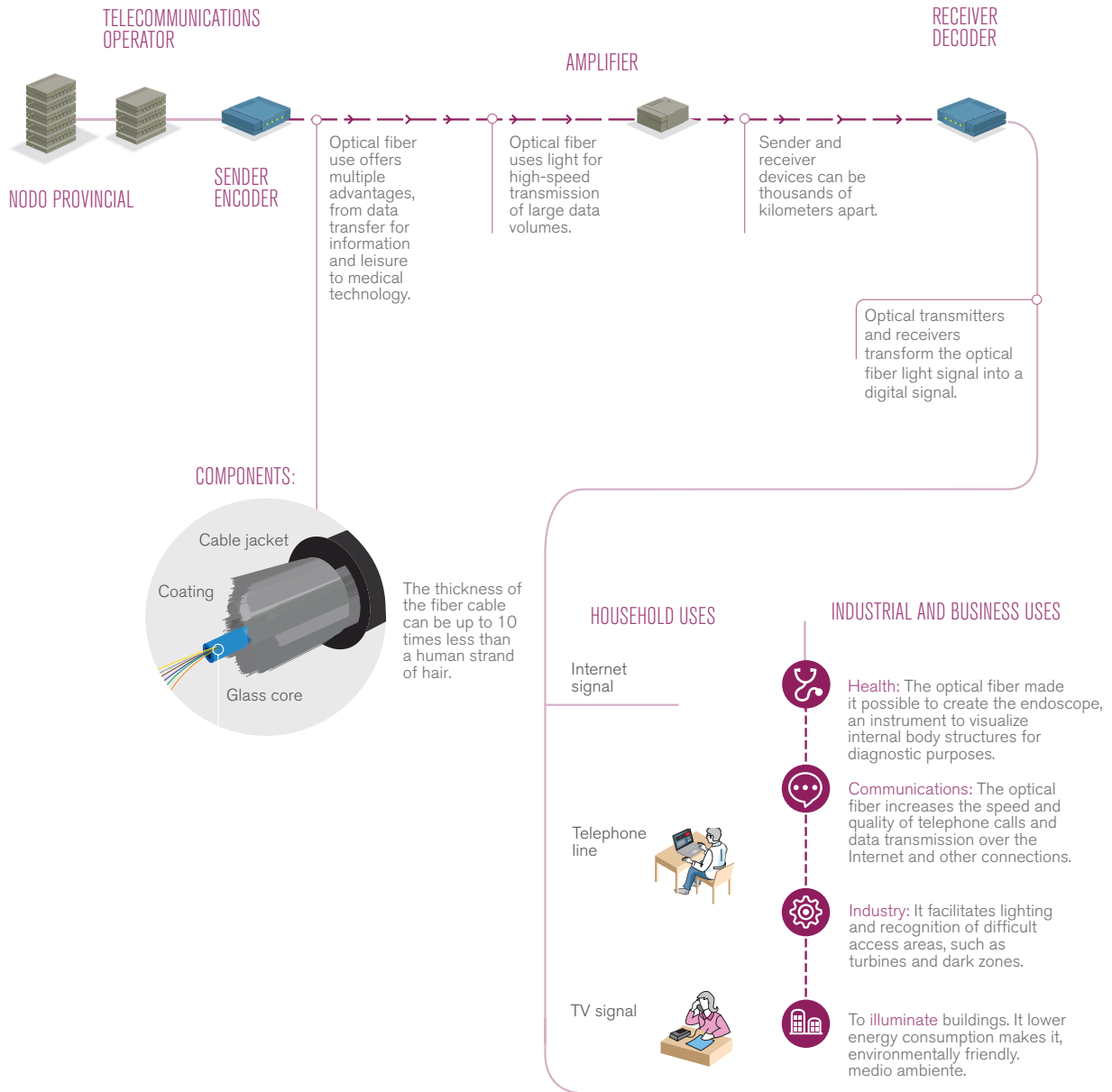
Parallel to the above, the MTC commissioned CAF to conduct a study of the digital public service offerings originating from the backbone network, with an impact on traffic that would contribute to the project's financial sustainability. On other hand, CAF conducted a technical analysis of the access network configuration. Therefore, Peru's Digital Inclusion Plan was proposed within the framework of a technical cooperation initiative geared toward enhancing the use and ownership of advanced communications services in the country as a mechanism to reduce poverty and improve the quality of life of Peru's citizens. By the same token, a backbone network capillarity study set out a strict methodology to estimate costs for the provision of broadband connection at strategic points across Peru, such as schools and hospitals. Specifically, CAF's support focused on the aspects below:

- Digital Convergence Plan Design. In coordination with the MTC and other public and private stakeholders, Peru's Digital Convergence Plan was designed with a holistic approach to supply and demand problems aimed to promote higher social inclusion across the country.
- Fiber optic backbone network capillarity. Support was provided to the design of the access networks for the districts to be connected to the fiber optic backbone network.
- Demand aggregation in districts. A strategy was designed to identify and promote broadband connectivity demand in the districts to aggregate the highest traffic volume possible at department level. Potential service users were identified, such as schools, hospitals, municipalities, SMEs, production centers, that add value to the planned network.

The policy objectives set by the country for the coming years underpinned the Digital Inclusion Plan. It was pointed out that, for the plan to succeed, the attraction and participation of multiple public and private stakeholders was needed.

17. Separation of the project "Broadband development and massification of fiber optics in rural areas and places of preferred social interest in the country: Universal Southern Coverage, Universal Northern Coverage, and Universal Center Coverage" into two: Backbone Network Project and Access Project.

Figure 4. Integration between the concessionaire and telecommunications operators



Source: Proinversion

By investing in RDNFO and regional fiber optic backbone networks, the MTC sought to narrow the digital gap in regard to accessibility, capacity, affordability and reliability of information and communication technologies. In addition, in order to enhance the effect of infrastructure development on digitization, the MTC—among other policy actions—set to promote the implementation of demand aggregation [distribution] centers (Centros de Agregación de Demanda, CAD) at a national level. The implementation of this measure was expected to decrease the existing digital gap not only in Peru, but also in regional countries.

To do this, in the context of the RDNFO and based on an analysis of the national and international experience in the implementation of CADs, CAF supported a study that proposed a design model applicable on a national scale to set out the guidelines for CAD creation, implementation, operation and maintenance based on the principles of CAD services sustainability and demand persistence. After an analysis of the differences of both networks (access and backbone) in relation to technical¹⁸ and operational¹⁹ issues, and types of clients,²⁰ it was decided that they should be handled independently.

In addition, section 9 of Law No. 29904 dated June 28, 2012 states that the backbone network operator may not supply end services to users; therefore, the tender had to be held separately to meet this requirement.

The MTC proposed a neutral operator, a concept under section 23 of Law No. 29904, and determined that this operator should solely provide the service of acting as a carrier for other telecommunications operators, not acting as a supplier to end users.

All agencies involved in the project agreed that the use of preexisting electrical infrastructure to install the optical fiber was the best choice because of the significant reduction in infrastructure cost in benefit of society.

The initial idea was that the transportation network wiring should share its infrastructure with high-voltage power lines. From a technical standpoint, that was the ideal solution because breakups could be kept to a minimum as compared to other medium-and low-voltage systems. However, as will be explained later, the negotiation problems between the PPP contract awardee and electricity companies finally led to the decision that only medium-voltage power lines be used.

Fewer negotiation problems would have been encountered if the project owner had established predefined sample contracts to be used as a basis for negotiation. By setting out key aspects of the agreement—protocols, rates, among others—in the contracts the risk of the private party could have been mitigated and the power of electricity companies limited.

As has just been described, the RDNFO was created to offer a high-capacity network in areas that originally were not attractive to the private sector because of their low potential return. However, while the project was being developed, two operators (Telefonica and Vitel) expanded their optical fiber network and reached a large portion of the provincial capital

18. The dorsal network consists of fiber optic cables, while the access network is a microwave system.

19. The backbone network requires centralized O&M, while the access network requires local O&M.

20. The only clients of backbone networks would be the telecommunications operators; the access network clients would be end users.

cities traversed by the RDNFO. The main advantage for these operators was how they became positioned to the Backbone Network and the fact that they were entirely free to determine the rates they charged other operators for use of their transportation system. In some cases, these rates were even lower than those agreed upon with AZTECA.

This is one of the greatest paradoxes of the RDNFO. The project originated as a PPP initiative because, apparently, the private sector was not interested in putting it into effect without public support. Nevertheless, when the decision was made to launch it as a PPP, telecommunications operators developed their own projects to compete with what was expected to be a monopoly.

To complete the RDNFO and reach all the points in the country, 21 regional projects were also designed to connect more than 1,500 district capital cities with more than 31,000 km of optical fiber and each regional network to the National Fiber Optic Backbone Network’s nodes.

Contract tender and award

This section describes the process comprising from project conception up to the call for tenders and contract award.

Pre-existing studies

With the goal to make quality information available to companies interested in participating in the tender, PROINVERSION published a report proposing a method to estimate demand in each Peruvian region. The provincial traffic was calculated as the product of the traffic projected for each year and the total of projected connections in each province, considering an effective network traffic factor that depended on the existence and redundancy of optical fiber in the province (equation 1). This study assumed conservative parameters (average 5Mbps broadband speed) because it was believed that demand could be stimulated by activities such as training programs, application development and helpful services for users.

$$\text{Total traffic}_{ijT} = \text{Average traffic}_T \times \text{Total Connections}_{ijT} \times \text{Factor}_{ij} \tag{1}$$

i=province; j=department; T=year (2012-2025)
 Factor:
 1=If there is no optical fiber in the province
 0.5=If there is optical fiber in the province
 0.1=If there is redundant optical fiber in the province

Table 6. Total traffic estimates per units (Gbps²¹).

Department	2012	2015	2020	2025
Amazonas	0.9	2.0	6.5	14.0
Ancash	2.7	5.9	19.9	43.9
Apurimac	0.8	1.9	6.0	12.7
Arequipa	1.7	3.6	12.2	26.8
Ayacucho	2.5	5.2	17.1	36.5
Cajamarca	3.5	7.6	24.8	53.4
Callao	0.0	0.1	0.1	0.2
Cusco	3.6	7.6	25.2	54.1
Huancavelica	0.3	0.8	2.5	5.3
Huanuco	1.0	2.2	7.2	15.4
Ica	1.4	2.9	9.8	21.5
Junin	3.6	7.6	25.7	56.0
La Libertad	2.1	4.5	15.0	32.4
Lambayeque	1.3	2.8	9.3	20.3
Lima	2.3	5.4	16.8	35.6
Loreto	0.1	0.2	0.6	1.3
Madre de Dios	0.4	0.8	2.6	5.6
Moquegua	0.3	0.7	2.3	5.2
Pasco	0.9	1.8	5.9	12.7
Piura	1.2	2.7	8.7	18.8
Puno	3.4	7.3	23.8	50.7
San Martin	1.9	4.1	13.6	29.2
Tacna	0.3	0.6	2.1	4.6
Ucayali	0.9	1.9	6.4	13.9
Total	37	80	264	570

21. Gigabit per second

Source: World Bank (2011), PYRAMID Research (2010), INEI, BCRP, APOYO Consultoría

At present, traffic is lower than expected. There are several reasons for this. On one hand, other operators developed their own infrastructure in advance and offered lower rates in some zones. On the other, the contract offered few incentives to the private sector to attract higher demand to the network. Finally, the percentage of capacity originally reserved for REDNACE has not yet become effective.

Contrary to what is customary in PPP projects in Peru, the MTC, not PROINVERSION, defined the economic, technical and legal design of the RDNFO. *Section 7.3 of Law No. 29904 provides that the Ministry of Transport and Communications is the agency in charge of conducting*

all necessary actions for the implementation of the National Fiber Optic Backbone Network. In this context, the ministry defined the technical, economic and legal conditions of the network's design, construction, concession, operation, financing, among other actions that may be necessary. This situation left very little space for PROINVERSION to participate in project structuring. Similarly, OSIPTEL did not have any participation in the first project stages, involving formulation and design.

Access to the tender and bidder's prequalification processes

The tender documents were published in May 2013. However, the final document was not approved until November. The reason for this delay was the large number of circulars issued by the PROINVERSION Committee²² to answer requests for clarification submitted by the private sector. In order to open the market to different operators and avoid a dominant position by the main telephony operators in the country, only carriers of carriers (companies that carry data but do not reach the end customer) were allowed to submit proposals. Therefore, large companies such as Telefonica and Claro were left out of the tender.

After filing several complaints, these operators were finally allowed to participate as tenderers, but with a score penalty and under the obligation to set up an independent company in Peru to carry out the tasks defined by the contract.

According to the tender documents, the first step to access the tender process was to pay a participation fee of USD 1,000, inclusive of IGV, which would not be returned. By paying this fee, the tenderer was entitled to receive the information available in the data room and request interviews with committee members, the project leader and MTC staff regarding technical, economic and legal conditions.

After that, tenderers had to prepare the contents of envelope 1 and deliver it at the Committee offices before September 13, 2013. The documentation to be submitted for the prequalification process was divided into three blocks:

- An affidavit signed by the tenderer's legal representative undertaking to submit true information.
- Proof of adequate technical experience to perform the contract successfully. Two conditions had to be met in this regard:
 - i. Having provided telecommunications public services for 10 years.
 - ii. Showing proof of the operation of at least 10,000 km of single-mode optical fiber in the last year (since the tender call).
- Guarantee minimum financial requirements to be selected for prequalification:
 - i. Revenues collected in fiscal years 2011 and 2012 had to add up to not less USD 80 million.
 - ii. Capacity to take out loans in the financial market for an amount higher than USD 50 million to invest in the national backbone network

22. PROINVERSION Committee—in energy and hydrocarbon projects—PROCONNECTIVIDAD, set up by Supreme Resolution No. 010-2012-EF dated February 9, 2012.

- iii. Minimum net worth of USD 85 million at the close of audited accounts from 2011 or 2012.

On December 10, the list of tenderers that met the above requirements and qualified to access the next process step was published in Circular 34. The prequalified companies were:

- Prequalified tenderer 1: Consortium CABOVISÃO – Televisão by Cabo SA and DSTelecom SA (PERU DIGITAL).
- Prequalified tenderer 2: Consortium TV AZTECA-TENDAI.
- Prequalified tenderer 3: Gas Natural Fenosa Telecomunicaciones SA. None of these prequalified companies sold telecommunications services in Peru. Telcos did not submit tenders for this project because of the penalty enforced against them, although later some of these firms, such as Telefonica, ended up creating their own networks to compete.

Tender award and valuation mechanism

After several revisions to the original time schedule, the deadline established by the committee for prequalified companies to submit their technical proposal (envelope 2) and financial bid (envelope 3) was December 19, 2013. Given short amount of time from the selection of prequalified candidates to the deadline for delivery of the second and third envelopes, CABOVISAO Consortium and Gas Natural Fenosa Telecomunicaciones requested a postponement from the public powers. Their petition was denied, possibly because the government wanted to have the project in operation before the following presidential elections. The brief time span available to prepare the proposals was one of the main reasons two of the prequalified tenderers left the concession abruptly, reducing the competition to only one consortium.

Although there was just one tenderer, the process followed its regular procedure. Below the contents of envelopes 2 and 3 that had to be submitted by all prequalified companies are described. In the end, only TV AZTECA- TENDAI remained:

Envelope 2: Technical proposal. This envelope consisted of five documents:

- Acceptance of the tender conditions and the concession contract. The consortium had to submit an affidavit stating that it was aware of the tender conditions and accepted the final version of the concession contract. This final version was approved by the PROINVERSION's Board of Directors on November 22, 2013 under Circular No. 28.
- A bid bond to guarantee the tender validity and serious intent. The value of the bond was approved by PROINVERSION Committee by Circular 19. The total amount had to be issued by a world-class national or international bank and would remain valid for 120 days since the issue date. The total amount of the bond exclusive of IGV was slightly above USD 4.7 million.

- Technical proposal. It had to include the preliminary engineering for the installation, operation and maintenance of the national backbone network. This tender had to meet at least the specifications in Annex No. 12 of the tender conditions, and include field studies and a preliminary timeframe for the activities to be conducted by the concessionaire until the start of operations.
- A copy of the final version of the concession contract signed by the tenderer's legal representative.
- Affidavit: Confirmation that all the information submitted in the first envelope will remain valid until the contract was fully performed. The content of this envelope was evaluated by the same Committee²³ that analyzed envelope 1. The resolution had three possible outcomes:
 - Declare it technically acceptable.
 - If the technical proposal was qualified with a non-material objection, the tenderer had to submit precisions, clarifications or modifications within the established timeframe.
 - If a defect or omission was detected in any of the documents, the tenderer would be requested to remedy the problem. The tender conditions stated that errors could not be remedied if the full number of documents had not been delivered.

23. Appointed by the Committee and the MTC.

The final score of each tenderer may not be challenged in any way and would be known at the public opening of envelope 3. The tender conditions stated that only the selected tenderers, i.e., those whose technical proposal had been declared acceptable, would enter the following stage.

Envelope 3: Financial bid. The tender conditions set out that this proposal were an integral part of the concession contract and, therefore, were binding upon the parties.

The financial bid was divided into three variables:

- Investment repayment (RPI). A quarterly payment received by the concessionaire for the repayment of the investment made under the contract terms and conditions.
- Payment for operation and maintenance (RPMO). A payment to the concessionaire to be made during the phase in which the carrier service is provided. This concept does not include any fees for the commercial use of the service; the contributions to FIDEL and to OSIPTEL; or the payment to OSIPTEL for its supervision.
- Excess funds margin. The percentage indicated by the concessionaire that, when applied to gross excess funds,²⁴ determines the net excess funds²⁵ and the results-based premium.²⁶

24. It is the monetary amount resulting from the quarterly deduction of the RPI payment plus the RPMO payment from available revenues.

25. It is the monetary amount resulting from multiplying the excess funds margin (margen del excedente) by the gross excess funds.

26. It is the difference between gross excess funds and net excess funds, kept by the concessionaire.

To evaluate this envelope pursuant to the tender documents, the so-called competition factor was used. The design of this indicator was based on the grouping of two variables within one same equation:

- Investment, operation and maintenance expenses (VP). This was the main variable, accounting for 80% of the total weight of the competition factor.

- Excess margin. It is the percentage of gross excess funds to be shared with the Peruvian government.

$$P_i = 80 * \left(\frac{VP_{\min}}{VP_i} \right) + 20 * \left(\frac{E_i}{E_{\max}} \right) \quad (2)$$

- P_i : Weighted bidder i 's evaluation criteria value.
 VP_{\min} : Minimum present value of investment, operation and maintenance expenses offered by bidders.
 VP_i : Maximum value of the excess funds margin offered by bidders.
 E_{\max} : Excess funds value offered by bidder i .
 E_i : Present value of investment, operation and maintenance expenses offered by bidder i .

To do this, the Committee would award the concession to the selected bidder with the highest score or, in case of tie, the bidder that within two hours after the envelopes were opened improved its financial bid. However, in this project, there was no competition since the other two bidders abandoned the process, so the contract was directly awarded to the TV AZTECA-TENDAI Consortium on December 23, 2013.

Table 7. TV AZTECA - TENDAI Consortium's financial bid (USD).

Stages	Quarterly RPI (w/o IGV)	Quarterly RPMD (w/o IGV)
One	1,777,953.75	2,646,038.42
Two	1,193,954.58	382,175.87
Three	543,887.25	214,967.87
Four	1,349,467.57	490,410.55
Five	1,741,299.11	614,048.36
Six	450,379.56	187,682.91

Proposed excess margin: 80%

Source: Authors

The only reason why the tender could have been declared void is if no valid financial bid had been submitted. In this particular case, the procedure moved forward even though there was only a single tenderer.

