Design & Build For Hospitals

How Can we Improve the Performance of Infrastructure Projects in the Region?

Marco Alemán
Ignacio Astorga
Wilhelm Dalaison
Leticia González Escobar
Enrique Saint-Pierre

Infrastructure and Energy Sector
Social Protection and Health Division
Financial Management and Procurement Services Office

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Ignacio Astorga, ignacioa@iadb.org - Wilhelm Dalaison, wilhelmd@iadb.org

Social Infrastructure

DESIGN & BUILD FOR HOSPITALS

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IDB

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Abbreviations

BI: Building Inspector

BIM: Building Information Modeling

EA: Executing Agency

FIDIC: International Federation of Consulting Engineers

FMP: Office of Operations Financial Management and Procurement Services (IDB)

HEODRA: Oscar Danilo Rosales Arguello Teaching Hospital (Nicaragua)

IDB: Inter-American Development Bank

ISSEMyM: Mexican Institute of Social Security

LAC: Latin America and the Caribbean

MINSA: Ministry of Health (Nicaragua)

MINSAL: Ministry of Health (Chile)

MOP: Ministry of Public Works (Chile)

NEC: New Engineering Contract

PMBOK: Project Management Body of Knowledge – a guide to the fundamentals of PMI Project Management

PMI: Project Management Institute

PMO: Project Management Office

PMU: Project Management Unit

PPP: Public-Private Partnerships

PRINCE: Projects in Controlled Environments

SA: Sectoral Agency

SESAL: Honduran Ministry of Health

SPH: Health and Social Protection Division (IDB)

TOR: Terms of Reference

UIS: Social Infrastructure Unit (IDB)

VFM: Value for money

Executive summary

When implementing hospital infrastructure projects, there are various management modalities and execution strategies. These modalities can lead to the independent contracting of design, construction, and equipment, identified as a traditional scheme, or a combination of these; an in-house or external supervision scheme; a designer and supervisor scheme; a Design-Build or Build-Equip scheme; the "turnkey" modality; or a Public-Private Partnership (PPP) scheme, which includes infrastructure operation and maintenance for a specified period of time.

The existing literature and background identifies what should be considered in the development of the different phases of an infrastructure project. Over the last few years, the Inter-American Development Bank (IDB or "Bank") has financed hospital infrastructure projects in several Latin American and Caribbean (LAC) countries, with different execution modalities, allowing for an analysis of the various modalities.

At the same time, several countries have developed different strategies, including the introduction of good practices in project management; improvement in cost planning and estimation methodologies; the application of information technologies such as Building Information Modeling (BIM); and the development of new contractual models that redefine the relationship between the contracting party, designer, builder, and technical supervision.

This document includes the study of 15 different cases of hospital infrastructure projects implemented in recent years in Bolivia, Chile, Honduras, and Nicaragua, with the goal of obtaining lessons learned and recommendations to improve project implementation practices. The analysis covers aspects related to project governance, as well as scope, timeframes, and costs, in accordance with the different execution modalities.

The PRINCE2 (PRojects IN Controlled Environments) structure was established as a model for the analysis of project governance. It establishes four levels in the structure of project management: Corporate Management, Direction, Management, and Delivery. This analysis did not find any variability in project governance according to the different execution modalities, but did identify that projects that had a clear governance structure and were executed by agencies with experience in project management presented smaller cost and time deviations.

The analysis of variations in the scope of case studies revealed that these variations occur in any form of execution. There are key aspects to minimizing the risks of deviations from project scope, such as the technical capabilities of Executing Agencies, the existence of pre-investment studies, the accuracy of the Terms of Reference, and the proper management of contracts.

Regarding the timeframe for preparing tenders, it was found that in low and medium complexity projects it is between 30 and 60 days; and that in more complex projects the duration is much longer. However, the timeframe for evaluating tenders until the start of the project is unrelated to the complexity of the project. At the same time, on average the scheduled tender timeframe is equivalent to 18% of the scheduled project duration and the actual term reaches 40% of the scheduled duration. However, this data serves as a reference only and cannot be applied to all projects, as timeframes depend on different factors, including the availability of human resources and Sectoral Agency (SA) priorities.

While projects differ in terms of country context and complexity, the analysis of costs determined that for more complex hospitals, the average design cost is 76.7 USD/m2; and in hospitals of medium and low complexity, the average is 32.7 USD/m2. Construction supervision costs average 2.7% of the construction contract, albeit with very disparate cases ranging from 0.9% to 6.3%. This data is for reference as a result of this study and cannot necessarily be applied to all projects.