At first, the deadline for TV AZTECA-TENDAI to sign the concession award certificate was June 12. However, Circular No. 39 postponed the date to June 17, when the concession contract came into force. At this ceremony, the consortium was required to show proof of having furnished the guarantees as provided for in the concession contract and of having all the legally required documents in order.

TV AZTECA-TENDAI had serious funding problems, so deferring the date to sign the concession award certificate may have originated in the consortium's difficulty to find liquidity to pay the applicable guarantees. The amount to be paid at this ceremony was USD 71.5 million, broken down as follows:

- A USD 0.133 million payment to PROINVERSION for expenses incurred in the process to promote private investment, which was paid with a check issued by BBVA Banco Continental.
- A USD 1.3 million payment to FONCEPRI, as agreed in Circular No. 37.
- A guarantee for the deployment phase. It was issued by Scotiabank in the amount of USD 50 million and was valid from the date of the concession award certificate to the property handover certificate of the last delivery stage.
- A guarantee for the phase during which the carrier service is provided. It covered the fulfillment of the concessionaire's obligations under the contract for the concession life in the amount of USD 20 million.
- A guarantee for a differential amount. It had to be furnished if the financial bid was lower than 80% of the highest financial bid to be recognized, which did not happen in this case.

The concession award certificate also recognized that TV AZTECA-TENDAI had fulfilled the requirements of the bid bond, term of validity and serious intent of the tender. Therefore, the project owner returned the USD 4.7 million deposited by the concessionaire.

Table 8. Tender process time schedule.

Date	Event
May 2013	Publication of the basis of the contract.
September 13, 2013	Delivery date for Envelope 1
November, 2013	Final acceptance of tender documents
December 10, 2013	Publication of prequalified tenderers
December 19, 2013	Initial date for the delivery of Envelopes 2 and 3
December 19, 2013	Failed date for the opening of Envelope 3 and award of the contract
December 23, 2013	Final date for the opening of Envelope 3 and award of the contract
June 12, 2013	Planned date to sign the concession award certificate
June 17, 2013	Final concession award ceremony

Source: Authors based on contract circular letters

Income sources and allocation of risks

Income, rate structure and demand risk

According to section 9 of Law No. 29904 dated June 28, 2012, TV AZTECA-TENDAI would derive its revenues solely and exclusively from telecommunications operators using the Backbone Network. The service provided companies must meet the conditions established in the submitted technical proposal (Service Levels [SLA] and quality) and the financial bid (rate structure).

The rate structure was defined in the concession contract as a single rate for the first five concession years. The amount to be paid by telecommunications operators in these five years to TV AZTECA-TENDAI was USD 23 per each megabit per second of dedicated transportation (exclusive of IGV). During this first period, there were two possible scenarios:

- Income from the payment of rates may not cover the costs originating from RPI + RPMO. In this case, the Peruvian state would cover this gap through subsidies in line with clause 30 of the contract: if income in the applicable quarter did not cover payment for RPI and RPMO, the project Owner shall grant and provide the necessary resources for payment fulfillment. In addition, clause 26 sets forth that the project owner is required to schedule and quote, per each fiscal year, the necessary resources to pay for RPI and RPMO [...].
- Income from the rate collected from operators may be higher than RPI + RPMO costs. In this case, this excess margin should be shared between the Peruvian state and TV AZTECA-TENDAI in an 80:20 ratio, as established in the awardee's tender.

After these five years, the rate is no longer fixed and is calculated annually according to an equation set forth in the concession contract. The purpose of this formula is to adjust the concessionaire's annual income to RPI and RPMI costs and to:

- Guarantee the RPI+RPMO payment by the concessionaire as established in the financial bid, as the minimum rate value resulting from the formula is the sum that would cover these costs;
- Once the traffic is higher, users can benefit from lower rates adjusting the higher revenue to investment and maintenance costs based on the equation.

$$\text{Tarifa}_T = \frac{\text{ARPI}_T + \text{ARPMO}_{t-1}}{q_{T-1}} \quad (3)$$

- ARPI_T: Annual sum of tendered RPI values, for the four quarters of year t.
- ARPMO_{t-1}: Annual sum of adjusted RPMO values, for the four quarters of year t-1 adjusted on a quarterly basis.
- q_{T-1}: The quantity of megabits-per-second demand contracted for the prior year.

However, it is important to note that this clause eliminates the project's demand risk almost entirely, which is a major disincentive for the private party to attract more traffic.

Other project risks

The risk of legislative changes refers to an indirect contract alteration caused by legislative modifications making the project more costly for the contractor not due to the contractor's fault. Clause 31 of the RDNFO's concession contract mitigates this risk by setting up a mechanism to reestablish the economic and financial balance of the concession if a legislative change should directly impact RPI and RPMO, adversely affecting the concessionaire.

The concession contract sets forth a threshold to determine a negative impact on the economic balance requiring the concessionaire be compensated if the absolute unbalance percentage between the two items below exceeds 10%:

- (i) results before income tax from the year comprising twelve consecutive months, and
- (ii) recalculation of results before income tax of the same year using the revenue or cost values applicable before the modification brought about by the legislative changes.

This clause also establishes that the amount the concessionaires to be compensated be calculated based on the difference between amount (ii) minus amount (i) if (ii)>(i). Under the concession contract, if (ii)<(i), the concessionaire will be required to pay the project owner the difference between both amounts. Therefore, this clause mitigates the risk in favor of both the public and the private sectors.

In addition, clause 31 sets forth that higher costs or longer terms will not trigger an economic-financial balance reestablishment if caused due to technical, operational, performance or administrative reasons. This risk will have a direct impact on AZTECA-TENDAI as the concessionaire will have the means to manage it. Therefore, any delay in delivery timeframes or increase in costs during the deployment phase will be solely borne by the concessionaire.

In order to facilitate financing and mitigate concessionaire risks, PROINVERSION proposed in the tender documents that revenues, i.e., the rate to be paid to AZTECA-TENDAI for the use of the transportation network, be set in US dollars. The aim was to facilitate access to financing and secure liquidity in a stronger currency. However, this strategy transferred the risk to the telecommunications operators that would use the network because they invoiced end users in Peruvian Soles.

Contract management

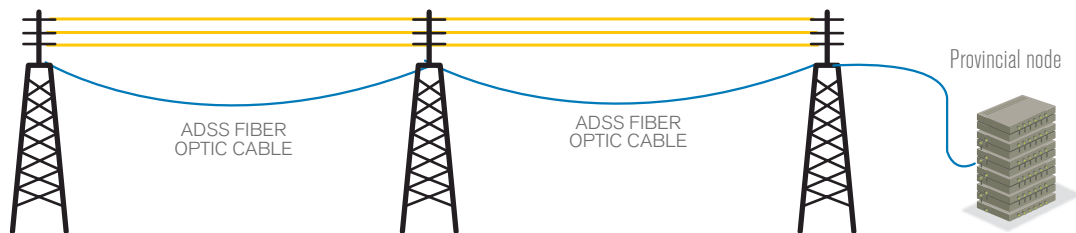
This section describes the major incidence factors that have had an impact on the concession since the contract was awarded.

From high- to medium-voltage

The shared use of electric power infrastructure for fiber optic cabling to ensure project viability was one of the most conflicting aspects of the contract. In a report prior to the tender, the IDB and PROINVERSION stated that the use of existing electric power transmission infrastructure, including high- and medium-voltage power towers, in addition to utilities' poles, would facilitate the project's implementation. In addition, the report described that in many Andes areas, the use of electric power infrastructure was the only economically viable means to implement this project. The harsh terrain, the narrow and winding roads, and the slim soil surface on solid rock did not make the installation of dedicated utility poles or underground ducts economically attractive [...].

Figure 5. Concession's technical scheme.

Fiber optic will be deployed using the high- and medium-voltage electric power towers belonging to electricity distribution companies.



Source: Proinversion

Electric power companies were required to share their infrastructure a priori. However, this point was one of the most controversial in the project because of the lack of a more detailed definition in the tender documents and of relevant standard contracts.

AZTECA's urgency to complete the project on schedule so that no penalties would be enforced against it, coupled with the lack of a contract sample that could regulate the relation between AZTECA TENDAI and electric power companies, endowed the latter with huge market power. To solve the conflict, which jeopardized the contract, two potential actions were contemplated: (i) a negotiation, which was too slow, or (ii) the fast track way through an OSIPTEL mandate. Option (ii) was finally adopted, but it ended up being more complicated than originally expected.

In spite of OSIPTEL's mandate, AZTECA and Red Eléctrica del Perú (REP) were unable to reach an agreement since the latter demanded high bonds and insurance coverages for potential damages that may be caused by AZTECA. This disagreement led to a modification of the original design to now lay the fiber optic cables using the medium-voltage power lines infrastructure located by the roads, as the conditions established by the companies in charge of managing these lines were more lenient. This new design, which not only entailed high cost overruns for the concessionaire, was not the best technical choice as these types of line break more frequently, which could impair service quality. Therefore, AZTECA applied for a time extension to find another alternative given the electric power company's refusal to let AZTECA use its high-voltage lines. This finally led to an arbitration procedure that had not yet been resolved at the time of writing this book.

The problem regarding the use of high- or medium-voltage electric power infrastructure is the result of poor risk allocation under the contract, where the risk for the use of the electric power infrastructure is on the private party. However, this is actually a risk that should be borne or at least mitigated by the public sector based on its unique features. On the other hand, if the project owner will not assume this risk, it should draft sample contracts to be used as a starting point for negotiations to avoid conflicts. These contracts should describe key project aspects in detail, such as incident or rate protocols, to mitigate the risk of the private party and restrain the negotiating power of electricity companies. In addition, a more meaningful dialogue with power companies from the beginning would have also helped reduce this point of uncertainty.

Rules applicable to property and real estate

Property and real estate rules have been another highly controversial project issue. The concession contract follows Law No. 30025 from 2013 as the basic legal norm. This law facilitates the acquisition, expropriation and possession of real estate for infrastructure works. Azteca was the party in charge of land acquisition, even though the contract did not set out

clear acquisition rules. It was not viable to secure the necessary land plots under an ownership formula during the contract life due to problems with the communities and the difficulties involved in finding out the identity of landowners as there was no relevant ownership record.

When this book was being written, the definition whether property should be owned or could be rented was still under arbitration.

Setting of payments to access complementary facilities

The concession contract governing the RDNFO sets forth that the project awardee should provide three services: (i) carrier service, (ii) complementary facilities and (iii) additional services. Complementary facilities were defined as “any service that facilitates and complements access to the carrier service, such as (i) co-location of equipment units, (ii) access to a regional NAP (network access point), (iii) rental of RDNFO poles and infrastructure for the provision of telecommunications services [...]” In addition to the contract, paragraph 25.20 of clause 25 and paragraph 41.1 of clause 41 set forth the obligation to apply for the setting of a consideration for the RDNFO service’s complementary facilities to be paid to OSIPTEL, along with the right to collect this sum.

Under the contract provisions, on June 10, 2016 OSIPTEL passed Resolution No. 073-2016-CD/OSIPTEL to approve the general rules for the submission and evaluation of the basic proposal suggested by the concessionaire regarding the defined complementary facilities. This document also set forth that the following items be included in the basic tender:

- Co-location of equipment units: this is the physical space, energy, support infrastructure and/or other facilities to place and operate the applicant operating company’s equipment on the National Fiber Optic Backbone Network nodes [...]
- Pole rental: it is the use of the support points and/or other facilities on poles to support the cables used by the applicant operating company to reach and/or leave the National Fiber Optic Backbone Network nodes
- National Fiber Optic Backbone Network infrastructure: it is the use of channeling facilities (ducts and chambers).
- Access to Regional NAP: it is the access to the data traffic exchange point where servers and equipment are installed to direct on-net traffic to the contents of public administration entities.

The process for defining the payments started with the submission of a proposal for pole renting on February 19, 2016. AZTECA COMUNICACIONES PERÚ SAC sent the first proposal to OSIPTEL. However, it was not until October 2016 when the awardee submitted a final offer.

The delay to meet the preestablished time schedule was a consequence of the regulatory agency’s request for additional information before making a final decision.

OSIPTEL evaluated the proposal and decided that the methodology used by AZTECA to calculate the proposed payment was not consistent with the legal framework in force. OSIPTEL issued Resolution No. 157-2016-CD/OSIPTEL to communicate that AZTECA was already collecting a rate that covered the cost of the necessary elements to provide the carrier service to the telecommunications companies and that, therefore, the proposal submitted by AZTECA was not based on additional costs originating in the provision of complementary services. Therefore, as AZTECA had not presented a valid proposal, OSIPTEL calculated the payment, issued a public consultation and approved the value. The methodology²⁷ employed was based on an estimate of incremental costs assumed by AZTECA to allow third parties to access the support points. Table 9 shows the difference between both payments.

27. Approved in Annex 1 of Supreme Decree No.014-2013- MTC, consistent with Article 15 in the General Provisions.

Table 9. Payment for pole rental, exclusive of IGV.

Complementary facility	Charge unit	Monthly payment AZTECA	Monthly payment OSIPTEL
Pole rental	By support point, per month	USD 0.79	USD 0.14

Source: OSIPTEL

On January 11, 2017, AZTECA COMUNICACIONES PERÚ submitted a document where, on one hand, it recognized as correct the methodology used by OSIPTEL, while, on the other, made some comments regarding Resolution No. 157-2016-CD/OSIPTEL. One of these comments was AZTECA's discontent arising from the application of inconsistent criteria to the regulation of rates concerning the sharing of power and hydrocarbon infrastructures in favor of broadband telecommunications public service suppliers.

The main problem described by AZTECA was that the total payment to a power company by telecommunications operators that would use the same pole should not be constant, as this would not incentivize power companies to increase the number of operators that can use their infrastructure.

AZTECA requested that the regulations governing law be amended so that they became aligned with OSIPTEL's proposal. Similarly, AZTECA requires that OSIPTEL send an official statement to the MTC regarding the need to correct the variable "quantity of operators" of the formula under the regulations to generate consistent criteria and resolve the described problems. It should be pointed out that in Report No. 00033-GPRC/2017, which gives grounds for the Steering Committee's Resolution N° 032-2017-/OSIPTEL and sets the payments for complementary facilities to

be provided by AZTECA, OSIPTEL states that the effective number of operators using infrastructure at a certain point in time should not be considered variable as this would imply that the first operator that uses the infrastructure should pay the whole cost. In addition, OSIPTEL claims that this cost must be borne by all the operators that are allowed to use the infrastructure. This criterion had been adopted by OSIPTEL in its official statements through the Access Mandates applicable to power concessionaires' infrastructure.

In addition, OSIPTEL sent MTC a letter (C.0305-GG.GPRC/2017, received on March 29, 2017) recommending that the maximum quantity of tenants, not the quantity of tenants at a given point in time, be applied to the formula. The recommendation was made within the framework of an assessment of the proposal to change the formula of Annex I of the regulations governing the broadband law.

The procedure that was then carried out was the co-location of equipment at the RDNFO nodes. On July 25, 2016, AZTECA sent the first proposal to OSIPTEL. However, it was not until October 5, 2016 that the concessionaire submitted its final proposal. In this document, payment for investment, operation and maintenance of Lima, Cajamarca and Puno nodes was calculated.

In this case, OSIPTEL deemed the proposal was inconsistent with the applicable legal framework as all the installed equipment would be solely used by third parties. As can be seen in Table 10, the only variation between both proposals was that of the Lima node due to a discrepancy over the investment item. AZTECA included a land plot in this item that was not taken into consideration by OSIPTEL because it was an asset that would not need to be replaced because it was not depreciable. Therefore, OSIPTEL's proposal considered that this asset should only pay for the opportunity cost of the investment made, which translated into computing just 10% of the land investment value.

Table 10. Payment for co-locating equipment on nodes, exclusive of IGV.

	Proposal by AZTECA Monthly payment for space (1/3 of cabinet)	Proposal by OSIPTEL Monthly payment for space (1/3 of cabinet)
Lima node	USD 258.75	USD 256.92
Cajamarca node	USD 234.46	USD 234.46
Puno node	USD 256.88	USD 256.88

Source: OSIPTEL

Along with the co-location of equipment on the nodes, payment for the RDNFO infrastructure was processed (ducts and channeling). In this case, the second proposal by AZTECA was approved in full as it was in line with the project's legal framework.

Table 11. Payment for RDNFO infrastructure, exclusive of IGV.

Complementary facility	Charge unit	Monthly payment AZTECA	Monthly OSIPTEL
RDNFO infrastructures Ducts and channeling	By meter, per month	USD 0.12	USD 0.12

Source: OSIPTEL

It should be highlighted that, after payments are set, AZTECA may not charge any additional sum for complementary facilities.

Project funding

This section describes the financial sources that were necessary to make this project a reality.

Partners that drove the project forward

TV AZTECA S.A and TENDAI S.A. joined as a single company called "AZTECA COMUNICACIONES PERÚ S.A.C." on May 28, 2014 in order to fulfill the minimum requirements laid out in the tender documents. Although the benefit was for both companies, the interest held by each shareholder firm in the concessionaire company was not the same. TV AZTECA was the majority shareholder, paying in 80% of the capital stock, with TENDAI holding the remaining 20%.

The articles of incorporation of this company sets out that this company partnership has an indefinite duration and that its capital stock is USD 68 million, contributed by both parties and divided into 68 million shares, fully subscribed and of which 28% has been paid in.

Debt structure

One of the most complex issues about launching this project was seeking out financing. Initially, AZTECA sought potential lenders in China and Mexico.

However, financial entities were reluctant to provide funds for this venture because some key risks were not well defined in the tender documents or in the contract.

To tackle this situation, the Peruvian government had no choice but to accept an addendum guaranteeing the concessionaire an irrevocable right to receive the full invested amount (RPI) upon construction completion. This addendum was sufficient security for banks to grant loans assuring at least infrastructure deployment.

The concessionaire company accepted a bridge loan to fund the infrastructure. Despite this short-term interim financing, the concessionaire was not able to meet the deadline and was penalized. This conflict is still undergoing arbitration procedures.

Trading bonds on the New York Stock Exchange (NYSE)

Upon project completion, the concessionaire issued bonds to refinance the debt in an amount of USD 274 million to be traded on the NYSE. This operation was considered to be a success as the bond demand exceeded the number of bonds issued. These 15-year maturity notes were rated BBB by Fitch Ratings and Baa1 by Moody's. The Peruvian market bought 57% of the issue, while the remaining 43% was placed among investors in the global market.

Conclusions and lessons learned

The RDNFO has helped democratize and balance the opportunities for urban and rural areas to access communication services, making it actually possible to narrow the digital gap. The expected increase in the internet user population will be a positive contribution to the development of the Peruvian society and economy.

One of the main lessons that can be derived from this study case is that an in-depth assessment is needed before launching a fiber optic transportation PPP to determine whether the private sector is willing to provide the service if it has to compete with other providers. The RDNFO was implemented through a PPP because of the alleged lack of interest by the private sector to reach rural areas. However, after the project was awarded, several operators developed their own network in some of these areas with even more competitive prices. As these fiber distribution networks make up a natural monopoly in low traffic zones, the establishment of more than one operator (private and concessionaire) in these areas translated into loss of revenues and redundancy of resources.

It is true that, when the decision was made, it was difficult to foresee the future interest of the private sector and it could even be claimed that the launching of a PPP arose a much higher interest in potential competitors that, otherwise, might have taken significantly longer to expand their networks. However, in hindsight, the government's decision to restrict competition to pure carriers seems not to have been the wisest.

Another problem arising from this study case is that neither the state nor the private sector made a great effort to disseminate information about the network. In the concessionaire's case, this may be due to the rate structure

and the benefit allocation system's not being good enough to encourage client attraction. To remedy this situation and take advantage of the network's current overcapacity, it might be reasonable to allow the concessionaire to have greater rate flexibility through discounts on higher use or other strategies that can trigger fair competition with other operators. In addition, the contract should have given more incentives to the private sector to attract more traffic.

It is also worth mentioning that when this book was being written the initial project goals had not been reached as the tendering and operation scheme of the REDNACE network were not yet in place. Similarly, the concession scheme for the regional networks' transportation segments had not been defined either. These factors reflect a general project weakness.

For the success of other future initiatives, this study case is also a very attractive example of the need to have more interaction with key stakeholders—in this case, the electricity power companies—before a project is launched. To avoid conflicts over the use of preexisting infrastructure or the co-location of spaces, it seems reasonable for the project owner or the regulatory agency to draft predefined sample contracts that can be used as a basis for negotiation and to avoid future arbitration procedures. These sample contracts should describe key project aspects in detail—such as protocols and rates, among others—to mitigate the private party's risk and limit the power of the owner of the existing infrastructure that will need to be shared with the concession awardee.

Finally, as is the case of many other PPP contracts, this study case shows that political haste to put a contract into effect does not necessarily ensure contracts are well-defined nor does it encourage real competition during the tender process.



Sanitation Network
Expansion in the
Municipality of Serra

General project framework

- Regional context
- Industry evolution and current situation

PPP regulatory and institutional framework

- Regulatory framework
- Institutional framework

Project features

- Project rationale
- Project structuring
- Project goals and definition

Contract tender and award

- Pre-existing studies
- Tender award and valuation mechanism

Contract design

- Payment to concessionaire
- Performance goals and indicators
- Risk distribution and economic-financial equilibrium

Project funding

Project balance and lessons learned

General project framework

Regional context

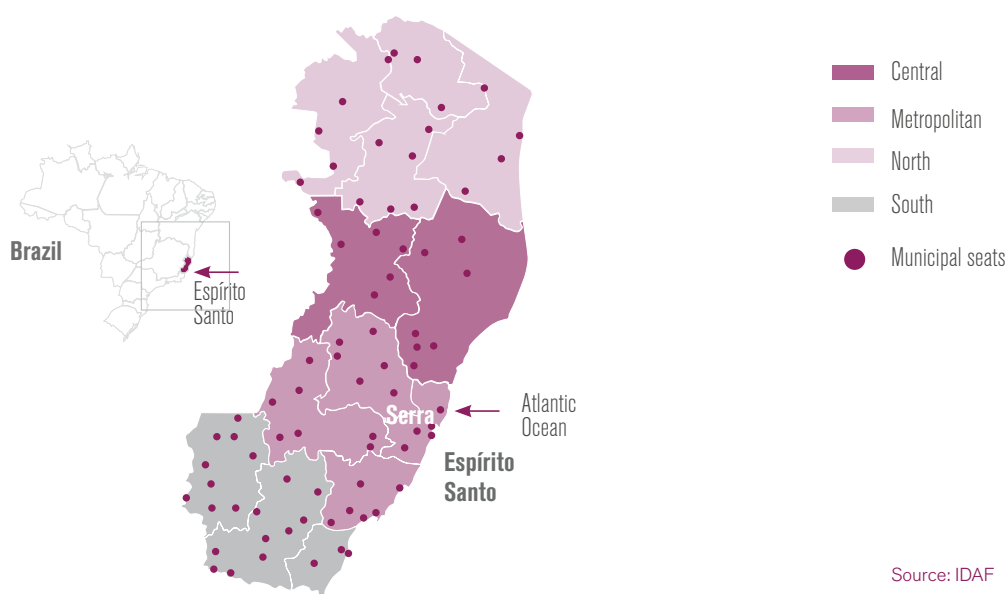
The Federative Republic of Brazil covers 8,514,876 km², being the fifth largest country in the world and the first one in South America. According to IBGE (the Brazilian Institute of Geography and Statistics), Brazil had more than 200 million inhabitants in 2016, close to 50% of the total population on the continent. Brazil is a federal republic formed by 26 states and the federal district. The population is not evenly distributed across the country, concentrating mainly along the Atlantic coast; the state of São Paulo has the largest number of inhabitants.

As per World Bank data, Brazil underwent a strong crisis involving negative GDP growth from 2015 to 2017, where per capita GDP (PPP¹) dropped from USD 16,192.43 to USD 15,123.85. This downturn, which was the first setback after almost uninterrupted growth from the early century, was accompanied by a high inflation rate (6.3%) in 2016 that decreased up to 2.95% in 2015. In addition, it is important to note that unemployment rose from 4.8% in 2014 to 11.8% in the last quarter of 2017.

The municipality of Serra, where this project was implemented, is located in the metropolitan region of Vitória, the capital city of the Espírito Santo state, in the southeastern portion of the country. According to the last official census (2010), the population of the municipality was 409,267 inhabitants, although the IBGE estimated more than 500,000 inhabitants by 2017, Serra being the second municipality with the largest number of inhabitants, second to Vila Velha.

1. Purchasing power parity GDP.

Figure 1. Situation of Serra in the state of Espírito Santo and in Brazil.



From a national perspective, the municipality of Serra is in an intermediate position in terms of standard of living and economy. In 2015, seven out of 10 economically active individuals (14-70 years of age) had a paid job, which made the municipality rank fourth at a state level and 370th at a national level. The municipality's human development index was 0.739 over 1 in 2010, slightly below the state's average rate (0.740), but higher than Brazil's (0.724). It is worthwhile noting the great improvement in this regard in just 10 years, considering that the human development index in 2000 was just 0.634.

In regard to economy, with a GDP volume (at current prices) of BRL 17,588 million (USD 4.64 billion) in 2014, the municipality of Serra ranked No.42 in the nation and second in the state of Espírito Santo.

Industry evolution and current situation

From the second half of the 19th century to the beginning of the 20th century, the first water supply and sanitation services started to be provided in Brazil. These were mainly operated by private companies, which, in general, did not have good quality services. In 1940, service management changed when management powers were transferred to public property local operators that were under the self-governing water and sewerage departments or services.

As a consequence of the urbanistic boom that took place from 1969 to 1971, a national sanitation plan was designed (Plano Nacional de Saneamento, PLANASA), which started to be implemented in 1971 and produced a large investment expansion from 1975 to 1982. This plan laid out the main sanitation services management characteristics, the most outstanding feature being the changed in the responsibility for service provision, which was no longer run by the municipality, but by the state.

The implementation of this plan was supported by the financial contributions by two structural funds, the financial housing system (Sistema Financeiro de Habitação, SFH) and the financial sanitation system (Sistema Financeiro de Saneamento, SFS). Both were managed by the national housing bank (Banco Nacional da Habitação, BNH), respectively, and by the loan funding policies dedicated to the transfer of functions from municipal public operators to regional public operators. These policies were materialized into basic sanitation state companies (Companhias Estaduais de Saneamento Básico, CESBs), of which a total of 27 were created that remained in operation as of 2017, one of them being Companhia Espírito Santense de Saneamento (CESAN) in the state of Espírito Santo.

PLANASA made it possible to achieve centralized service coverage: the traditional municipal management was abandoned and replaced by the establishment of contractual relations between municipalities and state governments, under which the former granted a concession for the provision of supply and sanitation services to state public services.

In 1992, PLANASA was officially shut down, which forced companies to look for self-economic and financial support to provide services. One of the main problems of the Brazilian sanitation policy dating back to that period was the absence of regulation. In fact, it was only in 2004 when Law No. 11445/2007 was passed, subsequently developed by Decree No. 7.217/2010, that the first national guidelines for Brazil's basic sanitation were established.

Along with Law 11455/2007, which represents the national sanitation legal framework, a series of state laws were passed to supplement it and add their own value. An example is Law No. 9096 from 2008, which sets forth the basic sanitation state policy for the state of Espírito Santo.

Under the framework law, state-owned service providers should formulate the basic sanitation public policy and draft the applicable municipal and/or regional plans. In the case of Serra, the Municipal Basic Sanitation Plan (PNSB) was drafted on the basis of Municipal Law No. 4010 from January 30, 2013.

At the same time the above norms were passed, Decree No. 7217 was approved on June 21, 2010 to provide a framework for the National Basic Sanitation Plan (PLANSAB). The design of this plan had already been foreseen in the 2007 law on national basic sanitation guidelines. In addition, the government promoted a far-reaching program called "Água para Todos" (Water for all) under Decree No. 7535 from July 26, 2011. The aim of the program was to facilitate universal access to drinking water and sewerage services.

A review of the status of basic sanitation in Brazil in 2016 shows that, despite the leap achieved thanks to the aforementioned norms, there is still a long way to go to attain the basic sanitation service universalization goal. There is still a persistent large deficit and a significant service disparity depending on the region, the location of the serviced home (rural or urban), and, above all, population income.

PPP regulatory and institutional framework

Regulatory framework

In 1993, Law 8666 was passed, setting forth the norms for public administration calls for tenders and contracts. But it was in 1995, under Laws 8987 and 9074, that the first concession regulations came into force for the provision of public services and the performance of public works in Brazil. These were called ordinary concessions and were characterized by the fact that revenues could only originate from user rates. Later, Law 11079 was passed in 2004, which acted as a framework regulation for PPPs including two additional concession types: administrative concessions, under which the revenues for services could originate from public contributions, and sponsored concessions, under which revenues were formed by a mixture of public contributions and user rates.

Law 11079 was amended on several occasions to reduce the financial cost for PPPs and improve their structuring processes, making them more attractive both for the private sector and the subnational public sector. The main changes have created room for the laws below:

- Law 12024 from 2009, which changed the conditions under which the legal entity under public law representing the federal government can furnish guarantees in favor of subnational governments in order to meet obligations with private partners.
- Law 13043 from 2014, which introduced tax changes.
- Law 13097 from 2015, which included the possibility of transferring a project to the financiers under either full-project-control or just-project-administration conditions.
- Law 13137 from 2015, which established that the PPP law will apply to the executive and legislative public administration branches of power.

The changes made by the Framework Law 12766 from 2012 were extremely important because the concept of variable consideration depending on the works availability was first introduced, along with the possibility of making partial payments when a portion of the construction is ready to be used. The law also requires engineering studies be carried out before the launching of the tender process to estimate the value of the PPP investment with a sufficient level of detail as if it were a draft project. In addition, this norm, in line with Law 12409, changed all the previous provisions applicable to the PPP guarantee fund (FGP), which is designed to ensure the payment of the obligations assumed by federal, district, state or municipal public partners under these types of contracts, with an overall limit of BRL 6 billion (USD 1.58 billion).

Because Brazil is a federal republic, its states, the federal district and municipalities are empowered to create their own special PPP legislation. However, under no circumstances may this legislation contradict National Law 11079 from 2004.

For this study case project, the state of Espírito Santo passed Complementary Law No. 492 dated August 10, 2009, which created the public-private partnership program in Espírito Santo to support, coordinate, regulate and monitor the implementation of PPPs in the state's direct and indirect public administration sphere.

Institutional framework

Brazil is a federal republic and, as such, its institutional structure for PPP management is sometimes shared across national, state and municipal levels. Below is a description of the agents that were most influential in the design, structuring and development of the project under analysis:

Espirito Santo's PPP Management Council (GGP-ES)

This body, as in the case under analysis, approves the results of technical studies and defines the Public-Private Partnership projects, along with

setting up technical work groups that are responsible for the follow-up of PPP contracts. It is also empowered to create a special commission charged with monitoring the contract's economic-financial equilibrium. In the Serra project, this council approved the technical cooperation agreement between the state sanitation company CESAN, the relevant state secretariat and the BNDES.

Espirito Santo's PPP Unit

This body provides technical support to the CGP-ES management council in project and contract drafting and execution, along with stakeholder agencies and entities.

Espirito Santo's Sanitation Company (CESAN)

The main role of this company² is the collection, treatment and distribution of drinking water, along with wastewater collection and treatment in the state of Espirito Santo. To perform these functions in the municipality of Serra, CESAN signed an agreement—a program contract—with the state of Espirito Santo through the state's Secretariat of Housing and Urban Development (SEDURB). CESAN participated in the Municipal Basic Sanitation Plan (PMSB), which created the possibility for the Serra municipality project to be structured under a PPP regime.

Under this contract, the state sanitation company ensures the fulfillment of contract obligations, monitors the PPP, pays for economic considerations and manage customer service, while the concessionaire focuses on the sanitation network's operation, maintenance and expansion. In addition, CESAN continues to be in charge of water supply management.

2. CESAN is a public-private company, classified as a corporation (sociedad anónima, S.A.) under the legal regime of private law.

Brazilian Project Structuring Agency (EBP)

This agency was established as a private company in 2008 when Brazil entities with little expertise in PPPs first started to develop PPP projects. Its shareholders were the main Brazilian banks, and its mission was to support the public sector to improve national and subnational PPP project structuring.

During the first eight years of EBP's existence, a technical cooperation agreement was signed with the National Economic and Social Development Bank, BNDES, under which both entities supported each other to develop a structuring process for these projects. This was the model used in this study case. After these eight years, BNDES gradually abandoned this process and EBP adopted a more central role.

Once authorized, EBP can start to conduct the studies necessary for the preparation of a given project's tender. This authorization is personal and non-transferable, and does not generate any exclusive right or privilege for the structuring entity. If a concession is awarded on the basis of the studies conducted by EBP, the agency's fees are be paid by the private concessionaire under section 21 of Law 8987. Therefore, EBP assumes the risk of anticipating any necessary spending upon

conducting the relevant studies, without any guarantee that these efforts will be paid if the project was aborted. This risk represents an incentive for EBP to structure projects that will end up being successful.

During project structuring and until the project contract is signed, EBP coordinates the conduction of studies and projects, performs value for money studies, manages the public consultation process, and organizes a road show to attract potential tenderers. The approximate duration of all this process for each project is two years, with the participation of four consortia on average in each tender.

Espirito Santo's Public Service Regulatory Agency (ARSP)

This agency guarantees the provision of a satisfactory public sanitation service in Espirito Santo. It was established in 2016 and took over the functions performed by the Espirito Santo's Basic Sanitation and Road Infrastructure Regulatory Agency (ARSI), which was the regulatory institution in force when the concession contract was signed.

ARSP's participation is limited to regulating and monitoring the program contract between the state company CESAN, the municipality of Serra and the state, along with the setting of the rates to be charged by CESAN to users. ARSP has a direct relation with CESAN, but not with the concessionaire.

As part of its regulatory function, ARSP also conducts periodic inspections of infrastructure and is empowered to penalize CESAN if it sees fit. CESAN, in turn, can transfer the penalties to the concessionaire if the cause for the penalty is attributable to the concessionaire. The regulatory agency did not have a direct participation in project structuring, although it was kept informed about the development of this process at all times.

ARSP offered support to the Espirito Santo's PPP Management Council, CGP-ES, on estimating the impact that rates and costs could have on CESAN during the concession term. At the same time, ARSP participated in the round of public consultations about the Municipal Basic Sanitation Plan (PMSB) and the concession contract.

Although this entity does not have direct control over the concessionaire, it regulates the concession indirectly. By means of the concession contract, CESAN can hold the private party liable for defaulting on the contract program—between CESAN, the municipality, the state and ARSP—in connection with obligations for which the private party is responsible.

Table 1 shows a summary of the functions taken over by the different entities involved in the project that is the object of this study case.

Table 1. Distribution of functions during the PPP project structuring, tendering and functioning.

	CGP-ES	UAPP	CESAN	SEDURB	EBP	BDNES	ARSP
Technical cooperation agreement			X	X		X	
Pre-tender studies					X	X	
Approval of previous studies	X	X					
Road-Show and tender	X	X	X	X	X	X	
PPP contract with the concessionaire			X				
PPP contract follow-up			X				
PPP monitoring			X				
Customer service			X				
Follow-up of contract between Serra and CESAN							X

Source: House on the basis of the concession contract

Project features

Project rationale

The United Nations Sustainable Development Goals (SDG) defined in 2000 established the objective in Target 7.C to halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation.

Brazil partially attained this goal in 2015, when 83.3% of the population attained access to safe drinking water. This fact coincided with Brazil hosting two major international events: the World Cup in 2014 and the Olympic Games in 2016. However, the gap regarding wastewater collection and treatment was still wide, with just half the population, 50.3%, with access to these services. In addition, there were regions and municipalities that lacked adequate coverage highlighting the strong territorial disparity that

pervaded Brazil in regard to these services. This was the case of Serra, a municipality in Espírito Santo, before project implementation, with levels of access to basic sanitation services below 60%.

The state of Espírito Santo's Strategic Sanitation Plan set service universalization as a goal for 2030. CESAN's plan was to develop six PPP projects in parallel in the majority of the municipalities that make up the metropolitan area of Gran Vitoria, where the municipality of Serra is located. However, it was finally decided to launch the first project in 2013 as a test. Based on the results, the other projects would be developed either using the PPP model or switch back to the conventional model.

It was decided to develop the first project in the municipality of Serra owing to the important problem suffered as a consequence of the low percentage of access to the sanitation network (about 60%), coupled with the strong pollution of nearby ponds. One of the reasons why this expansion had not been tackled before was the complicated orography of the area, which made the facilities more expensive. Launching the project under a PPP modality would make it possible to improve services, while lowering the burden on public budget.

Project structuring

In May 2010, a technical cooperation agreement was signed for 24 renewable months between SEDURB, CESAN and BNDES for project structuring, particularly public-private partnership projects, oriented toward the implementation of sanitation services in the Metropolitan Region of Gran Vitoria. The agreement, along with the cooperation agreement between BNDES and EBP, authorized EBP to develop PPP studies. Of note is that CESAN and SEDURB had the power to authorize prefeasibility studies from any companies they deemed necessary, although, advised by BNDES, they only authorized EBP.

As has been explained, the original idea was to tackle six PPP projects in parallel across the state. However, it was later decided that this strategy was not viable in this first phase and efforts just focused on the municipality of Serra. Several supply alternatives were discussed, and it was finally determined that the PPP model was the right one. EBP reached this conclusion after conducting a value for money study that was considered valid by CGP-ES, SEDURB and CESAN. Unfortunately, this study was not made public. Many countries in the world are evolving toward greater transparency in the documents used for project structuring and tendering. Not disseminating studies to the public without justified grounds shows that there are issues yet to be solved in this regard in Latin America.

In addition to the above *value for money* study, EBP developed a reference technical solution that it used as the basis for tenders.

Tenderers, however, were free to adopt the solution they deemed most appropriate, provided they met the quality goals under the contract. The future concessionaire had to pay EBP for its services pursuant to section 21 of Law

8987/95; the cost of which must be reflected in the tenderer's economic-financial plan. The set of studies conducted to provide grounds for the project and the use of the PPP mechanism were presented by EBP to CGP-ES on March 8, 2012 and approved on April 11 of the same year at an extraordinary meeting of the PPP management council.

The tender was preceded by a public hearing on May 3, 2012 and a public consultation that ran from April 13 to May 14, 2012. For the first time, Municipal Law No. 4010 from January 30, 2013 authorized CESAN to implement a PPP and created the Municipal Basic Sanitation Plan (PMSB), which was partly supported by the previous studies conducted by EBP. In this way, a legal basis was provided for the future concession and the required sanitation goals to be met were laid out.

The edict governing the conditions for the tender process was published on March 13, 2013, and the deadline for the submission of tenders was May 2, 2013. These started to be evaluated on August 29, 2013 and the winning tenderer was announced on October 16 of the same year.

On July 1, 2014, the concession contract was signed between CESAN and the winning tenderer. This ended the work by EBP. The major milestones along process structuring and tendering are shown in Table 2 below.