Regarding execution modalities, the Design-Build modality, where the design is carried out during the tender stage, presented shorter execution times, but costs 40% higher than the other modalities.

The study also identifies the variables that generate the greatest variations in scope, timeframes, and costs in hospital infrastructure projects. Identifying these aspects helps in determining what should be considered to improve processes and correct deviations. Design flaws and new requirements on the part of the Contracting Party during the construction process are the biggest causes of these situations.

Lastly, recommendations are included to improve the management of hospital infrastructure projects in LAC.

1. Background

In 2017, management in the Bank's Infrastructure and Energy Sector (INE/INE) and Social Sector (SCL/SCL) agreed to the creation of the Social Infrastructure Unit to provide specialized technical support in SCL/SCL-funded programs and projects that have infrastructure components.

The Social Infrastructure Unit, in conjunction with the Social Protection and Health Division (SPH) and the Office of Operations Financial Management and Procurement Services (FMP), work to improve the implementation practices of hospital infrastructure projects in Latin America and the Caribbean (LAC), based on the analysis of experiences that provide lessons learned and recommendations for the future implementation of projects of this nature.

This document continues this line of work through the study of 15 different cases of hospital infrastructure projects implemented in recent years in Bolivia, Chile, Honduras, and Nicaragua, with the goal of obtaining lessons learned and recommendations to improve project implementation practices.

The analysis was developed based on the contents prepared by consultants Enrique Saint-Pierre and Leticia González Escobar under the coordination and general editing of Ignacio Astorga, Marco Aleman, and Wilhelm Dalaisón. The collaboration of colleagues from the countries involved was invaluable: Luis Buscarons, Hugo Godoy, and Leonardo Pinzón, and their corresponding project teams; as well as Willy Bendix, María Cecilia del Puerto, and Santiago Castillo. For the cases in Chile, José Cerda Mena of the MOP and Diego Solar and Victoria Basilacos of MINSAL cooperated and provided the project data.

Finally, the following colleagues contributed during the final review and document adjustments: Matilde Neret, Victor Roa, María Elena Ramirez, Livia Minoja, Carlos Henriquez, Beatriz Toribio, Jimena Sánchez, and Ashley Morales.

This document was originally written in Spanish and translated into English by Sarah Benton, for The Write Stuff.

2. Introduction

Planning and implementing hospital infrastructure projects is a complex process requiring a lot of economic resources, time, a high degree of technical capacity, coordination between different areas—sometimes even between different institutions—and procurement strategies, among other aspects. The technical capacity and experience of executing agencies, as well as the availability of firms and contractors in the local or international arena interested in participating, are decisive for the success or failure of these processes. Thus, depending on the country, the implementation strategies of infrastructure projects may vary and will never be adopted without a prior specific analysis.

These strategies can lead to the independent contracting of design, construction, and equipment (traditional), or a combination of these; an in-house or external supervision scheme; a designer and supervisor scheme; a Design-Build or Build-Equip scheme; the "turnkey" modality; or a Public-Private Partnership (PPP) scheme, which includes infrastructure operation and maintenance for a specified period of time.

In recent years, the Inter-American Development Bank (IDB) has financed hospital infrastructure projects in several Latin American and Caribbean (LAC) countries, with different execution modalities. In Nicaragua and El Salvador, for example, the Design-Build modality has been used. Nicaragua also has experience with joint contracting for construction and equipment. In Bolivia, some second and third level hospitals have been designed by a firm, with the construction tendered independently, as well as the equipment. The supervision of the work has been carried out by the same design firm. New hospitals in Bolivia will be made under the turnkey modality, where a single contractor designs, builds, equips, and delivers the operational project to the contracting party or owner. However, countries have their own laws that permit or limit any of these options, with various experiences in their implementation.

In addition, several countries have recently developed different strategies, including the introduction of best practices in project management; improvement in cost planning and estimation methodologies; the application of information technologies such as Building Information Modeling (BIM); and the development of new contractual models that redefine the relationship between the contracting party, designer, builder, and technical supervision.

With regard to project management, standards like PMBOK from the Project Management Institute or the UK Government's PRINCE2 (PRojects IN Controlled Environments) methodology have generated best practices that have been widely accepted in industries such as mining and energy, as well as in construction.