Table 2. Summary of the major milestones in the project structuring and tendering process.

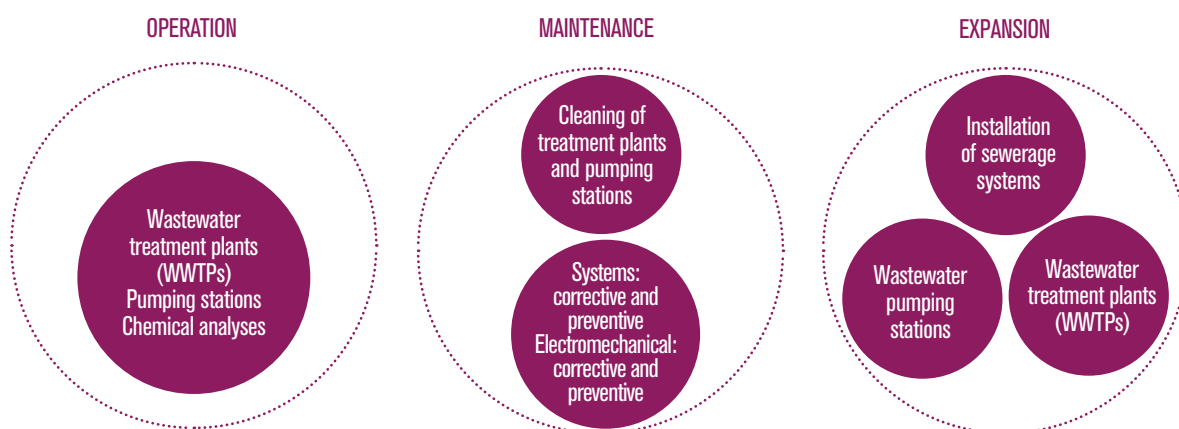
	DATE
Signing of technical cooperation agreement with BNDES and authorization to EBP to participate in project structuring	May, 2010
Approval by CGP-ES of previous studies conducted by EBP and BNDES	April, 2012
Public consultation	April and May, 2012
Public hearing	May, 2012
Municipal Law No. 4010 authorized CESAN to find ways to partner with the private sector and approved the PMSB	January, 2013
Presentation of tender conditions	March, 2013
Deadline for tender submission	May, 2013
Opening of envelopes	August, 2013
Announcement of winning tenderer	October, 2013
Signing of concession contract	July, 2014

Source: EBP

Project goals and definition

The project assumed that CESAN would assign the operation and maintenance of the existing sanitation network to the concessionaire. This, in turn, was to expand the network and fulfill the duties shown in Figure 2 below. CESAN would still be required to fulfill its own obligations associated with water supply services.

Figure 2. Services to be rendered by the concessionaire.



Source: CESAN

Here, it is important to distinguish two concepts: 1) the network's accessibility or coverage level and 2) the connection level. The former refers to the number of households that have access to the network (regardless of whether they are connected or not), while the latter is the number of households that are actually connected to the network. The reason why households that have access to the network are not connected is because the connection requires the payment of a fee by the user, and users may not be interested in paying the fee if they have their own sanitation system such as a septic tank.

Project goals were described in the Municipal Basic Sanitation Plan (PMSB) approved by Municipal Law No. 4017 from January 30, 2013. The plan presented the situation of the sanitation network at the time, and laid out the goals to be achieved as well as an investment plan for the following 30 years. It was designed by the municipality administration with the technical support of several experts and CESAN, and subject to public participation.

One of the main goals in the PMSB is to ensure universal access (understood as a 95% access) to the sanitation network by year 10 of the

concession (2024). In 2011, when CESAN first introduced the project, the percentage of access was around 60%. The target coverage level should remain unchanged until the end of year 30 of the concession, as reflected in Table 3.

Table 3. Project's coverage and population targets.

	Year 1	Year 10	Year 20	Year 30
Coverage rate	60%	95%	95%	95%
Urban population	470,736	541,515	586,789	606,338
Covered population	310,685	514,819	557,449	576,021

Source: EBP

In addition, the idea was to increase the percentage of treated wastewater given that Serra was facing a serious disposal problem in nearby ponds, which was causing serious environmental issues. Wastewater treatment methods were one of the critical points in the contract. Efforts were made to adopt the most modern techniques to generate the least amount of harmful waste for the environment.

It is worth pointing out that the project comprised almost the entire municipality of Serra, although some small zones were left out on technical grounds. These neighborhoods, called small-sized districts in the PMSB, were very far from the municipal downtown area and would be better taken care of under a self-management model. To this end, cooperation was requested from CESAN's rural sanitation division that developed infrastructure, and then the community was entrusted with responsibility for system operation. The Praia Grande neighborhood, however, was included in the contract for technical reasons, despite belonging to the municipality of Fundão.

As per the contract, the concessionaire took over CESAN's functions in terms of the network's operation, maintenance and expansion. CESAN, in turn, continued to manage the relationship with the client. Under this scheme, complaints are made by users directly to the state-owned company, which then forwards them to the concessionaire. CESAN is also charged with monitoring the PPP and defining the investments to be made in order to meet the PMSB. ASRP is the ultimate entity empowered with the function to determine whether the service rendered to users is up to standards. Therefore, ASRP's functions did not vary before or after the concession contract. In other words, its mission is not to regulate the concession contract, but to ensure the provision of an adequate service. This body is also empowered to penalize CESAN if it cannot guarantee fulfilment of the required service standards, even though non-performance might be the concessionaire's fault, because ASRP does not have a direct relationship with the concessionaire.

Users pay the service connection charges to CESAN, and the concessionaire receives, in turn, a monthly payment by CESAN, comprising two parts: a fixed payment in line with the investment made, and a variable payment based on the volume of treated wastewater.³ Each of these payments is modulated by performance indexes, so that if the concessionaire does not reach the contract goals in terms of these indicators, it will receive a lower payment.

Upon expiration of the contract term, the concessionaire will automatically return to CESAN all instruments, facilities and other property and assets, rights and privileges associated with the concessioned service, including those previously transferred to the concessionaire by CESAN. Property and assets associated with the concession will be all those necessary to regulate the sanitation system operation for at least two years, according to the needs at the time of contract completion. The concessionaire will be required to make an inventory of the assets to be delivered to CESAN and should ensure that they are free from any onus.

3. Treated wastewater refers to the wastewater volume actually measured using micro-metered methods on sewerage system connections that are also active on CESAN's database.

Contract tender and award

Pre-existing studies

As already described, out of all the sanitation projects slated for development in the metropolitan area of Vitoria, Serra was the first. This project would become a benchmark for future PPPs, like the project in the neighboring city of Vila Velha, which was tendered a few years later.

After the project location was defined and the PPP model was determined to be suitable, EBP developed a technical solution and a reference business plan. These served as a basis for tenderers' proposals and met the goals subsequently included in the PMSB. The reference solution had to reflect the technical, environmental and economic conditioning factors below:

The technical aspects were the following:

- Have a proven technical efficiency during its service life at CESAN's facilities or at facilities in other regions in Brazil. Specifically, the document mentioned a system of up-flow anaerobic reactors.
- Take into account aspects related to the greater or smaller proximity between systems so that the treatment plants can be set up efficiently.
- Adopting suitable measures for the final disposal of generated solid waste. In regard to environmental aspects:
- This control implied the need to create instruments to evaluate the evolution of water quality based on the kind of receptor body to facilitate the setting and control of the established goals.
- Meeting progressive goals in terms of the receiving body of water type in line with environmental legislation. This control entailed the need to create instruments for the assessment of the evolution of water quality according to the receptor body of water type to facilitate goal setting and monitoring.

- Controlling the body of water receiving WWTP effluents against the parameters set for the type of water resource.
- Affecting the considered areas to a minimum before carrying out any implementation, extension or improvement proposed, as the natural conditions of most of the areas had already been fairly affected or were in an environmentally fragile status.
- The location of WWTPs should conform to the Urban Master Plan and its usage zones and land occupancy provisions.

From an economic standpoint, the solution needs to meet two fundamental aspects:

- The concessionaire had to use the capacity of existing facilities in the most efficient possible manner. In addition, it should adapt or extend the deficit units and supplement the system with any new necessary facilities to afford population growth and the expansion of the urban mesh.
- The concessionaire was required to achieve a significant reduction in the number of treatment facilities, as it was too large and multiplied the need for operation and maintenance equipment, with a resulting increase in costs.

The reference solution proposed by EBP was the result of an economic and financial study comparing several alternatives. To this end, parameter curves of implementation costs and operation expenses were reviewed to estimate a budget. This was helpful to choose among these curves without delving into technical particulars, which further allowed future tenderers to understand what CESAN wanted to find.

Some initial projections were performed to develop the reference business plan, which were used as basic assumptions (population projections and wastewater-to-be-treated volume). To calculate OPEX and CAPEX, the works needed were defined to attain sanitation goals.

Actions were divided into sewerage and treatment investments. Sewerage investments comprised connections, sewerage networks, trunk sewerage networks and wastewater pumping stations. Treatment investments included WWTP (wastewater treatment plants) using UASB technology (up-flow anaerobic reactors). The estimated total investment was BRL 409 million (USD 108 million).

Operation expenses were divided, on one hand, into expenses associated with rendered services: chemicals, sludge, electric power, operators, materials and services; and, on the other, overhead, administrative and ITC service expenses. The sum of the estimated nominal value was BRL 722.7 million (USD 191 million).

Revenue projection was directly related to the payment model that will be described in the next sections. The payment was divided into two parts:

- Fixed payment: it returns CAPEX and is affected by the construction performance indexes, so this payment is penalized if the concessionaire does not meet the reference values relative to these indexes. To estimate its amount, it was established as a condition that after penalties for

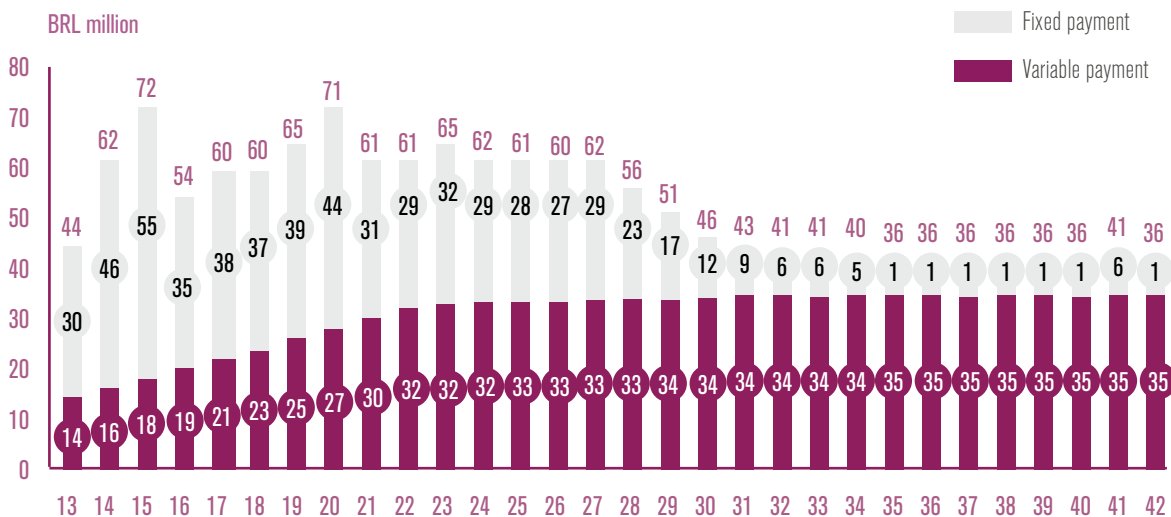
indicators and taxes, obligations arising from initial investments could be paid to a reference financial institution.

- Variable payment: it returns OPEX and is calculated using a unit price that is multiplied by the treated wastewater volume. The price is modulated by the operation performance indexes, which, as the fixed portion of the payment, penalize the result when certain minimum values are not attained.

The unit price that is multiplied by the treated wastewater volume to make up the variable portion of the payment to the concessionaire was determined on the basis of a simulated cash flow, reaching a maximum value of BRL 1.36/m³ of treated water (USD 0.36/m³). This value, combined with this study's financial assumptions and projections, generated an IRR (internal rate of return) consistent with those that were commonly found in the Brazilian market. At the same time, a unit value of BRL 0.35/m³ of treated wastewater was determined (USD 0.09/m³) for wastewater from Praia Grande (Fundão). The difference between both values can be explained by the different costs of the treatment. This calculated unit price of BRL 1.36/m³ is very important for the tender process because tenders were evaluated in terms of the discount percentage that the concessionaire offered on this price.

The sum of fixed revenues projected over the concession term was BRL 622,913 million (USD 164.5 million). The sum of the variable revenues was BRL 907,045 million (USD 239,5 million), which involved a total estimated payment of BRL 1,530.0 billion (USD 404 million) over the course of the concession term.

Figure 3. Estimated payment.



Source: EBP

The financial model used estimated a debt volume of BRL 223 million (USD 58.9 million), representing the funding of around 55% of total investment. The reference values used for the calculation were the rates and conditions offered by a benchmark financial institution. It is important to highlight that, even with the incidence of reducing factors (taxes and indicators), the simulation of this payment reached values that were always sufficient to guarantee debt repayment.

Table 4. Main estimated project economic values.

	Final value	Unit
Total investment	BRL 409,018	BRL thousand
Operation expenses	BRL 722,747	BRL thousand
Financing	BRL 222,888	BRL thousand
Payment	BRL 1,529,958	BRL thousand
Fixed portion	BRL 622,913	BRL thousand
Variable portion	BRL 907,045	BRL thousand
Reference price of the rendered service	BRL 1,36/m ³	BRL/ m ³ of treated wastewater
Reference price Praia Grande (Fundão)	BRL 0,35/m ³	BRL/ m ³ of treated wastewater

Source: EBP

Tender award and valuation mechanism

The tender was preceded by a public hearing pursuant to section 39 of Federal Law No. 8666, duly published in the Official Gazette of the State on April 18, 2012 and issued on May 3, 2012. Another public hearing was also conducted from April 13, 2012 to May 14, 2012.

The edict establishing the conditions governing the tender process was published on March 13, 2013. Tenderers could send questions and statements about the process up to five days before the submission of proposals. The deadline for the submission of tenders was May 2, 2013.

The special commission for the tender was formed by five members. The president was from SEDURB; the legal, financial and technical members were from CESAN; and the administrative member was from the Espírito Santo PPP unit.

Although no explicit prequalification process was performed, tenderers were required to include in one of the envelopes (envelope C) some proof of technical experience in the services they planned to provide. In addition, only the participation of Brazilian or foreign legal persons was allowed, as well as supplementary pension funds and investment funds (either alone or as

part of a consortium), and public-private companies. No public company that was a member of the federal, state, district or municipal administrations was admitted in the process.

Finally, four consortia participated in the tender: e

- Consórcio Serra Ambiental: formed by the companies Sonel Engenharia Ltda. (leader), Construtora Aterpa M.Martins Ltda. and Mauá Participações Estruturadas S/A.
- Consórcio Serra Ambiental (same name as above): formed by companies Saneamento Ambiental Águas do Brasil Ltda. (leader), Carioca Christiani-Nielsen Engenharia S/A and Sanevix Engenharia Industrial Ltda.
- OAS Investimentos S/A.
- AEGEA Saneamento e Participações S/A.

Although tenderers had a previous solution designed by EBP, they were free to develop the sanitation network in the way they deemed to be the most appropriate, provided the goals in the PMSB were attained, and the concessionaire assumed the design risk. The concessionaire must also bear the expropriation costs, but CESAN and the government authorities were required to declare the property to be expropriated of public benefit before the expropriation was accomplished.

Each tenderer had to deliver a total of three envelopes including the information below:

- i. Envelope A: it had to include the representation documents and an affidavit stating knowledge of the terms of the tender. It was also required to include a tender guarantee for a minimum value of BRL 4 million (USD 1,056,000) that could be stated in national currency, federal government debt securities, insurance-guarantee or surety with a minimum term of 270 days. The guarantee would be enforced if the tenderer were to withdraw its tender during the validity term, if the winning tenderer was considered forbidden to act when “envelope C” was opened, or if the winning tenderer did not sign the concession contract within the established term.
- ii. Envelope B, including the tender, comprising three documents:
 - A business proposal. The tenderer had to submit a proposal including the unit price offered and a discount on the maximum unit price set at BRL 1.36/m³ of treated wastewater.
 - A statement signed by a financial institution endorsing the viability of the business proposal. The institution had to be authorized to operate by the Central Bank in Brazil or a similar foreign institution.
 - A confidentiality agreement signed by the financial institution.
- iii. Envelope C, that had to include the whole series of administrative documents that supported the tenderer’s ability to develop the project. In this envelope, the tenderer was also required to include proof of sufficient technical experience and economic solvency to perform the contract. The tenderer had to prove that it had performed and operated similar projects, and that its net equity until the date of delivery of the documentation and proposals was equal to or higher than BRL 40 million if it was a consortium (USD 10,563,200).

After the proposals were presented, the envelopes were opened on August 29, 2013, according to Law No. 8666 dated June 21, 1993, Law No. 8987 dated February 13, 1995, and Law No. 11079 dated December 30, 2004 and amendments thereto, as well as the Complementary State Law No. 492 from August 10, 2009.

First, “envelope A” documents were analyzed. BM & FBOVESPA (Bolsa de Valores, Mercadorias e Futuros) were appointed to determine the regularity of the representation documents, the preliminary statement and the furnished guarantees; they should inform the tender commission of the result of their evaluation and, if any of the tenderers did not meet the requirements, they should be banned from participating.

As all participants successfully passed the evaluation of “envelope A,” “envelope B” was opened in a public ceremony and its contents were reviewed by the tender commission appointed by CESAN. The commission examined the business proposal and sorted the candidates according to the lowest bid price, considering always the lowest unit price. Table 5 below shows the proposals of each participant.

Table 5. Submitted tenders

Company	Consortium	Offer	Discount
	-Sonel Engenharia Ltda. (leader)		
Consórcio Serra Ambiental	-Construtora Aterpa M. Martins Ltda. -Mauá Participações Estruturadas S/A	BRL 1,06/m ³	22.06%
	-Saneamento Ambiental Águas do Brasil Ltda. (leader)		
Consórcio Serra Ambiental	-Carioca Christiani-Nielsen Engenharia S/A -Sanevix Engenharia Industrial Ltda.	BRL 1.14/m ³	16.18%
OAS Investimentos S/A		BRL 1.32/m ³	2.94%
AEGEA Saneamento e Participações S/A		BRL 1.33/m ³	2.21%

Source: CESAN

Finally, envelope C submitted by the tenderer that was best rated in the previous process (Consórcio Serra Ambiental) was opened. This consortium was declared the winning tenderer upon verification that all the requirements under the tender documents were met.

On October 16, 2013, the winning tenderer was officially announced. It was Consorcio Serra Ambiental, whose tender was BRL 1.06/m³ of treated wastewater, which meant a 22.06% discount on the top unit price

(BRL 1.36). The tenderer ranked second (the other Consorcio Serra Ambiental) filed a motion against the selection that was not successful, so the contract was finally signed on July 1, 2014.

In 2016, Aegea, one of the biggest sanitation companies in Brazil, that had unsuccessfully participated in the tender, purchased the majority of the stock of the companies that formed the winning consortium. It then became the main partner of Serra Ambiental. CESAN had to approve this transaction.

Contract design

Payment to concessionaire

The contract between CESAN and Serra Ambiental was signed for an estimated value of BRL 805,949,541 (USD 212,835,154)⁴ corresponding to the net updated value (VAN) of the payment to be received by the concessionaire over the 30 years of the concession life. As has already been explained, this is an administrative concession because the concessionaire's revenues originate fully from the public entity and not from the rates paid by users.