In this framework and based on real experiences, this Technical Note focuses on the analysis of different execution modalities for hospital infrastructure projects for the purpose of determining the advantages and disadvantages of each of them. It also discusses how project governance and the selected execution modality conditions and impacts costs, timeframes, and scope, and how these aspects should be monitored throughout the project cycle.

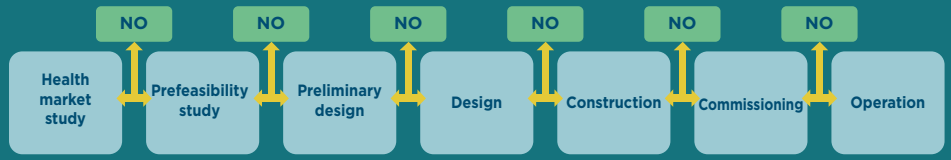
3. Theoretical framework

3.1 life cycle of an investment project

The life cycle of a hospital infrastructure project starts with an idea, that is then developed through a set of successive phases and materializes at the end of the cycle in operational infrastructure.

Proper project governance requires coordination, consistency, and leadership in this cycle, as decisions made in the early stages of the project will be reflected throughout the following stages. If there is an error in the early stages, and it is not detected and corrected in time, it may be very difficult to do so later. It may also have implications on supply of or demand for healthcare services and the correct size of infrastructure.

Figure 1. Investment project phases in health establishments.



Source: Guía para la contratación de proyectos de inversión en hospitales

The aforementioned phases can be grouped into three stages, according to the volume of resources mobilized for each.

- **Pre-investment stage**-focuses on the execution of studies related to project planning and definition.[1]
- **Investment stage**-where resources are mobilized for the physical execution of the construction work, as well as purchasing of medical equipment. This phase is followed by the commissioning of the building.[2]
- **Operation stage-** where the establishment is delivering services.

This Technical Note focuses on the investment phase, which, as already explained, can be implemented through different modalities. Focusing on this phase allows for the identification of how decisions, or the lack thereof, in the pre-investment phase can somehow condition the success of the project.

1 Pre-investment includes the selection and acquisition of land. This activity cannot be relegated to the investment stage.

2 In some countries, commissioning is treated as a specific phase.

3.2 literature review

The existing literature and background identify points that should be considered in the development of the different phases of an infrastructure investment project, especially in hospital infrastructure.

A. The 2015 *Guide for Contracting Investment Projects in Hospitals* (available in Spanish—Guía para la contratación de proyectos de inversión en hospitales) identifies the necessary processes and requirements for managing health infrastructure projects. The guide analyzes cost, time, and scope variables from three projects executed between 2006 and 2013.

Some conclusions of this study are relevant and related to this publication:

- "Timeframe: the average estimated construction time value was 1.4 years; however, the observed timeframe was 3.8 years, representing a time overrun of 169%.
- Price: the price paid had an average increase of 32% compared to what was awarded.
- Scope: the main changes in scope relate to the development of non-architectural specifications of buildings such as structure, sanitary facilities, climate, and others. In the clinical field, only one of the projects had major changes in the number of beds and other care facilities." (translated by author)

Figure 2. Organization of phases and stages of hospital investment projects.

Source: Guía para la contratación de proyectos de inversión en hospitales.

In addition, in the same publication, the following were identified as the main causes of cost and time overruns:

- *"The main delay factor in the three projects was the adjustment of the design delivered by the contracting party in the bidding process. In all cases it had to be redone, either because of a change in requirements (e.g., role of establishment, number of beds), regulatory compliance, or a change of preferences by the contracting party.*
- *The Contracting party's delay in acquiring the authorizations required to start the construction work, which like any other, must comply with the municipal, environmental, and national investment system requirements.*[3]
- *The Contracting party's delay in approval procedures for changes and payment authorization.*
- *The low financial capacity of companies that rely on payment to continue the construction work.*
- *The irregular availability of technical advisors to verify the state of progress." (translated by author)*

When analyzing why these situations occurred, three types of responsibilities are identified:

- *"Contracting Party: the greatest responsibility is in time and cost overruns. Among the main reasons are that tender processes are started without having the appropriate land and pertinent authorizations; incomplete designs are submitted, especially with regard to non-architectural specialties; and delays are caused in the approval processes for changes.*
- *Company: the main responsibility relates to limited financial capacity, which makes it highly dependent on the contracting party's payments and results in slowing down of the construction process.*
- *Force majeure: mainly related to climatic conditions that had a significant impact in one of the projects."* (translated by author)