The payment model is based on monthly payments by CESAN to the concessionaire equivalent to the sum of two portions: a fixed and a variable one, impacted by the construction and operation performance indexes, respectively.

4. It should be highlighted that this value is updated using the applicable discount rate (6%) of the estimated consideration and according to the 22.06% discount on the unit price offered by the concessionaire compared to the top tender value.

$$CM = Pf * IDC + Pv * IDO$$

- CM*: Monthly payment
- Pf*: Fixed portion
- IDC*: Construction performance index
- Pv*: Variable portion
- IDO*: Operation performance index

The fixed portion represents CAPEX payment, an investment made by the concessionaire. This payment, an invariable value in principle, will be distributed along the 360 months of the concession and will be reviewed annually to adjust it by inflation according to the national consumer price index. Its amount was determined based on values calculated in the previous business plan, BRL 622.912 million (USD 164.5 million), that ensured a payment to a reference financial institution and its adjustment according to the 22.06% discount on the unit price offered by the concessionaire compared to the top tender value. Along these lines, the maximum total payment set forth in the contract for the fixed payment was BRL 485,498 million (USD 128.21 million) before any penalty under the construction performance indicators (IDC). Figure 4 lays out the process for the calculation of the fixed payment.

Figure 4. Fixed payment portion.



Source: Authors

The variable portion pays for the operation by the concessionaire (OPEX) and is calculated by multiplying the unit price (BRL 1.06/m³ of treated wastewater) by the volume of treated wastewater measured by CESAN using micro-metering methods. This value will be adjusted by inflation on an annual basis.

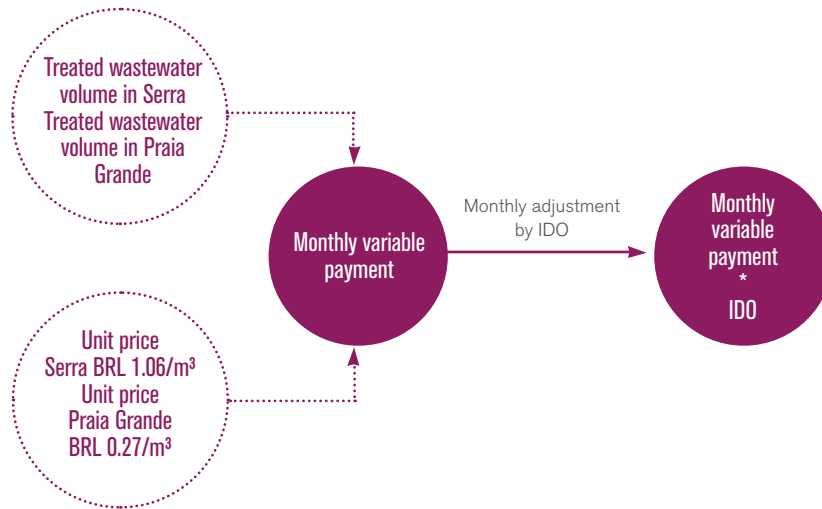
$$P_v = (PU * V) + (PUF * VUF)$$

- P_v* : Variable payment portion
- PU*: Unit price under the contract
- V*: Treated wastewater volume
- PUF*: Unit price under the contract for Praia Grand area
- VUF*: Treated wastewater volume from the municipality of Fundão

The variable portion of the payment can be penalized if, during the quarter, the goals are not met in line with the operation performance indicators.

It also should be remembered that Praia Grande sewerage, in the municipality of Fundão, is included in the project, under the same scheme, but with a unit price for the wastewater originating in this area of BRL 0.27/m³ of treated wastewater. Figure 5 below lays out the process for the calculation of the variable price.

Figure 5. Variable payment portion.



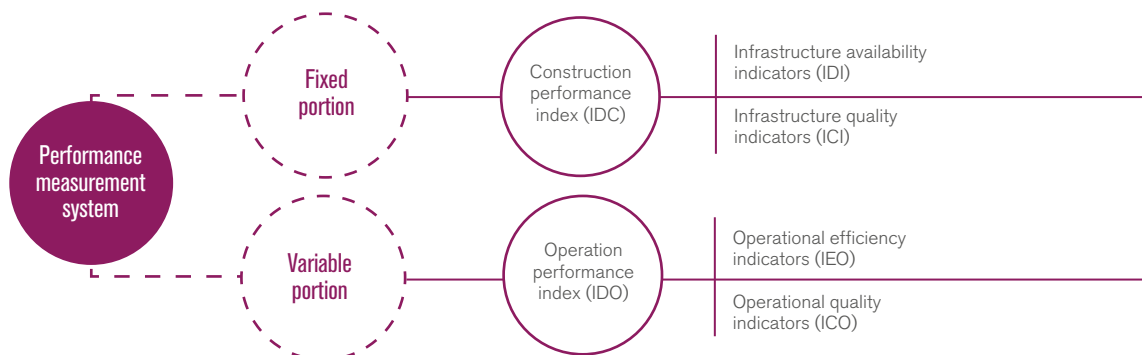
Source: Authors

Performance goals and indicators

Setting out a system of goals and objectives for the project had the purpose of guaranteeing the availability of the projected infrastructure and the quality of rendered services according to the rules in force and the required certification standards. To this end, two types of performance indexes were defined, construction and operation.

The construction performance index modulates the fixed portion of the payment and is divided into the infrastructure availability index, with a weight of 60%, and the infrastructure quality index, with a weight of 40%.

Figure 6. Concessionaire's performance measurement.



Source: CESAN-Serra Ambiental

Infrastructure availability indicators (IDI) refer to the level of network accessibility and the level of treatment. As has already been described, one of the objectives of the project was to reach 95% coverage in concession year 10 starting at 60% coverage in year zero. The reference value of this indicator is variable over time. However, the reference value of treatment security, evaluating the security of the system's rated treatment capacity against demand, is fixed.

Table 6. Infrastructure availability indicators.

	Type of indicator	Reference value		Unit of measure	Weight
		Year 1-10	Year 10-30		
Level of network accessibility	Accrued	Progressive growth starting at 60% in the 4th quarter of year 1	> 95%	% of households with the possibility connecting to the network	50%
Treatment security factor	Accrued	> 1.1		Monthly installed capacity Average monthly flow*	50%

* Recorded in the quarter of the station having the lowest ratio between recorded treatment and installed capacity.

Source: CESAN-Serra Ambiental

Infrastructure quality indicators (IQI) were developed to reflect the service operational quality provided by the concessionaire during the works performance phase. The contract included four indicators in all, with fixed reference values. These indicators are defined in Table 7.

Table 7. Infrastructure quality indicators.

	Type of indicator	Reference value	Unit of measure	Weight
Accident frequency index	Individual	< 10	Number of accidents per million hours	10%
Complaints by clients and public agencies regarding the works in general	Individual	< 24.5	Number of complaints per km of constructed network	30%
Complaints by clients and public agencies regarding the pavement status	Individual	< 9	Number of complaints per km of constructed network	50%
Environmental regularity of treatment systems during the works performance phase	Accrued	> 100%	Updated environmental licenses during construction	10%

Source: CESAN-Serra Ambiental

The reference value of the accident frequency indicator⁵ is determined based on the number of accidents per each million hours actually worked during works development. Complaints indicators are quantified per kilometer of network and per quarter, and a distinction is made between complaints about the works in general (traffic problems, noise, etc.) and those referred to the pavement status. Finally, the infrastructure quality indicator relative to environmental regularity refers to the proportion of environmental licenses that need to be kept up to date during the works performance phase.

Accidents at work, involving physical injuries, covering the whole workforce (own and third-party's).

The operation performance indicator adjusts the variable portion of the payment in line with two sub-indexes: the operational efficiency sub-index, with a weight of 60%, and the operational quality sub-index, having a weight of 40%. The operational efficiency sub-index (IEO) was developed to evaluate availability and efficiency during the sanitation system's operation phase. It is made up of six indicators, some of which are fixed and other, variables, that take as initial reference values those that were customary before CESAN ceased to operate the sanitation system. The set of indicators and their reference values are shown in Table 8.

Tabla 8. Operational efficiency indicators.

Type of indicator		Reference value					Unit of measure	Weight
Connectivity index	Accrued	Year 1-2	Year 3-4	Year 5-10	Year 11-15	Year 16-30	% of households connected to the network over the potential ones	40%
		> 65%	> 75%	> 80%	> 90%	> 95%		
Elimination of organic load	Accrued	Year 0-10			Year 10-30		BOD elimination efficiency ⁷	25%
		> 85%			> 90%			
Availability of EEEs ⁸	Individual	> 100% ⁹					% of operational hours of EEEs	10%
Wastewater leaks	Individual	Year 1-3		Year 4-7	Year 8-30		Leaks per network km	10%
		< 1,2		< 1,0	< 0,7			
Branch line blockages	Individual	Year 1-3		Year 4-7	Year 8-30		% of blocked connections	10%
		< 2,4		< 1,8	< 1,2			
Odors	Accrued	> 100%					% of effective odor elimination systems	5%

7. Biochemical oxygen demand.

8. Wastewater pumping stations as per the initials in Portuguese.

9. These values should disregard duly justified cases, such as: preventive maintenance, theft / vandalism (up to 24 h) and scheduled power outages.

Source: CESAN-Serra Ambiental

The connectivity index, as indicated by its name, refers to the proportion of actual user connections to the points reached by the network. The contract requirement for this indicator increases over the concession years. The rest of this type of indicators refer to different operation and maintenance elements, such as the blockages of branch lines or the appearance of odors.

The second operational index is quality, designed to measure user satisfaction and the sanitation system service quality during operation. It is made up of four indicators, shown in Table 9.

In regard to the care of requests, maximum response times are established according to the need to be met:

- A request for network connection -> Within 15 business days.
- An obstruction -> Within 24 hours.
- A request to perform other works > Within 48 hours.

It was decided to use surveys to measure user satisfaction and that the general user satisfaction for rendered services would be distinguished from the care of service requests by the concessionaire (service level).

Environmental regulation aims to measure the percentage of environmental licenses in the operation stage (operation license and environmental regularization license) that are up to date within the applicable quarter term.

Table 9. Operational quality indicators.

	Type of indicator	Reference value			Unit of measure	Weight
Average time to take care of a request on the network	Individual	> 100%			% of requests taken care of within maximum time limits	35%
General satisfaction	Individual	Year 1-3 > 65%	Year 4-7 > 70%	Year 8-30 > 75%	% of optimal and good in surveys	25%
Satisfaction about service level	Individual	> 90%			Degree of satisfaction for the level of service obtained as per survey	30%
Environmental regularity of treatment systems during the operational phase	Accrued	> 100%			Updated environmental licenses during operation	10%

Source: CESAN-Serra Ambiental

Three agencies participate in the indicator evaluation process: the concessionaire, CESAN and an independent auditor. The concessionaire produces a quarterly indicator report that is reviewed by the independent auditor and CESAN. The report must contain, in addition to the regular updates planned for each performance index, their history and a detailed list of indicators and the measurements performed during the reported period.

The independent auditor, hired and paid by CESAN, checks for the validity of the indicator report by analyzing the produced documentation submitted by the concessionaire and based on occasional index follow-up visits, as needed. The independent auditor is hired for 24 months, renewable for an equal term. After this period, a new firm must be hired to perform this function.

CESAN makes the monthly payments to the concessionaire according to the performance indexes verified by the independent auditor. Each indicator is scored from 0 to 4, according to the deviation percentage observed as compared to the allocated reference value, where 0 is a very serious deviation and 4 an almost null deviation. These reference values are aligned with the strategic goals set for the provision of sanitation sewerage services. The thresholds were defined taking account of their viability within the terms foreseen according to the available technology.

Allowed deviation values are separated into two groups: accrued indicators and individual indicators. Accrued indicators are those whose reference values reflect an accrued goal, while individual indicators reflect the value measured only in the quarter when the measurement was performed and not the accrued value of quarterly measurements.

Table 10. Score table for accrued indicators.

Concept	deviation %	Score
No deviation	Refv < 2%	4
Mild deviation	2% < Refv < 5%	3
Relevant deviation	5% < Refv < 10%	2
Serious deviation	10% < Refv < 15%	1
Very serious deviation	Refv > 15%	0

Source: EBP

Table 11. Score table for individual indicators.

Concept	deviation %	Score
No deviation	Refv < 5%	4
Mild deviation	4% < Refv < 10%	3
Relevant deviation	10% < Refv < 20%	2
Serious deviation	20% < Refv < 30%	1
Very serious deviation	Refv > 30%	0

Source: EBP

The performance indexes' (IDC and IDO) calculation formula takes into account the indicators that make up these indexes and their respective weights, according to the formula below:

$$IDC = 0,6 + (\sum_{i=1}^n \text{Construction indicator}_i * \text{Weight}_i) / 10 ; 0,6 \leq IDC \leq 1$$

$$IDO = \sum_{i=1}^n \text{Operation indicator}_i * \text{Weight}_i / 4 ; IDC \leq 1$$

Risk distribution and economic-financial equilibrium

The concession contract lists the risks that each party should assume as shown in Table 12.

An aspect that deserves highlighting is the way in which this contract has managed demand risk. Higher demand benefits both CESAN and the concessionaire. CESAN benefits from an increase in revenues from users and the concessionaire benefits from a larger volume of wastewater to be treated, which increases the amount of the variable payment received.

The fact that the concessionaire's revenues from investments are fixed and that operation revenues are linked to operation costs slightly mitigates the demand risk assumed by the concessionaire. In spite of this, the concessionaire will still take on a certain demand risk because the expected variable payment has an important weight in the full payment. CESAN assumes a certain risk that committed payments should be higher than the revenues from system users. This risk, however, is mitigated because an important portion of the payment to the private party depends on the system use.

Rate calculations were performed so that the project does not generate a public subsidy to CESAN. In other words, the payments that CESA expects to make to the concessionaire are lower than the revenues CESAN expects to receive from the users in exchange for the rendered service, a fact that also helps mitigate the risk assumed by the state company if demand is lower than projections. CESAN applies to users the rate table established by the contract regulatory agency, which, for the Metropolitan Region, is the Public Service Regulatory Agency (ARSP).

Before works were performed at any specific area, the concessionaire held meetings with dwellers associations, which have a strong impact on the local public opinion. This made the concessionaire's relation with local communities easier, which is very important for works performance to develop smoothly. As has already been described, both the concessionaire and CESAN are interested in having as many users as possible connected to the system, so the incentive for both parties is guaranteed.

Along these lines, Serra Ambiental is committed to developing an awareness plan to incentivize system users to connect to the sanitation network. However, the concessionaire will not be penalized if, having tried to persuade a user up to three times, its efforts are unsuccessful. The fact that higher demand benefits the concessionaire assures a proactive attitude on its part to develop this awareness plan.

Table 12. Risk allocation matrix.

Type of risks	Concessionaire's	Shared	CESAN's
Damage to third parties	X		
Design	X		
Construction, operation, maintenance cost overruns or indicators' measurement	X		
Expansions of the network over and above what was foreseen in the contract			X
Archaeological finding ¹⁰		X	
Change in quality standards ¹¹		X	
Demand		X	
Occupational safety	X		
Term delays	X		
Force majeure ¹²		X	
Environment ¹³	X		
Geotechnical	X		
Strikes	X		
Hidden defects	X		
Change of law			X
Interest rate	X		
Exchange rate	X		
Inflation			X

10 The derived cost would be borne by the concessionaire, but delays would be assumed by CESAN.

11 These will be assumed by the concessionaire provided this does not entail any significant cost increase.

12 These will be assumed by the concessionaire when coverage is accepted by Brazilian insurance companies at least two years in advance to the time of event occurrence.

13 Civil and criminal costs and liabilities.

Source: EBP

Provided contract conditions are fulfilled in line with the risk allocation under the contract and shown in Table 12 above, the economic-financial equilibrium is deemed to be preserved. Otherwise, this equilibrium should be rectified.

The process to redress the economic-financial equilibrium can be initiated at the request of CESAN or the concessionaire. CESAN can choose the measures to reestablish the equilibrium, which, in general, can be the following:

- A change in the value of the unit price that composes the monthly payment.
- A change in the concession term, which cannot be extended more than five years from the original term.
- A change in the concessionaire's contract obligations.
- Another form decided by common agreement between CESAN and the concessionaire.

The contract will be deemed to be rebalanced when the impacts of the events that originated the request for the reestablishment of the economic-financial equilibrium are offset by the imposition of cash flow overlay measures so that the net current value of the cash flow has a value equal to 0, calculated by the formula below:

$$VPL = \sum_{t=1}^t \left(\frac{Ct}{[1+r]^t} \right)$$

Where:

- VPL:** Net current value of the nominal cash flow developed to show the effects of the events that led to the request to correct the contract economic-financial equilibrium
- t:** Reference term of the effects of developments
- C:** Current monetary value of the events in each **t** term
- r:** Discount rate equal to the long-term interest rate (TJLP) current during equilibrium redressing or another rate that could replace it, plus 4 percent points.

To solve technical or economic discrepancies, or any controversy related to performance indicators, CESAN can conform a technical committee within less than 30 days from the notice of controversy either by CESAN or the concessionaire. The technical committee will be formed by a member from CESAN, a member from the concessionaire and an expert appointed by common agreement whose fees will be paid by both parties. The aggrieved party will file its allegations within 15 days. The committee, in turn, will have an additional 30-day term to discuss the matter and issue an opinion that will be considered valid when there are at least two favorable votes out of the three votes cast by the members.

During this process development, the concessionaire will continue to be under the obligation to perform its functions. As of October, 2017, just one request for rectifying the equilibrium had been submitted due to a discrepancy between the information in the tender document and the situation that was actually found at the start of the concession, which was being processed.

Furthermore, if the conflict between the parties is related to the enforcement, interpretation or integration of the rules governing the administrative concession, the conflict will be solved by arbitration. To this end, an arbitration tribunal will be formed that will have the same structure as the technical committee above: a CESAN member, another member from the concessionaire and an expert appointed by the parties by common consent. The arbitration tribunal may be assisted by technical experts and consultants whom the tribunal may deem appropriate to

appoint. Except in the case of agreement between the parties, the tribunal will rule as per the Brazilian law and its ruling will be final. The decisions will be issued no later than two months after the tribunal was formed.

Project funding

The concessionaire applied for two bridge, short-term loans that were granted by private banks in an approximate amount of BRL 40 million to fulfill the contract objectives.

When this case was being written, the project long-term financing was being structured, estimated at be BRL 322 million. BNDES would make a large contribution to this amount in order to refinance the investments that had already been made.

Project balance and lessons learned

In general terms, it can be ascertained that, when this case was being written, the expansion of the municipality of Serra's sanitation network was being successfully managed for the government and users alike. This last point is confirmed both by the opinion of stakeholders involved and system end users. The concessionaire was reaching maximum performance indexes, attaining progressive goals in terms of both access and connection without any enforced penalty as of late 2017. In addition, works performance and inspection of facilities have met the established deadlines at all times.

This case also shows important lessons in terms of the role played by EBP as an independent structuring actor to facilitate the drafting of complex contracts in municipalities with little experience in the matter. Furthermore, the state of Espírito Santo has decided to apply the PPP model for sanitation management in a progressive manner in order to correct potential mistakes made in the first experience for future contracts.