B. Alternatively, the 2017 publication Innovation in the Methods of Public Procurement in Latin America and The Caribbean considers the analysis of four cases of innovative government procurement used in Latin America and the Caribbean (LAC). Inspired by practices used in Europe and the United States of America, it allows for the "identification of trends in public procurement, which promote more flexible procurement frameworks to incorporate additional methods to traditional ones. It is based on a broader approach of value for money and is compatible with the principles of transparency, efficiency, economy, integrity, and equity." (translated by author)

This publication includes the Build-Equip case of the Regional Hospitals of Tlanepantla and Toluca in Mexico under the modality of Projects for the Provision of Services (PPS).[4] In this model, the State (ISSEMyM) is responsible for providing physicians, nursing services, and medical supplies; the concessionaire executes the construction and is responsible for the facilities and equipment, in addition to the provision of diagnostic services for 25 years.

3 Although the publication does not expressly mention it, another factor that affects timeframes is the delay in obtaining title or a document proving possession of real estate, which must be in the name of the Contracting Party or the Sectoral Agency.

4 Conceptually, Projects for the Provision of Services (PPS) are PPPs.

The Hospitals went into operation in mid-2012 at a cost of more than 25 million USD, with a savings estimated at 4.6 million USD per year for the state government.[5] According to the authors, by 2017 both hospitals functioned satisfactorily, lowering operating costs by one-third. However, the study does not refer to the quality of the infrastructure or its designs, among other things, which are still relevant in this type of infrastructure.

C. Although referring to schools rather than hospital infrastructure, the publication *Analysis of Alternatives for the Execution of School Infrastructure in Latin America and the Caribbean* (available in Spanish–Análisis de alternativas para la ejecución de infraestructura escolar en América Latina y el Caribe) includes the most commonly used tender/execution modalities in the region, especially for new construction work.[6]

This analysis identified the Design-Tender-Build modality as the most widely used in the region. In addition, some other decision-making methods and processes, applied less frequently and only by some countries, were identified and may serve as valid alternatives with the potential to improve the efficiency of school infrastructure construction processes in some contexts.

The study, which covered 12 LAC countries, made it possible to identify that, although with slight differences, these processes provide for the completion of the design before starting the construction contracting stage.

In addition to this method, the publication identifies five other alternatives for the execution of school infrastructure: (i) Design-Build, (ii) "reverse fairs", (iii) use of prefabricated modules, (iv) Public-Private Partnership, and (v) direct execution by the community.

Regarding the assessment of these methods, and in the case of school infrastructure, the publication concludes that none of the alternatives presented can be considered "the best". One or the other may be more appropriate depending on the specific context of each country and project.

Interestingly, the common challenges encountered in the execution of projects in the region include:

- The limited involvement of beneficiaries in the execution processes, especially in the traditional modality, which may lead to less involvement later that affects the care and appropriation of the schools by them.
- The extension of deadlines in project execution processes, attributable to technical times to execute tenders; insufficient resources–human or financial–in the government entities responsible; or delays in construction, among others.
- The fact that it is not considered during planning that the effectiveness of the execution methods may vary depending on the context, urban or rural, in which the project is developed.

D. In the 2018 publication Design Well, Build Better: A Guide for Planning, Creating, Overseeing, and Making Decisions about Social Infrastructure Designs, a series of recommendations are presented defining the scope of the designs, based on the premise that "*the main causes of cost overruns, poor quality, and non-compliance with deadlines in infrastructure projects are design deficiencies.*" (translated by author)

5 The PPP contract provides for monthly payments covering construction and operation, so it is not possible to separate the two concepts (at least with the information contained in the document).

6 In this Technical Note, this modality is referred to as "Traditional".

The publication identifies four main methods for the development of a design: (i) carried out by the staff of the executing agency or another public institution, (ii) forming an ad hoc team with individual consultants, (iii) contracting a consulting firm specializing in design, and (iv) contracting a company responsible for both the designs and the construction of the designs through a Design-Build contract (D+B). For each case, the publication presents the advantages and disadvantages and the types of projects where their use is most common.

In any of these cases, it is emphasized that it should be "*of quality; consistent between the different specialties; and contain all the necessary elements to be able to carry out the subsequent stages without generating conflicts or claims, higher costs, decreases in quality, or longer construction times.*" (translated by author)

The guide provides recommendations, tools, and content to facilitate the process of contracting and developing social infrastructure designs, including the minimum elements that a design should contain, and aspects related to the management of the process. This framework highlights the following:

- The correct definition of scope is required.
- The designer must be provided with, at least, the architectural program, the standards that the design must meet, the design criteria requested by the contracting party, all the information related to the property, and the conceptual designs by phase.
- The contents of the deliverables must be precisely defined.
- The final beneficiary of the design must be involvedo.[7]
- If the technical specifications are sufficient, design supervision should be limited to verifying compliance, eliminating subjectivity as much as possible.
- Accepting design or scope changes may result in claims for additional cost and time.

7 The involvement of the beneficiary in the design processes is a relevant topic and a project management good practice. The referenced publication addresses the importance of this aspect to ensure its future acceptance. In these cases, it is recommended to do an analysis of key stakeholders and involve those most relevant in the design. The quality of a project not only refers to construction standards being met but responds to the needs of the final beneficiary

E. Cost analysis is addressed in the 2016 *Manual for Estimating and Tracking the Final Cost of an Infrastructure Program* (available in Spanish Manual para la estimación y seguimiento del costo final de un programa de infraestructura)–The publication identifies the main sources of project cost variances and presents several tools to avoid optimistic biases that lead to underestimating the actual costs of a project and controlling potential deviations in the project lifecycle.

In the pre-construction stages, deviations are due to variations in the area considered during preliminary designs and that which results from the final designs; and differences between the estimated prices and those obtained in the selection processes. During construction there may be design gaps or needs that were not considered in the tendered project, which result in contract extensions that increase the cost and timeframes of the project. Finally, divergences may also occur due to variations in the exchange rate during the course of a project, when budgets and appropriations are designated in one currency (usually the dollar) and contracts are agreed in the local currency.

Based on the identification of these factors, the manual proposes a model based on historical data observed for each of them in previous projects, which then anticipates these variations in costs and timeframes at distinct "checkpoints" (for example, when moving from preliminary designs to final project). Given the uncertain nature of these changes, these projections are expressed as probability distributions, which allows, for example, to state that a given project will cost more or less than X, with a 90% probability.

F. Finally, considering new modalities that seek greater risk transfer and long-term contracts, one of the most studied has been that of Public-Private Partnerships. Chile's 2017 Evaluation Report of the Cost Scheme and Financing System of Hospital Concessions (in Spanish—*Evaluación de Esquema de Costos y Sistema de Financiamiento de Concesiones Hospitalarias*) presents a comparison between hospitals built by the Hospital Concessions Program of the Chilean Ministry of Health (MINSAL) with those built and operated in a traditional way.

The study found that while hospitals built in the traditional way had on average costs 25% higher than initially contracted, PPP hospitals had not had contract modifications that increased costs (at least through the date of preparation of this report).[8]

It was also estimated that if the PPP hospitals in the program had been built and operated in the traditional way, the present value of their costs would have been between 11% and 13% higher than the concession contracts.

8 It is important to consider that beyond PPP contracts being modified or not, the private sector seeks to maximize investment and save as much as possible; so, there are other factors that the private sector uses to control and avoid increasing possible cost deviations.

4. Execution modalities of investment projects

In public sector investment projects, independent of their source of funding, the entity responsible for the appropriate use of resources is always a public SA. In the case of the health sector, this is done by the ministry or secretariat of health at the national or subnational level, depending on the country.

The responsible SA makes two types of decisions: (i) Which entity will be responsible for execution, in terms of timeframe, scope, and budget; and (ii) What will be the execution mechanism, which establishes the grouping or not of the various project phases that include pre-investment, investment, and operation.

4.1 Management modalities

Traditionally, public health investment projects are executed by the Sectoral Agency itself, which is responsible for contracting the execution and supervision of the different project products. In many cases, these agencies create Executing Agencies or Management Units within their own units that are assigned the specific commitment and responsibility to carry them forward. These types of cases are called **internal management modality.**

In some countries, Sectoral Agencies choose to strengthen Executing Agencies by involving firms that provide technical assistance for the development of different activities or contracting project management experts to form stronger

teams. In these cases, responsibility is never transferred to an actor other than the public sector itself.[9]

However, there are modalities where the SA establishes a mandate, agreement, or contract with another agency or institution to carry out the project under established terms, including the contracting of the execution and supervision of the construction work. The rationale for this type of option is that these institutions can collaborate with expanding project execution capacity at a time of increased demand; have an expert technical team in infrastructure or have Project Management capacity; among other reasons. In these cases, decisions are never fully delegated, as the Sectoral Agency maintains leadership of the project.