As of today, there is no ex post analysis comparing project implementation under a PPP versus a conventional model in terms of costs incurred showing conclusive results. However, CESAN's senior officers said to the authors of this report that, according to preliminary estimates, the conclusion is that the cost of implementing these actions under a PPP has been similar to what they would have been if a conventional procedure had been used. The main advantage of the PPP model in this case, according to CESAN's and the concessionaire's opinion, is not so much the cost but the radical improvement in the supplied service, the considerable reduction from 27 to one in the number of managed contracts, and the possibility of more agile actions.

Another important aspect to be reviewed in this case is that, as per reasonable expectations, the PPP model will incentivize the private sector to be more innovative. In fact, the concessionaire company is working hard to optimize water management through the adoption of measures such as the use of new technologies to measure water flows and remove sludge from sewage lagoons; environmental improvements for water reuse and the reduction of lift stations' power consumption; water modeling for the improvement of the existing system; among others.

Some important lessons for future experiences can be identified from this PPP model. First, defining the most suitable quality indicators in the contracts is no easy task because significant aspects may be left aside in a prima facie analysis and the perception of quality is uncertain for project duration. Therefore, the contract that was subsequently tendered had some indicators removed and other ones added. Given the relevance of quality, indicators should be selected taking the necessary time and involving technical experts. In addition, indicators need to be flexible enough to adjust to society's changing needs.

Another lesson is that the concessionaire has the capacity and incentive to manage the business, which boosts efficiency gains that are relevant for the public sector in this domain.

The Vila Velha PPP contract, tendered after the experience in Serra, took into account the above issues. On one hand, additional and more demanding indicators were included, based on Serra's experience.

On the other, the concessionaire was granted more powers to take care of business management. Along these lines, the idea to first implement a pilot project to enrich the model for future contracts based on its experience should be commended. When there is not enough experience available, starting with a single project and then extrapolating the lessons learned to subsequent projects is an advisable strategy to follow, although it is also true that delaying projects has a cost for society.

One of the main concerns about this project was the future of some CESAN employees when the private sector took over management. At the time of defining the contract, this gave rise to union protests, which were solved by an agreement to relocate the employees across oversight groups or other company sectors. Although this case shows that a shift to service private management is possible while respecting the rights of company employees, it is important to point out that it is not an easy issue to solve, as it may involve additional costs than those foreseen if the relocation is not duly justified based on efficiency and productivity criteria.

Another important lesson learned from this case is that, although the tender valued the tenderers' sanitation management experience, this item was possibly not given sufficient relevance. In fact, Aegea, the company that had unsuccessfully submitted a tender, shortly afterwards purchased the majority of the concessionaire's shares because the consortium awarded the contract didn't have enough experience operating this

type of system. Therefore, in projects where technical experience is of the essence for suitable performance, tenders should allocate more importance to technical expertise. Finally, of note is that, although the role of the regulator in this project is a novelty for the management of sanitation services, the established mechanism has been positively valued by the different stakeholders. The regulator itself considers this a suitable system. In fact, ARSP has continued to guarantee, although indirectly, that the rates and service quality are of benefit for the society as a whole.



Keys to Success for
Public-Private
Partnership Projects

Introduction

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- Transport and mobility

- Water supply and sanitation

- Solid waste management

- Public lighting

- Health

- Education

- Public and social facilities

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- Allocation of competences in urban infrastructure

- Structuring of PPP projects and legal framework

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Tariff policy and network integration of projects

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Risk allocation and contract management

Key aspects to attracting private investors

Mechanisms to preserve public interest

Recommendations for Latin America

Introduction

Latin America has experienced strong population growth in recent decades. In 1995, the total population of the region was 472 million people, while at the end of 2016 it was around 625 million, according to the report by Observatorio Demográfico de América Latina (Demographic Observatory of Latin America) (CEPAL, 2017). Associated with this population growth has been an intense urbanization process driven by the rural exodus, which led to a concentration of about 80% of the population in cities in 2016, thus qualifying Latin America as a predominantly urban region. This situation, far from stagnating, will continue to deepen. Forecasts indicate that 90% of the population of Latin America will reside in cities in the coming decades, reaching 780 million people by 2050, according to the Observatory.

Likewise, cities have become the main engine of economic and social development, as well as centers of opportunity for both companies and citizens, serving as a connecting link between them. The largest Latin American cities have also witnessed a boom in culture, dissemination of ideas, knowledge, learning and innovation.

The expansion of cities brings with it needs related to proper land-use planning and a balanced development of infrastructure and public services, which, as will be shown in this chapter, have not generally been adequately met in the region. Among other causes, this problem can be attributed to municipal budgetary limitations since their tax collection and debt capacity are much lower than that of the regions or nations, and their budgets depend, in many cases, on subsidies and transfers from non-municipal entities. In this situation, cities are potential market niches for mechanisms that provide services and infrastructure based on collaboration between the public and private sectors.

Due to the increasing importance of Latin American cities, and the possibilities they offer for public-private partnerships, we have included this chapter, which, unlike the rest of the book, does not pertain to a case study. However, given the future importance that PPPs can have in cities, this chapter outlines a set of ideas based on experience that can contribute to governments carrying out a more efficient promotion and structuring of PPPs in urban environments.

Along with this, several challenges regarding PPPs at the municipal level were identified, including those linked to governance and the sharing of competences; legal and regulatory frameworks; the structuring and promotion of projects; tariff and financial issues; and, finally, mechanisms to safeguard public interest.

With the aim of improving the technical capacities of subnational governments, which generally have fewer resources and experience than national governments, CAF has recently developed a guide for regional

and local governments that outlines some basic concepts for a better understanding of the PPP model, identifying the challenges that arise in urban environments.

Potential of public-private partnership models to improve the quality of life in Latin American cities

Current challenges facing Latin American cities

Over the last 15-20 years, the rapid development of metropolitan areas in Latin America has not been accompanied by the necessary planning processes, leading to a series of unmet needs associated with this growth.

In 2017, it can be said, that most of the cities of the region have not had, in general, a sustainable urban development—understanding sustainability as the adequate combination of social, economic, and environmental dimensions. This is reflected in several studies and reports. Next, we will summarize the most pressing problems facing Latin American cities, focusing mainly on the provision of infrastructure and services.

Reports such as *RED 2017* or *PRO-INCLUSION* highlight the informality of the urban structure in Latin America resulting from inadequate land-use management and planning. The agglomeration of economic activity in the center of large cities brought with it a significant increase in demand and urban regulations, which was translated into a progressive increase in the cost of housing and, in general, the cost of living in these areas. As a result, low income families can no longer afford to buy their own homes and they are forced to live in informal settlements and marginal neighborhoods that formed without any control on the outskirts of large urban centers as well as in more central areas. These settlements have a high population density, their inhabitants living under poor conditions, most of them building their own homes using low quality materials and having quite limited or even non-existent access to basic services such as drinking water, sanitation, lighting or streets. Another commonality is their significant geographical and environmental vulnerability, which means that they are highly exposed to adverse weather events and natural catastrophes. Examples of these informal settlements include the Brazilian favelas or the Argentine shantytowns, where as much as 30% of the population of the cities lived in 2017.

The main problem associated with the emergence of informal settlements is that more often than not they occupy land with an inadequate degree of urbanization (unpaved roads, without access to drinking water and sanitation systems, lack of lighting, etc.) or land that was destined for public infrastructure and/or public services, creating a vicious circle. In the marginal neighborhoods formed, access to public services is limited precisely because

the land occupied could not be properly urbanized or it was intended for a hospital, school, park or sports center that can no longer be built. There is little chance—if any—for the inhabitants of these areas to escape the poverty trap that emerges given that they do not have the capacity to access the opportunities offered by cities.

At the same time that these slums or informal settlements have emerged, the upper classes have isolated themselves in gated or walled communities, monofunctional residential areas and urban housing developments. Many times, these elitist districts have appeared in previously marginal areas giving rise to what is known as gentrification. As a result of this process, the original population with fewer resources in an area, generally centric and working class, is progressively displaced by another group of persons with higher purchasing power as a consequence of hikes in housing prices and the cost of living in the neighborhood. Unlike informal settlements, these upper-class districts have low population density and an adequate level of services and facilities. In this regard, there are significant contrasts in Latin American cities, where neighborhoods or areas with a vast gap in terms of quality of life and income are found within close proximity to one another.

The great differences in income and quality of life among population segments in Latin American cities have greatly compromised social coexistence, favoring the appearance of antisocial and violent behavior. As the 2013 IDB public opinion survey *“Megaciudades e infraestructura en América Latina: Lo que piensa su gente”* (Mega-Cities & Infrastructure in Latin America: What its people think) reflects, insecurity and crime have become one of the region’s main concerns, above issues such as transport or inequity. Every year the Mexican NGO Citizen Council for Public Security and Criminal Justice (CCSPJP) publishes a list of the 50 most violent cities in the world, and this ranking is dominated by Latin America almost in full (43 cities in 2016). Gang wars, drug trafficking and express kidnappings have almost been institutionalized on the continent, yielding figures of around 20 homicides per 100,000 inhabitants. These security threats have become a major concern, despite different government measures to address the problem for several years. Preventive solutions (community centers, schools, public spaces, etc.) and corrective solutions (investment in police forces, judges and prisons) have been adopted.

As stated in the article *“Crecimiento urbano y movilidad en América Latina”* [Urban Growth and Mobility in Latin America] (Cunha and Rodríguez Vignoli, 2015), Latin American cities have grown demographically and in extension. However, in 2017, they were still quite dense demographically, due in large part to informal settlements and neighborhoods with fewer resources. The tendency, though, is toward more dispersed cities, mainly as a result of peripheral expansion, associated both with the internal emigration of the lower classes that do not have the resources to live in more central areas, and the relocation of productive centers or the formation of exclusive affluent neighborhoods, as mentioned above.

The urban sprawl of cities in Latin America poses great management and sustainability challenges. The loss of density represents an increase in the cost of all infrastructure and associated maintenance. Larger cities require more roads and highways, more pipes, more cables and more transportation systems, as well as more hospitals, schools, etc., reducing economies of scale and the advantages of agglomeration.

The rapid and unplanned urban growth of Latin American cities has been particularly detrimental for mobility. Not surprisingly, in the same way that there has been a demographic and economic development in urban environments, ownership of private vehicles has increased. If we add to this the high population density, the agglomeration of economic activity (usually in the center of the city) and the progressive physical growth of a city without a parallel growth of public infrastructure and transport services, high levels of vehicular congestion are likely to occur. This congestion has economic, social and environmental costs that affect society as a whole, since they entail greater environmental impacts due to emissions, noise, accidents and time spent traveling to the detriment of other activities.

As shown by CAF's *Urban Mobility Observatory 2015-2016 (OMU)*, both public transport and walking are very important in Latin America because a large part of the population does not have the economic resources to purchase a car. In this situation, the development of an adequate public transport system is fundamental. As highlighted by the PRO-INCLUSION report, a public transport system makes it possible for a significant portion of the population to access the resources and opportunities offered by the city on a daily basis, reliably, comfortably, and safely, in a timely manner and at an affordable price. The report also emphasizes that public transport must be an integrating tool that helps to correct the aforementioned territorial social segregation. In the same vein, pedestrian infrastructure must also be properly addressed since up until now a significant portion of the sidewalks, platforms, etc. in many Latin American cities have been in precarious conditions.

Urban growth has also had an environmental cost. Cities depend on the environment for their physical integrity and the supply of water, food, raw materials and energy as a result they exert considerable pressure on natural resources.

Economic and population growth have resulted in an increase in the demand for water in cities. On some occasions, and despite being the region with the largest share of water resources on the planet, many Latin American cities have tended to overuse water sources, generating an imbalance between availability and demand. This situation is especially worrying in large urban centers such as Mexico City or Lima. In addition to excessive overuse of available water resources, excessive discharges of wastewater with insufficient treatment have led to their contamination.

On the other hand, land transport, electric power generation and industrial production have contributed to a sharp increase in air pollution in Latin America cities in recent decades. Some cities have begun to

implement measures such as restrictions on vehicle circulation to reduce pollutant emissions based on air quality forecasts. However, it is not a widespread practice, especially in the smallest cities, due to the economic and technical capacity involved.

As we have seen, the lack of sustainability of Latin American cities has occurred as a result of a deficient and unequal expansion of infrastructure and poor urban planning, which are the ultimate result of many municipalities' suboptimal governance and lack of resources.

The governance of cities has been adversely affected by issues of inter-agency competencies and coordination. As reflected in the report *RED 2017*, the administrative definition of a metropolitan area and its political organization does not normally coincide with its size or its economic and social dynamics. As big Latin American cities grow, they tend to gobble up nearby municipalities. For example, the metropolitan area of Mexico City covers more than 60 municipalities and extends into two states (Hidalgo and Mexico). This administrative fragmentation has led to a lack of coordination for the application of different urban development policies such as land use planning, the provision of infrastructure and services, or the management of mobility. It is even normal that a municipality's actions can lead to externalities in the other components of the metropolitan environment.

Just as there has been a lack of internal coordination between the different municipalities and agencies pertaining to a metropolitan environment, it has been observed that the same occurs at the national, state and municipal levels. The decentralization of competencies has not always been accompanied by the necessary transfers of resources and capacities, so that many of the important decisions for urban development have been taken at the supra-municipal level, which may represent inadequate efficiency since the principle of subsidiarity is ignored.

Regarding lack of resources, it depends on the size of the city to a large extent. Municipalities have three sources of financing: transfers from higher levels of government, loans and their own collection efforts. Despite the great heterogeneity that exists between countries and zones, in general, it can be said that larger municipalities or those with a more dynamic economic profile (industrial or tourist cities) can become self-financing, while smaller municipalities have a high dependence on the resources transferred to them by other levels of government.

According to the 2012 report *Estado de las ciudades de América Latina y el Caribe 2012: Rumbo a una nueva transición urbana* (State of Latin American and Caribbean Cities 2012. Towards a new urban transition), these transfers to municipalities from other levels of government have often promoted inequality between cities. There has been no adequate redistribution of the funds allocated to the municipalities. In Peru, for example, it happened with the fees, the surcharge and royalties obtained from the use of natural resources that were distributed among the municipalities of the regions where the activities were carried out, deepening the territorial differences between states and cities.¹

1. The regional compensation system "FONCOR" later addressed this redistribution problem.

Local governments' collection capacity depends on real estate and land taxes to a large extent. However, the following obstacles have been associated with this type of taxation, limiting its efficiency:

- Property tax collection on real estate and land has been handled by supra-municipal levels of government, as such, the collection potential for cities may be limited.
- The relatively high administrative cost of this type of tax reduces the management and tax administration capacity of those municipalities with fewer resources, entering a loop that is hard to escape from.
- Poor land-use planning—along with poor planning of public works and infrastructure investments, which limits the possible revaluation of the recipient areas of investment—reduces the funds raised by local governments in the form of fees and taxes on beneficiaries of this revaluation (which could cover the costs of the infrastructure).
- The lack of up-to-date cadastres including real estate market values in many municipalities prevent them from properly capturing the tax benefits deriving from the revenues generated by public works for the owners of the beneficiary properties.

As a summary of all the above, as reflected in the 2017 RED report, the balance between the benefits of economies of agglomeration (economies of scale, attraction of companies, etc.) and the costs associated with the externalities of congestion (insecurity, emissions, mobility problems, rise in prices, etc.) is inadequate in Latin American urban environments. In order to rebalance the scales, some aspects must be improved. As has been discussed, these have been generating inadequate urban sustainability, fostering social inequality, impacting the environment, and limiting citizens' access to opportunities.

Public policies in Latin American cities, contrary to their function for decades, should combine suitable land-use planning and regulation, sufficient investment in infrastructure and public services (with a particular emphasis on mobility), and improved access to housing (flexibilization of supply, subsidies, etc.) for citizens with a view to reducing or mitigating the emergence of informal neighborhoods and increasing the cohesion of the city. All this would lead to a series of side benefits such as reduced emissions or better citizen security.

In addition, achieving adequate coordination between the different agencies of the metropolitan area is essential for the success of these policies. Likewise, municipalities and the higher levels of government must coordinate efforts, with a good distribution of powers so as not to tie the hands of the municipalities in regard to tax matters and the implementation of regulatory measures.

As we have seen throughout this compilation of the main problems facing Latin American cities, most of the region's municipalities do not have sufficient resources or depend heavily on the central government to carry out infrastructure projects on an ongoing basis. The search for new sources of financing has become a necessity in recent years. In this situation, PPPs are presented as a solution for this infrastructure deficit and a driver of sustainable development in Latin American cities.

Infrastructure and facilities well-suited to PPP in Latin American cities

Urban infrastructure and the provision of public services are fundamental to improving quality of life, equity and social inclusion in urban environments. Infrastructure enables people to access drinking water, electricity without power outages, well-lit neighborhoods, clean streets, fast and safe transportation, education and health, parks, gardens, and sports facilities. The need for infrastructure investment arose in parallel to the uncontrolled urban growth in recent decades. Often times, it has gone unmet in some Latin American cities. This has led to a deficit of infrastructure and services that can negatively impact growth, as well as the economic and social development of urban environments.

In the 2017 edition of Mercer's annual report *Quality of Living City Rankings*, a worldwide list of 450 cities ranked according to urban infrastructure appeared for the first time. Only two Latin American cities—Santiago (84) and Buenos Aires (89)—ranked within the top 100, highlighting the region's lag behind more developed countries. The report assesses the population's access to electricity, drinking water, telephone services, postal services, and public transport, as well as traffic congestion and the different options of international flights available from local airports, among other aspects.

The need for infrastructure in Latin American cities combined with a lack of resources in the majority of municipalities has fostered a strong commitment to Public-Private Partnerships in recent years as a mechanism to address the infrastructure deficit in the region. The next section of this report will provide an overview of the sectors in which PPPs already have established a certain trajectory, and those in which the model has potential, always keeping in mind the heterogeneity of Latin American countries.

Transport and mobility

Urban public transport in Latin America, despite being one of the national and sub-national priorities in recent decades, continued to face important challenges in terms of coverage and quality in 2017. In the first place, it must be emphasized that mobility (understood as public and private pedestrian and mechanized transport) depends strongly on the available infrastructure in the form of sidewalks, streets, bridges, parking lots, etc. In recent years, this infrastructure has been insufficient in many cities, as shown by CAF's Urban Mobility Observatory. [Latin American cities] are ranking far below the average of more developed countries. The main causes of this situation are the lack of public resources, and poor land-use planning and management, which limits the space available for these applications. In this context, the private sector is increasingly supplying urban infrastructure for mobility, which it considers to be a niche of opportunity, with projects such as urban highways in Santiago, Chile, one of the case studies in this publication.

According to ECAF 2016,² the main public transport problems highlighted by the people living in the region's cities are: poor service levels,³ especially in the lowest-income neighborhoods and informal settlements; low frequency of services; insecurity while traveling; and the excessive length of travel times compared to the time it takes to cover the same distance in a private vehicle.

Given this situation, many municipalities are developing improvements focused on achieving more efficient mobility. In regard to bus services, the longest standing form of public transport in the region, other modes of transport such as underground metros, trams, and bus rapid transit (BRT) with specifically designated lanes for buses have been introduced in recent years. As a result, many Latin American cities are developing transport systems comprised of several modes. This growing complexity is generating the need to develop policies and actions from within urban areas that ensure an articulation and integration of different transport modes so they are functional within the context of the city.

The previous edition of this book addressed the case of the Moncloa transport interchange hub in Madrid, highlighting how all the agents involved had benefited from the new infrastructure. Modal interchange hubs similar to those in Moncloa have a large niche market in Latin American cities as they facilitate the integration of different modes of transport, minimizing the impact of transfers on travelers' trips. Air conditioning, commercial activity and the provision of other related services contribute to a more comfortable user experience. In addition, on many occasions, this type of infrastructure has a certain cultural component for two reasons. In the first place, sometimes they are designed as singular architectural works; and, secondly, because they function as a public space, becoming meeting centers for different groups.

Following the global trend of smart cities, Latin American cities are betting progressively on the development of more efficient and sustainable cities, with actions especially visible in the transport sector. Many of the capitals and main cities in Latin America already offer bike sharing alternatives, with users paying an annual fee for the use of bicycles that are shared among all registered citizens. With the same philosophy, shared electric motorcycles have appeared in Mexico City through the eConduce platform. Unlike bicycles and motorcycles, car sharing services have not been as successful. Companies such as Carrot in Mexico City, Zazcar in São Paulo and Awto in Santiago have experienced to what extent the adoption by citizens has been quite moderate compared to the results achieved in other parts of the world. However, despite this slow start, it is expected that this type of companies will continue to invest, and that new participants will join this market in the coming years.

With regard to the management of public transport in Latin America, the truth is that there is considerable variation in the configuration depending on the country, even the city. However, in most cities, a large part of the public transport network has traditionally been the responsibility of private operators that operate allocated routes through concessions and administrative permits. There are also public operators, although they are mainly concentrated in the management of railways and metros.

2. CAF–Banco de Desarrollo de América Latina (2016) Survey on access, quality and satisfaction with public services in Latin America.

3. Service level refers to citizens' proximity and ease of access to public transport.

Water supply and sanitation

Considerable progress in urban drinking water and sanitation services in Latin America has been made in the last two decades; that said, there was still a significant infrastructure deficit in 2017.

Poor service quality manifests as unbilled potable water, or losses, in the order of 40% of production; over-employment with four employees per thousand connections on average, which is twice the level observed in developed countries; high delinquency; low level of micro-metering; discontinuity of services (intermittence); non-domiciliary access to potable water service (public sources); limited sewerage coverage and widespread use of on-site sanitation systems, such as latrines and septic tanks; and a small proportion (perhaps between 20% and 30%) of urban wastewater is treated to some degree. One of the most serious problems is the poor quality of the water supply. More often than not, it is not properly disinfected or sanitary control is insufficient, a situation that can cause serious disease outbreaks.

Traditionally, the operators of this sector have been state-owned but new needs have driven the insertion of private partners through PPP. In Latin America, important potable water supply and sanitation projects have been implemented under this model in countries such as Brazil, Chile, Colombia, Mexico and Peru. Examples of this are the wastewater treatment plant of La Taboada (Lima), the largest in the region, or the expansion of the sanitation network in the municipality of Serra (Espírito Santo, Brazil), covered in a chapter of this book.

Solid waste management

During the last decades, there has been significant growth in the generation of urban solid waste, doubling or tripling the amounts in some cities. In addition to the increase in the number of tons generated, the typology and composition of the waste has also changed. Until recently, organic compounds predominated, but now more toxic waste that is difficult to eliminate has gained prevalence as a direct consequence of the region's development, which has led to a growth in the consumption of more industrialized and artificial products.

Solid waste collection and treatment is, overall, the municipality's responsibility. Small and medium-sized cities normally pay for these operations from their own funds and generally have relatively low service levels (only 70% of the population has access to waste collection services). On the other hand, larger and more important cities are using concessions and contracts with the private sector ever more frequently, achieving higher coverage levels, but neglecting, as in the rest of public services, the most marginal neighborhoods and informal settlements.

Public lighting

Municipalities have lighting systems for streets and avenues, and have the obligation to maintain their systems correctly to guarantee road safety and meet minimum requirements for lighting, quality of service, and increased safety of people.

Increasingly, municipalities are seeking more efficient public lighting or low energy consumption in order to achieve a more sustainable city. However, the lack of public resources has led to a stagnation of investment in efficiency. The high operating costs and the great need to renew equipment, combined with the lack of public financing due to budgetary difficulties have meant that many cities have opted to reduce costs, collaborating with the private sector.

Public-Private Partnerships for street lighting can have different configurations (BOOT, leasing, etc.) although the normal practice is that considerations are set according to performance indexes based on energy efficiency and service quality.

In Latin America, PPPs have been used to supply public lighting in cities such as Santiago in Chile, Salvador and Fortaleza in Brazil, and Mexico City, with great results in terms of energy savings, according to PIAPPEM⁴.

These first successes have led to a continued wager on the model. At the end of 2017, the Brazilian entity Banco Nacional de Desenvolvimento Econômico e Social (BNDES) was conducting the preliminary studies and structuring of a PPP project to operate the public lighting service of Porto Alegre. The contract involves an expansion of the lighting system and the change of around 104,000 lights with LED bulbs. This project is also very remarkable given the introduction of remote management, which allows for a more exhaustive control of the lighting stock, allowing, among other things, to manage the lights differently depending on their location (pedestrian zone, monument, large avenue, etc.). The tender is expected to begin in mid-2018 and the contract would be signed by the end of the same year.

4. Program for the promotion of PPPs in Mexican States

Health

Collaboration projects between public and private sectors in the Latin American health industry have made strong progress in the last decade due to a situation in which demand is outstripping supply. As a result of population growth and higher income levels, people increasingly require access to modern health systems like those of developed countries. In 2016, there were a total of 13 hospitals in operation under the PPP model, nine under construction and 13 out to tender, located in Brazil, Chile, Colombia, Mexico and Peru.

Broadly speaking, two PPP models have been developed in the health sector. The first corresponds to the concession of public works, the provision and maintenance of equipment, and the operation and operation of non-health services (cleaning, security, food, laundry or administration). The second model, in addition to all of the above, includes the provision of health services, whether primary care or medical specialties.

There is a third model that consists in the provision of logistical or clinical support services to a network of establishments, although it has only been developed in the city of Lima. This PPP project in the Peruvian capital city included the construction of a logistics center along with the storage, distribution and delivery of materials to a network of warehouses and pharmacies in Lima belonging to EsSalud (Peruvian social security).

Normally, the granting authority has associated the payment to the concessionaire to performance indexes related to availability and quality to safeguard public interest.

These indexes, however, tend to be more complicated to measure and value compared to other sectors, such as highways and energy.

As stated in the technical note “10 años de Asociaciones Público Privadas (APP) en salud en América Latina. ¿Qué hemos aprendido?” [“10 years of Public-Private Partnerships (PPP) in health in Latin America: What have we learned?”]⁵ most of these first hospitals operated under the PPP modality are medium/high complexity facilities. They have the basic specialties (medicine, surgery, pediatrics and obstetrics), some subspecialties (which vary depending on the project) and critical care beds. These centers—located in areas of urban growth—provide services to populations that before did not have access to them in their territory. This publication highlights the good results of these first PPP projects in the health industry, which is giving rise to an expansion of the model with a large number of projects under study throughout the region.

5. Note 4 of the series of technical notes on public-private partnerships in the health sector in Latin America prepared by the IDB.

Education

Education in the urban environment is very important because it generates human capital along with the economic and social development that this implies. More education means more productive individuals with higher incomes.

Education is a preferential subject for any country. The adequate destination of the investment in educational infrastructure and the quality of it must be a priority for the municipalities, ensuring that the most disadvantaged segments of the population can access education as it is a mechanism for these citizens to escape the trap of poverty in which so many are immersed.

To assist in the development of education, many local governments have chosen to develop partnerships with the private sector. In education, different PPP models can be developed, generally differentiated by whether the private sector exercises or not the management of educational services and the level of control exercised by local governments over these services. Examples of this include “charter schools” (publicly owned institutions run by a private entity with public financing); “voucher” or educational bond schemes (which are transferred to families so they choose the private or public school that best suits their educational preferences and which aim to encourage competition between schools); or subsidies and outsourcing of private schools by governments.

An example of PPP implementation at the municipal level in Latin America is in Belo Horizonte (Minas Gerais, Brazil). This city, with the help of the International Finance Corporation (IFC), structured a project to expand and strengthen its preschool system (32 centers) and primary education (five schools) with the collaboration of the private sector, becoming the first PPP in education in Brazil when it was awarded in the year 2012.

Another highlight is Uruguay's commitment to education with the 2015 launch of four important packages of educational projects to be developed via PPP promoted by the National Administration of Public Education (ANEP) and the Institute for Children and Adolescents of Uruguay (INAU). In 2017, the first package to build 44 kindergartens and 15 child and family care centers (CAIF for their acronym in Spanish) was in the tender evaluation phase with an estimated investment of USD 48 million; the second, including 42 preschools, was out to tender, with estimated investment of USD 79 million. Packages No.3 (45 CAIFs and eight schools) and No.4 (64 high school buildings) were in the structuring phase, with an estimated investment of USD 41 million and USD 120 million, respectively.

In the same way that PPPs are making a vigorous entry into the educational system at a basic level (kindergartens and nursery schools) and secondary education (high schools), it would be possible to extrapolate the scheme to universities and higher education centers.

Public and social facilities

Public spaces in Latin America perform social, environmental, mobility and recreational functions. They also create synergistic effects, helping to narrow the social gap between neighborhoods, promoting the economy of the area, supporting crime reduction and serving in general as cohesion axes of cities, increasing the sense of belonging of its inhabitants. The *PRO-INCLUSION* report, in fact, defines the improvement of social facilities as one of the four priority axes of the policies to improve social cohesion and interaction.

Sports facilities accessible to any citizen such as courts, pavilions, swimming pools or public gyms increase a city's social integration, as well as improving the citizen's perception of the urban environment. A similar function is carried out by other places of leisure, whether public or private, such as museums, cinemas or large shopping centers, which, following the North American model, tend to attract a large number of visitors during weekends and holiday periods.

Other spaces such as green areas (gardens, parks, etc.) also contribute to improving the health and well-being of citizens, becoming in some cases the city's lungs. In addition, all public spaces and their urban furniture (benches, litter bins, planters, fountains) have a positive impact on economic activity, promoting retail commerce around them and multiplying the attractiveness of the city for tourists, with the consequent impact on jobs and income. Ultimately, all these social, economic and, to a lesser extent, environmental effects will result in an increase in citizen welfare and in a very efficient way to prevent violence and reduce insecurity.

In Latin America, the creation and maintenance of the different types of social facilities has not historically had much expansion or support, since this has been considered as a limiting factor for the real estate development of the land or, in some cases, the land allocated to the social facilities was already occupied by an informal settlement.

In some cities of the region, the most disadvantaged population has limited access to public spaces, either directly or indirectly. An example of this would be the great distance to which many of these slums are located in some cities; or the high price for access to private places. With a tendency towards appropriation and control of access to public areas in residential zones by their residents, streets and collective spaces have been closed, demanding exclusivity of use and limiting the benefits provided by social facilities.

Collaborations with the private sector are a model that is taking center stage in the supply of social facilities. However, care must be taken in this regard, not to prioritize private interests over the integrating function of these spaces and to always ensure universal accessibility. For this type of project, the different actors must participate in the planning processes of public spaces, especially their users, given that according to the PRO-INCLUSION report, if the public feels ownership of the public space, its maintenance and development will be much simpler.

Public buildings, in turn, have a certain tradition in Latin America as far as PPPs are concerned. This supply mechanism has been used in courts and courthouses, administrative centers, police stations, town halls or sports stadiums throughout Latin America. Example of this would be the administrative center in Tlajomulco de Zuñiga in Mexico (one of the case studies of the previous edition of this publication, Public Private Partnership in Latin America: learning from experience), the justice center building in Chile (Centro de Justicia), or many of the sports complexes created and remodeled for the 2016 Rio de Janeiro Olympic Games.

Key factors for PPP development in cities

This section pinpoints some key factors for the successful implementation of public-private partnerships in Latin American cities: institutional governance and legislation, planning and decision-making, coordination of tariff policies, the possibility of obtaining additional resources to finance projects, risk allocation, mechanisms to attract private investors, and the defense of public interest.

Institutional governance and legislation

Cities around the whole world, and in Latin America, in particular, are characterized by the multiple competences of different public agencies over their infrastructures and services. To this is added that, in different cities, the administrative division acquires diverse and complex forms. Some urban infrastructures are managed by central or regional governments, while others remain under the jurisdiction of municipalities. Likewise, the large urban growth experienced in recent years has involved town halls beyond the original metropolitan administrative limits. In this way, many Latin American

cities are now the result of the aggregation of a set of municipalities with very different characteristics, but which, for practical purposes, are part of a single urban group.

The coordination of this group of public entities and competences is, without a doubt, one of the main challenges to be tackled when it comes to making the PPP model successful in the cities of Latin America. Some aspects worth considering in this regard are: what should the framework of powers of the different public entities involved in different urban infrastructures and services be? Who should structure PPP projects in cities? Should there be a different legal framework in place for each public entity? How to manage projects whose competences fall within more than one public entity? How to start developing a PPP program before acquiring the sufficient experience and institutional capacity? Each of these points will be answered below.

Allocation of competences in urban infrastructure

It is common to find infrastructure and services in cities that are managed by different administrative entities: national governments, regional governments, metropolitan authorities and municipalities. For the PPP model to be successful, it is necessary to ask beforehand if the administrative competences are correctly defined, for which it is necessary to resort to the principle of subsidiarity. This establishes that the management of a certain service must fall on the sphere of the public entity that is better equipped to run it correctly for the benefit of the community that is affected directly or indirectly by it. It will not make sense, for example, that a metro line that crosses several municipalities is managed by each municipality in its territory, since the global interest of society should prevail over the interest of each municipality. In general, all intermunicipal network infrastructures within a city must be managed by supra-municipal entities.

In other circumstances, however, it may be preferable for the infrastructure to be managed by the municipalities themselves. This can be, for example, the case of specific infrastructure that directly affects a municipality, such as sports facilities or infrastructures that form part of a network but do not have a core character, as is the case of the secondary access roads to homes. The fact that the infrastructure in this case is owned by the municipality involved does not exclude that, in the context of the city, mechanisms to redistribute the fiscal resources of the different municipalities located within the same urban area are discussed, in order to achieve a greater social balance between higher and lower-income municipalities.

In many Latin American cities, mainly due to historical reasons, the allocation of competences is not adequate for the management of some urban infrastructure and services, which represents an obstacle for PPPs to be successful in many cases. It is usually very difficult to change the competency framework in the short term, but at least it is possible to reach an agreement between the different municipalities to create specific supra-municipal authorities for a specific type of infrastructure, as is the case with regional transport consortiums, to which specific competences are assigned for the good of all.

Structuring of PPP projects and legal framework

As has been shown throughout this book, the granting administration must have a specialization in economic, financial, competition and regulation aspects for the proper structuring of PPP projects. However, many municipalities do not have this knowledge due to lack of resources or experience in the matter. Along these lines, questions arise such as: which municipalities should train a PPP specialist team? Should municipalities have their own legal framework? Is it feasible to coordinate municipal legislation and management with those of other supra-municipal authorities?

Most PPP programs in Latin America have been promoted by national governments, for which they have approved their own legislation, and established institutional governance, in many cases with specific PPP units, to structure, tender and supervise projects as required throughout their service life. Municipal governments have begun to develop their programs after-the-fact employing different strategies. Some larger cities, having, because of their size, great potential to develop projects, have promoted their own legislation and institutional frameworks. The majority, however, has opted to rely as much as possible on the supra-municipal legislation and institutional governance—whether national or regional—to structure their projects.

For the private sector it is important that the different levels of government in the same country have similar legislations and institutional frameworks, so as to avoid uncertainty about the contractual framework and the allocation of risks between the parties. Assuming this principle, the strategy may be different depending on the size of the municipality and the volume of activity expected in years to come. Large municipalities with a lot of planned activity may establish their own legislation and may even set up specific PPP units, which in any case must be coordinated with other supra-municipal entities. However, it is expected that most cities use supra-municipal legislation and institutional governance as a tool for municipalities to develop their own projects.

To promote this model, a good practice would be to design national legislation and institutional governance so that municipalities can adapt and make use of them. To ensure experience already acquired is applied, PPP design is always a team effort that requires collaboration between the different entities involved. For example, a municipality may have a plan to develop municipal sports infrastructure. However, due to the fact that it does not have the necessary know-how to structure PPPs, it can approach the national or regional PPP unit for support undertaking this task under a framework of close collaboration with the municipality's technical staff. Along this same line, a municipality can take advantage of the existence of a national regulatory authority for assistance resolving conflicts affecting sub-national projects. In any case, no matter how much the municipality relies on structures already in place, it will always be necessary for the municipality to have at least a small well-trained team that is familiar with this model and that can serve as an interlocutor with other institutions having more experience.

If supra-municipal governments design governance schemes that can serve as support for municipalities, it will be much easier for entities with little experience in the use of PPPs to consider using this model from the start to promote the development of their cities.

Project planning, decision making and promotion

For the success of PPP projects, it is not enough to have an adequate legal framework, or sufficiently solid project structuring; the most important thing is that the project makes economic and social sense in its own right. Experience shows that, on some occasions, PPP projects in urban settings fail not because of poor structuring, but because they are not properly integrated into the territory or the infrastructure network of the city itself.

A prerequisite, therefore, for the success of the PPP model in cities is that the projects are framed within overall urban planning. The project must be understood as one more piece that contributes to making the rest of the city's projects work better. Unfortunately, in the case of some granting authorities, there are two plans—one for conventional projects and another one for large PPP projects—that do not talk to each other. Any city should first ask itself: what are our needs? The next question should be: what model of contracting and financing will we use to put it into practice?

To answer the second question, the city needs a methodology that makes it possible to select the most suitable model to carry out the projects. For this, in the first place, a distinction must be made between public initiative projects and private initiative projects. In the case of public-initiative projects, cities must have a tool to help them decide whether the project should be carried out under a PPP scheme or using another contractual model. This tool should incorporate, in addition to a value for money estimation model, other aspects of a strategic nature such as the impact on society due to the delay in action because the city lacked sufficient resources, or the economies of scale derived from applying the PPP model to other similar projects.

Along these lines, it is important that the officials in charge of the municipality or the city understand the real advantages and disadvantages of the PPP model over conventional mechanisms that supply infrastructure, without falling into simplistic arguments that obviate the inherent complexity of these models. For example, it is common to hear that PPPs are more expensive than conventional tendering systems because of their high transaction and financial costs. This argument, however, does not take into account that public financing also has an opportunity cost, and that the financial costs are the market price of the risks assumed by the private sector, which the public sector would assume in one way or another if the PPP is not carried out.

One aspect that is particularly complex in urban areas is that of private initiatives. On one hand, it is always good to leave the private sector free to propose initiatives that can benefit society. On the other hand, there are several reasons that explain why the possibility that the private sector propose actions in cities is more limited than in interurban areas. Moreover, it is also important

to note that many of the projects that can be developed through PPPs are subsidized public facilities such as hospitals, sports centers, etc., which could represent a business opportunity for the private sector if provided for people who can afford them. In addition, in the case of public network services offered in the urban area, it is essential to adhere to the tariff integration scheme in place and the connection with the existing infrastructure network, which leaves the private sector with less room for action.

In order to better understand the above, we will provide an example. Let's assume that a private company wants to use old railway tracks to offer a transport service in the city. It is possible that the project would be viable by charging those users a fare that is not integrated into the public transport system. However, if the goal is to integrate this project into the tariff scheme of the city's public transport system, which makes full social sense, the project will probably not be profitable and will need a public subsidy. The private initiative could be proposed anyway, but it would require greater flexibility in legislation, and a more intense cooperation between the private company and the public sector, which means taking private-initiative models in a direction that until now has not been proposed.

Tariff policy and network integration of projects

The integration of public services in large cities makes it feasible to establish tariff policies aimed at not only covering infrastructure, maintenance and operation costs of the corresponding services. When setting the prices of the services offered, other aspects are more important, such as users' ease of understanding, the setting of adequate incentives that promote the internalization of the externalities produced, and the promotion of equity, both horizontal and vertical, that contributes to the most disadvantaged people and neighborhoods converging with the rest of the city.