These cases, in which the Sectoral Agency makes arrangements with other agencies, are called **mixed management modalities** These agencies are identified as the following:

I. Other public agency: Execution is transferred to an existing public agency specialized or experienced in the execution of infrastructure projects. The most common examples are Ministries of Public Works, or Infrastructure Agencies that are part of the state apparatus and that have expertise in this type of activities.

II. Specialized Agency:[10] Execution is transferred to experienced agencies with their own policies and procedures, as well as accountability mechanisms, so they develop the agreed project. The most common examples are United Nations-affiliated agencies.[11]

III. Management Firm: Through a competitive process, a firm is contracted to perform managerial functions—such as planning, communication, and project administration—and to be in charge of procurement and supervision of contracts.

Notwithstanding the transfer of execution responsibility to a third party, the Sectoral Agency retains the overall leadership of and responsibility for the project. Therefore, agreements or contracts include monitoring and supervision clauses.

4.2 Execution modalities

To carry out and contract the design, construction, equipment, and operation of hospital infrastructure, there are various schemes—some commonly used by various countries, and others more particular and adapted to the regulations of each country. Design and maintenance may be carried out in-house or through private suppliers, but construction and equipment is always provided by a private supplier.[12]

The selection of the execution modality to be used relates to the responsibilities or risks that are transferred to the private supplier. Responsibilities or risks relate to planning, specifications, design, construction, equipment, maintenance, and investment financing among others. The selected scheme depends on the regulatory framework (laws and regulations), financial availability, institutional capacity, the private market, and social acceptance.

9 Examples of this may be firms that provide technical assistance to the project teams either holistically or on specific topics, such as design, procurement, or supervision of construction work. In addition, the formation of Project Management Offices (PMO) within the Sectoral Agencies themselves contributes to strengthening project execution without shifting responsibilities to other actors outside the Sectoral Agency.

10 Generally, international bodies such as UNDP, UNOPS, UNICEF.

11 While Specialized Agencies have their own procurement policies, their use in IDB-funded projects requires approval of an exception to the Bank's Procurement Policies.

12 Under IDB procurement policies, companies or firms may be contracted independently or through partnership with others.

Some risks are permanently retained by the Sectoral Agency and others may be transferred to contractors according to the type of contract.

The following describes the gradient of options from higher risk retention to lower risk retention (or higher transfer), including options used more frequently or identified in this study:[13]

I. Traditional (TRD): The design, construction, equipment, and maintenance of the project are contracted separately. These contracts are made through independent and time-coordinated procurement processes for the purpose of having a finished and equipped hospital.

II. Build-Maintain (B+M): A single company, to which a completed design is provided, is hired to construct and maintain the infrastructure. Usually, the maintenance period is set at three years. Alternatively, it may also include medical equipment.

III. Build-Equip (B+E): A company, to which the completed design and the list of equipment are given, is hired for construction and to acquire and install equipment.

IV. Design-Build (D+B): A company that is hired to do the designs and then construct them. To do this, the contracting party provides the company with its requirements and technical specifications and, in some cases, a pre-design. In this case, two variants have been observed:

a. The final design is developed during contract execution.

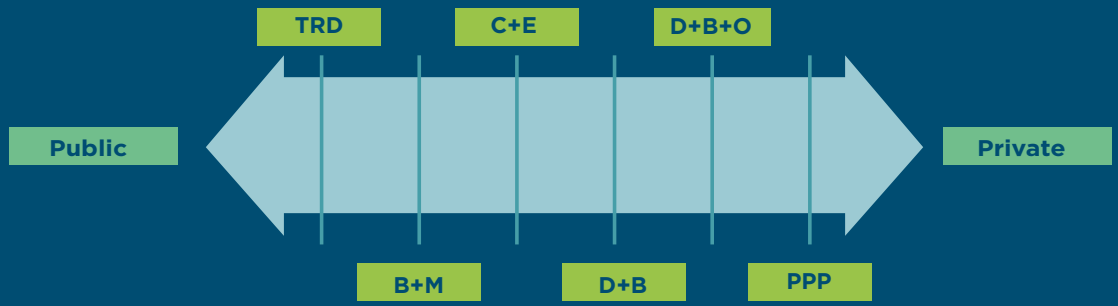
b. The final design is developed in the tender phase by each tenderer as part of their technical proposal.

V. Design-Build-Operate (D+B+O): A single company is contracted to do the design and construction, and is also responsible for operation for a period of between three and ten years. Alternatively, it may also include medical equipment.

VI. Public-Private Partnership (PPP): A company is contracted to finance and execute all phases of the project lifecycle—planning, design, construction, equipment, and operation for a certain period (usually greater than 10 years)—and must meet certain service and quality standards. Payments to the company are made once the project is put into operation.

Figure 3 categorizes the various execution modalities according to the transfer of risk from the public to the private sector.

Figure 3. Transfer of risks according to the execution modality.



Source. Authors.

13 There are other modalities used by some countries within their specific regulatory framework, such as obras por impuestos (construction works for taxes), or direct execution by the community. Generally, these modalities are used for smaller-scale and more complex projects than hospitals, that are local in nature and require an elaborate design.

Table 1 shows risk retention according to execution modality. In all cases, the definition of the project, its size and physical characteristics, as well as healthcare responsibility, are the sole responsibility of the Sectoral Agency. Some of the most common risks are the following:

- **Design:** site selection, compliance with municipal regulations, construction and health codes, coordination of specialties among others..
- **Construction:** availability of working capital, coordination of areas of work, outsourcing of suppliers, supply of materials, climatic events, labor conflicts among others.
- **Equipment:** technical specifications, installation and compatibility of equipment with infrastructure and facilities, timing of arrival of equipment to the hospital.
- **Maintenance:** availability and quality of maintenance services.
- **Investment financing:** all models except PPPs depend on annual budget availability, which in the case of failure, leads to the slowing or stopping of construction work.

Table 1. State-retained risks according to execution scheme.

Activity	TRD	B+E	B+M	D+B	D+B+O	APP*
Planning	+++++	+++++	+++++	+++++	+++++	+++++
Specifications	+++++	+++++	+++++	+++++	+++++	+++++
Design	+++++	+++++	+++++	++	++	+

Source: Author. +++++ 100% risk retention by the state; + very low risk retention by the state

* This includes the gray-coat PPP modality; in the white-coat PPP modality which includes clinical services, the transfer is almost complete with the exception of planning and partially, specifications. See Bibliography.

4.3 Supervision modalities

For project execution in its various phases to meet expectations, supervision by the Contracting Party is required to guarantee the quality of the products, as well as compliance with the contractual terms.

Although the different supervision modalities have not been the subject of this study, a modality used in Bolivian projects has been identified, where the same firm designs the hospital infrastructure project and also supervises the project in the construction phase.

The execution of the design is considered under the traditional modality; but adding supervision activities to the same firm has another impact on the construction phase, differentiating it from an independent procurement.

This document contains lessons on this modality that may be useful for future processes. However, an analysis of the different supervision modalities of the different phases of a hospital infrastructure project merit further study.

PUBLIC-PRIVATE PARTNERSHIPS IN THE HEALTH SECTOR

The concept of Public-Private Partnerships (PPP) has been defined as "forms of cooperation between public and business authorities whose purpose is to guarantee the financing, construction, renovation, management, and maintenance of infrastructure or the provision of a particular service".[14] (translated by author).

This cooperation between the public and private sectors is regulated under a contract between both parties, where the private party receives remuneration from the State for the services it provides. The features of PPPs are as follows:[15]

- Contracts are long-term (more than 10 years).
- The private party finances the infrastructure investment and after its implementation receives remuneration from the Administration. In social PPPs, users do not make any additional payments.
- Payments are subject to compliance with the service standards defined in the contract. The company has the right to receive a payment to the extent that it complies with the contract.
- Public character: the good is publicly owned or reverted to the Administration at the end of the contract; and the planning, control, and financing of the PPP is public.
- The decision to use a PPP should be based on a "value for money" (VFM) assessment against other alternatives, which is essential to determine whether the PPP is a more advantageous option than the traditional model, by providing higher quality at equal price or equal quality at a lower price.[16]

14 See *Series of Technical Notes on Public-Private Partnerships in Latin America's Health Sector: General Concepts and Models* (available in Spanish-Serie de notas técnicas sobre asociaciones público-privadas en el sector de la salud de América Latina - Conceptos generales y modelos).