An example of what has been mentioned is the establishment of tariff policies in the field of public transport or of many other urban services. The most advanced cities have tended to set up fare integration schemes that have increased the use and quality of public transport at the expense of reducing revenue. These schemes tend to include lower fares for more vulnerable groups, such as the elderly or young people. Likewise, in many cases they establish schemes with unit fares that are reduced as the level of use of the service increases in order to avoid the negative externalities produced by competition from private transportation. As a result, it is extremely complex to individualize the part of the fare that corresponds to a specific infrastructure in these models.

This situation means that in the cities it is very complicated to implement PPP models in which the private operator's main source of funds comes from the tariff received from service users, which forces the financing model to be redesigned in urban areas. The solution that seems most reasonable to make the PPP model compatible with complex integrated tariff schemes is to distinguish between the real tariff charged

the user, which will be established based on a series of criteria, including the internalization of externalities and social and territorial equity; on the technical fare, which will be defined in PPP contracts based on the results of the corresponding tender according to the requirements that the private consortia deem necessary to cover their costs. This technical fare will not have to be linked to the demand for the infrastructure, but it may be fixed according to the most suitable availability and quality of service indicators to manage the infrastructure.

The division described above between the user fare and the technical fare may result in a need for cross subsidies between projects; or, as often happens in the management of urban public transport systems, a permanent subsidy for the system. In order to centralize financing, it seems reasonable to create a public trust whose functions are: to safeguard funds coming from user fares or other system financing sources (including public subsidies), to carry out the disbursements required according to the payments established in the contracts in line with the technical fares set forth therein. This trust, which will not have its own legal status, but which will have an entity that manages its assets, may in turn use its present or future assets to issue debt in the capital markets in order to obtain additional financing.

The above model can achieve the coexistence of PPP contracts with the need for cities to establish flexible fare structures that guarantee price consistency, the application of social policies and the incentive for a more rational use of resources.

Additional funding sources for project financing

Another aspect to take into consideration when developing PPP projects in urban areas is the fact that, due to the strong interaction between all the elements that make up the ecosystem of a city, any urban project can generate benefits or damages to other agents that are not directly affected by the relevant infrastructure or service. A proper definition of the project requires that it compensate the aggrieved party and capture the value of the beneficiaries. For example, the construction of a park and a sports complex in an urban area can appreciate the value of neighboring homes, which can clearly be associated with the improvement in the quality of life that the infrastructure itself has produced.

Capturing value is one of the schemes that, apart from the PPP model, has been promoted in many municipalities as an additional mechanism for obtaining funds to finance infrastructure by absorbing part of the real estate capital gains. However, its application in practice has been much more limited than expected. First, because producing an objective quantification of the generated benefits is not an easy task; and, second, because it is always difficult to demand payment from someone for an action that, although they have benefited from it, is not the result of their own choosing.

In real estate, value capture works much better when the land near the infrastructure has not yet been developed, or when it clearly benefits private businesses, such as the headquarters of a company or the location of a shopping center, as it is much easier to reach agreements that benefit both parties.

The capture of value, however, goes far beyond real estate gains. Many of the urban projects that are likely to be developed under a PPP scheme such as hospitals, sports centers, administrative buildings, transport interchange hubs, etc., are places where many people concentrate. Consequently, opportunities arise in these projects to provide complementary services that translate into attractive business initiatives for the private contractor, contributing to raising funds to finance the main venture. Among these services we can mention the leasing of coffee shops, retail spaces, parking lots, hotels to accommodate people, among others. In fact, in infrastructures such as public transport interchange hubs, an important part of the income generated comes precisely from the complementary services associated with the main activity. Public authorities that develop PPPs in urban areas must study in detail the possibilities that, within the framework of a PPP, the private sector has to capture value through the development of additional business initiatives that can contribute significantly to infrastructure financing.

Risk allocation and contract management

Much has been written in PPP literature about the fundamental principles of risk allocation. However, there is little written about the specificities of infrastructure in urban areas. In this section, we will delve into some of the key aspects to be taken into account for PPPs in cities.

PPPs in urban areas are especially complex in terms of risk management and allocation. On one hand, many goods and services coexist in close proximity. This means that any action on one of them is likely to affect those in their surroundings in one way or another. On the other hand, a city is a living being that undergoes constant changes in its configuration like new infrastructure that adds or removes demand for existing infrastructure, new neighborhoods that require their needs be covered, etc. Finally, the city is usually the test bed for the main technological changes. Currently, the implementation of smart solutions in the field of smart cities is revolutionizing the way cities work.

This situation suggests a problem regarding the drafting of PPP contracts. On one hand, contracts require, in general, long terms for private investors to recover their investment. On the other hand, the fast pace at which technology evolves and the preferences of society in cities require changes that in many cases clash with the scope of contracts signed a few years before. There is currently an open debate among PPP researchers about how to strike a reasonable balance between achieving effective competition in tender bidding, which requires contracts to be defined as best as possible from the beginning, and at the same time, establish a certain flexibility that allows them to adapt to the changing requirements of society.

With this starting point, the principles of risk allocation and contract management in large cities will necessarily have to be much more complex than in interurban areas. The risk of expropriations, if necessary for the project, will be very high due to the difficulty of acquiring properties in urban areas and the significant variability of property prices based on the speculative nature that in many cases affects land in cities. Because of this, it will generally be good practice for local governments to promote PPP contracts once the necessary land has been acquired or, if land cannot be acquired, to establish, at least clearly, compensation mechanisms for private contractors to offset any problems originating in land acquisition operations that are unrelated to concessionaires.

The construction risk will also be more complex in urban areas than in interurban areas, mainly due to the problems that may arise in connection with the impact on other urban services and that may end up involving important delays to actions. To this end, it seems important that the PPP legislation establishes the obligation for all involved public entities and companies to cooperate in order to get the project started as soon as possible. Establishing a clear and effective dispute resolution mechanism in this area and others is also fundamental so as to avoid unnecessary delays as works progress. This task can be entrusted to an independent regulator or an arbitration committee defined *ex profeso*. However, better coordination and work prior to signing the contract can help avoid these disputes once the process has begun.

Regarding the demand risk in urban projects, it will make sense to allocate it to the private contractor only in those projects in which its effort plays a fundamental role in attracting more users. This is not the case of most urban public infrastructure such as hospitals or administrative centers. In terms of transport infrastructure, the great uncertainty to which the expansion of the network in the city is subject implies in practice that demand for the service to be rendered upon works completion poses an unmanageable risk for the private sector. Only in some cases, such as the management of a convention center, can it make economic sense for the private concessionaire to assume the demand risk, because, in this case, their management performance is directly linked to the infrastructure's use.

In terms of operational risks, the adaptation of services to the required technological changes is the main problem that can occur. The private concessionaire will always have an incentive to adopt those technological changes to the extent that they can reduce costs or obtain higher revenues. However, there may be cases in which the private party does not have these incentives and even then it is reasonable to introduce technological advances. In these cases, it seems logical for the contract to allow certain flexibility in some contractual standards (such as term or quality) that may be changed in the future under the supervision of a regulatory entity or arbitration commission.

In many urban projects, revenue does not come directly from users, but rather from subsidies from the public budget. This situation adds the risk that the corresponding municipality will not be able to generate enough budgetary

resources in the future to pay the private contractor under the terms stipulated in the contract. If the municipality does not have enough financial support at the supra-municipal level, the financial costs will increase and it will be more difficult for the private sector to reach financial closure, which may jeopardize the final viability of the project.

Therefore, a first requirement for PPP contract development in cities is a plan for generating future fiscal resources that guarantee the municipality will be able to honor its financial commitments. Also, the city must establish a limit on the future payments associated with PPP contracts. The non-existence of that limit can seriously jeopardize the viability of the city's finances in coming years.

One of the most important risks that can arise in urban settings is political change. Political positions regarding PPPs in cities are often very much at odds among political parties, so that if a given political party is associated with the promotion of a PPP program, it is likely that the opposing party will work against PPPs. Although these approaches may be understandable in the context of political dispute, in practice, they are extremely harmful both to the private company developing the infrastructure, and to the users who benefit from the corresponding services.

The best way to mitigate these problems is to have an institutional setting that guarantees respect for the framework established by legislation and contracts. Supra-municipal entities can implement mechanisms that oblige or drive sub-national entities to comply with these commitments, conditioning future financing or intervening in institutions that do not respect the law as permitted by current legislation.

Finally, the social conflicts that arise from the change in the model can also imply an important risk for the company that manages the PPP. Mitigating this risk requires anticipating these problems and managing them appropriately, both from the point of view of social justice and institutional communication.

Key aspects to attracting private investors

PPPs are based on the fact that the private contractor is remunerated based on the service it provides, and not on the costs incurred. That means that it has to face investments before receiving payments and, consequently, it must gather private financial resources to undertake the project's investments. These resources will come from the project partners, and, to a greater extent, from external financiers, such as banks or specialized investment funds. Obtaining financing is, therefore, a key element for PPP success, and urban projects are not an exception to that rule. The possibility of obtaining financing for a project will mainly depend on two factors: the depth of the financial markets in the currency in which the project's revenue is stated, and the risks of the project itself.

Most urban projects, unlike other infrastructure, such as ports or airports, will have their revenues stated in the country's local currency, which in small and shallow financial markets, as occurs in some Latin American countries,

can pose an important problem for their financing, since in the long term the supply of credit will be scarce and interest rates will be very high.

One solution to this problem is to seek financing in currencies associated with stronger and deeper financial markets. However, it will be very difficult to obtain this financing at a reasonable cost if certain hedging is not guaranteed against the risk of devaluation of the national currency. It is difficult for financial markets to offer currency swaps in the long term for currencies with shallow financial markets, so, in order to obtain international financing, many cities will have no choice but to resort to public mechanisms to mitigate the exchange rate risk, or commit to tender part of the project's proceeds in some strong currency such as the US dollar. As can be seen, the solution is not easy for many cities in Latin America. This is the reason why the role of multilateral organizations such as CAF will be key in many cities. These agencies offer more affordable financing conditions, this being especially relevant for those countries that are still in the process of consolidating their financial markets.

The second fundamental element to obtain financing is the adequate risk management of the project as expressed in the previous section. If the risk in an urban project is not controllable by the private contractor, it will be tremendously difficult to find financing for the project. As already mentioned, a specific aspect to be taken into account in urban projects is that, in many cases, revenues come directly from the government, with the consequent risk for the concessionaire that [the government] will not be able to honor the commitment to pay in the future.

One of the main problems facing many cities in Latin America is that they have limited budgets and are subject to modifications that may come from political changes. If a city undertakes to pay significant future fees associated with PPP contracts without any guarantee that it will have budgetary resources available to make the future payments, it will be very difficult that private investors should be willing to increase that risk.

In addition to the development of plans for the generation of future fiscal resources, or the establishment of limits with future income associated with PPPs, potential investors will highly value the existence of mechanisms that guarantee payments in the event that municipal resources fail. An example of these structures is the Guarantee Fund of Brazilian Public-Private Partnerships (FGP) that was formed by Law No. 12766 from 2012. The FGP, with an overall limit of BRL 6 billion (USD 1.85 billion), was created to provide guarantees to ensure the payment of pecuniary obligations assumed under PPP contracts by federal, district, state or municipal public entities.

Another interesting mechanism is the one developed for the Administrative Center of Tlajomulco de Zúñiga project in Mexico, which was discussed in the previous edition of this publication.⁸ In this PPP contract, an irrevocable contingent credit line was taken out with the National Bank of Public Works and Services of Mexico (BANOBRAS) to mitigate the risk that the municipality would stop paying the concessionaire for fiscal or political reasons in the future. The credit line was guaranteed by the commitment of

8. Asociación Público Privada en América Latina: aprendiendo de la experiencia, CAF.

future contributions of the federal government (revenue-sharing transfers) to the municipality. Consequently, if the municipality defaulted on its commitments with the private sector, it would lose the possibility of using the funds from the revenue sharing transfers, which would be used instead to guarantee BANOBRAS's disbursements.

Mechanisms to preserve public interest

PPP projects should be aimed at improving citizens' quality of life. One of the most important missions of the granting governments then is to ensure that projects warrant the welfare of the general public. In any PPP project there are significant threats to public interest: abandonment of the project by the awardee; service delivered below established quality levels; possibility that the contract is incompatible with actions necessary to promote general public interest; and the risk that the private contractor returns the infrastructure to the state in poor condition.

Project abandonment is always a high risk and can be motivated by the projection of increasing losses over the future concession years. It is also a considerable risk for the granting government to the extent that, if this happens, the provision of the service promised citizens will be delayed.

To be protected from this situation, it is necessary to be efficient in carrying out the tender, carefully selecting the concessionaire and avoiding reckless losses. If, in any case, and despite these preventive measures, the project is abandoned by the concessionaire, the granting governments must employ two strategies. The first one is to establish sufficiently high construction guarantees until the work is completed, in order to discourage the private contractor from leaving. The second measure is the establishment of a mechanism to be able to terminate the current contract in an agile manner. Depending on the situation and characteristics of the works, the mechanism should set forth how to give way to the second qualified bidder of the original tender, or to start a new tender process. For this to be possible, the contract should provide for a repurchase option that the granting entity can exercise based on the volume of executed work and the time remaining until the end of the contract. This purchase option can be accompanied by a sale option to be exercised by the private party, returning the project to the granting government in the event of unforeseeable risks that make it impossible for the concessionaire to continue with the contract.

The provision of the service below established parameters is another problem that the granting government can come up against to guarantee public interest. These problems are generally associated with the private party's having a weak financial situation, which results in cost-cutting measures. In this case, the granting government can protect public interest in several ways. One of them is establishing contractual penalties for non-compliance that discourage the private party from delivering a service below established parameters. The other is to incorporate in

legislation, or contracts, the possibility of direct or indirect intervention in service provision to ensure that services are properly performed until the current contractor is able to guarantee good service provision or until a new private contractor is selected.

Another aspect that may be detrimental to general public interest is the fact that, after a few years, a situation arises in which the contract does not function properly, preventing the government from carrying out actions for the welfare of the general public. Several circumstances can contribute to this situation; for example, demand may have grown much higher than expected and additional works need to be carried out that were not originally included in the contract; or it may be necessary to implement a new technology not explicitly included in the contract. In these cases, the granting government must decide whether the best solution for the benefit of society is to renegotiate the conditions with the current private contractor or, instead, either terminate the contract to issue a new call for tender under different conditions or take care of infrastructure management again with its own means. In the event that the option selected is to terminate the contract, it will be necessary, as previously discussed, that the value for the granting authority to repurchase the works is established in the contract.

A final aspect to be considered is the return of the infrastructure to the city. As the end of the contract term approaches, the concessionaire does not feel encouraged to return the infrastructure to the municipality in good condition. The granting authority will therefore have to implement the necessary contractual mechanisms to prevent this from happening. The contract must include clauses such as the withholding of payment in the last years, subject to a final audit on the state of the infrastructure.

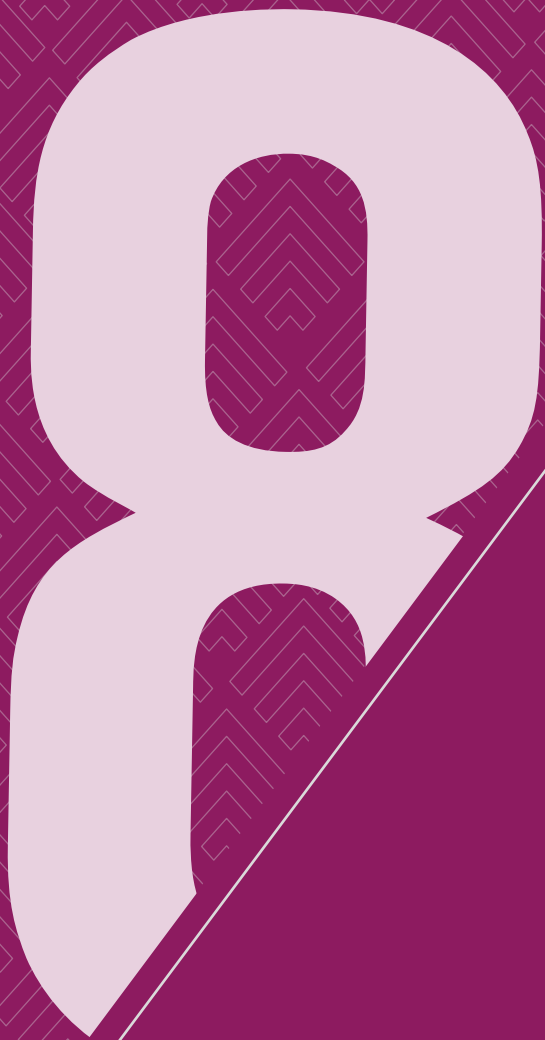
Recommendations for Latin America

This final section breaks down the recommendations for developing PPPs in Latin America into 10 aspects:

1. Latin American cities are facing significant problems that hinder their development and limit the quality of life of their inhabitants. Urban infrastructures and services are key to overcome these problems; but, at present, it is impossible to undertake such actions only with municipal financing given the budgetary restrictions facing most municipalities. Due to this, it is essential that cities in Latin America have the means to be able to use the PPP model.
2. The Public-Private Partnership is applicable to the provision of almost all public goods and services in a city. The PPP model in a municipality should have unique common features applicable to all types of infrastructure; and, at the same time, enough flexibility to adapt to the specific situations of each project.

3. To develop PPP projects, adequate coordination between the different levels of government is required given the complicated institutional structures of cities. An attempt should be made to take advantage of the governance structure and legal framework of PPPs already defined at a national level so that they can be used by subnational entities, especially when they are small or have little experience to start developing projects. The support of multilateral entities is also important, particularly in countries with shallow financial markets, in terms of project financing and contributions of their institutional and regulatory know-how based on prior experiences.
4. A starting point to ensure the success of PPPs in cities is good planning of infrastructure and related services. Planning must be joint for all projects regardless of whether they are carried out as a PPP or under other conventional contracting procedures. It is essential that municipalities have criteria that go beyond the traditional value for money models to decide which projects best adapt to the PPP model.
5. PPP projects in urban areas must be fully integrated into the infrastructure and services networks of which they are to become a part. This requires defining contracts that are compatible with the criteria of tariff and service provision integration schemes in such a way that the user does not perceive differences between one model and another.
6. PPP projects in urban environments should explore the possibility of obtaining additional financing resources for infrastructure and services via the capture of value or business linked to the project's main activity.
7. The optimal risk allocation matrix in urban areas will be very different from that of interurban projects. This will require a detailed study of the mitigation and distribution mechanisms in each specific case. In most cases, it will not be reasonable to transfer the risk of demand to the private sector due to the limited control that is exercised over demand in urban environments.
8. The construction phase of projects in cities will be more complex than those located outside them due to the significant impact that any project in a city can have on other urban services. The institutional structures defined in this regard must implement any necessary mechanisms to address and resolve problems that may arise. One solution may be to implement arbitration commissions—a general one for all projects, or individual ones created *ex profeso*—that contribute to agile dispute resolution.
9. Given that many PPPs in cities require earmarking resources from future municipal budgets, it is critical to ensure that municipalities are able to meet their commitments without having to cut funds from other essential needs of the city. This requires establishing limits on the budgets for future payments, which may be revised over time based on the municipality's financial health.

10. The great dynamism in urban environments requires technological and conceptual changes that are very difficult to envisage from the start in contracts. In order to facilitate that these changes can be put into practice, it is reasonable to define contracts that can be adapted over time, as well as giving governments an option to repurchase the contract in the event that executing an action that the contract itself prevents is in society's best interest.



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