15 According to the 2004 Green Paper from the European Union.

16 The concept of Value for Money in the framework of PPPs establishes that a service must be provided by a private party who can offer a higher quality for a fixed cost or the same quality results at a lower cost. In this way, it tries to maximize the satisfaction of the underwriters, as well as the optimization of the value of money.

The principle of PPP is the transfer of risks related to the management of assets during their life cycle from the State to the private party. The lifecycle of the asset includes design, construction, operation, maintenance, and replacement, and for health infrastructure projects the estimated term is 15 to 40 years. In this type of contract, the private party is responsible for the assets to be operational and in good condition throughout its validity. This provides an incentive for the concessionaire to seek the best mix between investment and operation.

International experience has shown that establishments built under the PPP modality are better suited to agreed deadlines and prices than those executed by traditional means.[17] In addition, PPPs are more efficient than the traditional investment and operation model.

17 See Fewer Stories, More Evidence: Public-private Partnerships in Scientific Literature (available in Spanish–Menos cuentos, más evidencia. Asociaciones público-privadas en la literatura científica)

In 2017, Chile's Ministry of Health commissioned a study to compare traditional procurement models with PPPs.[18] The average construction price of PPP projects is 22% lower than those executed via traditional modalities and the construction time was 35% shorter.

PPP contracts in Chile include non-clinical services such as cleaning, food, surveillance, among others. The operating cost of a PPP contract proved to be 9% cheaper than a traditional one, with a contract that ensures compliance with standards, a situation that does not occur under traditional management.

To understand the differences between the performance of PPPs versus the traditional model, one must keep in mind that they are different modalities. PPPs are favored for: (i) the long term;

18 See *Evaluación de Esquema de Costos y Sistema de Financiamiento de Concesiones Hospitalarias*, Enrique Saint-Pierre C.; Héctor San Martín R.; Diego Solar O. October 2017.

(ii) assured payments to the extent that the private party complies with the contract; and (iii) private management with incentives to stay on budget and get the hospital up and running as soon as possible.

On the other hand, the traditional model is exposed to the rules of public management that can affect the performance of contract management. These include:

- Multiple short- or medium-term contracts, with milestone payments.
- Annual budgets exposed to economic cycles.
- High turnover of public management, as they are subject to changes of authority.
- Difficulty hiring and retaining specialized personnel.
- Complex processes with multiple actors (technical, financial, administrative, and political) that are not necessarily aligned or coordinated.

5. Case studies

This Technical Note reflects the results of a study carried out to analyze different execution modalities of hospital infrastructure projects, and their differences in hospital infrastructure performance in terms of timeframe, cost, or scope.

For the completion of the study, 15 hospital infrastructure projects were selected that meet the following criteria:

- **i.** Executed in Latin America and the Caribbean (LAC)
- **ii.** Executed in the last 5 years
- **iii.** All the complexities
- **iv.** IDB and national financing
- **vi.** Information availability
- **vii.** Projects completed or in execution

The study was conducted during the period of August 2019 to June 2020 and included both projects already completed and some that are still under construction.

Table 2 summarizes the 15 cases with their execution status as of June 2020. Annex 1 has more detail on each of the projects

While the cases analyzed involve hospitals from different countries and with different scopes, complexities, and management and execution modalities, the analysis of these seeks to obtain relevant conclusions and recommendations for the future implementation of similar projects.

Table 2. List of case studies.

Country	Locality	Hospital	Complexity*	Total Hospital Beds	Construction area (final)	Type of project	Status as of June 2020	Management Modality	Execution Modality
Bolivia	El Alto	El Alto Sur	High	153	21,474	New	Under construction	Mixed	Design and Supervision
	Llallagua	Madre Obrera	Medium	81	9,649	New	Completed	Mixed	Traditional
	Ocurí	San Salvador	Low	33	4,893	New	Completed	Mixed	Traditional
	Potosí	De Potosí	High	276	27,204	New	Completed	Mixed	Design and Supervision
Chile	Santiago	Barros Luco	High	967	183,203	New	In design	Internal	Design-Build
	Santiago	Provincia Cordillera	High	394	92,886	New	In design	Internal	Design-Build
	Santiago	Dr. Sótero del Rio	High	710	213,861	New	In design	Internal	Design-Build
	Curicó	Curicó	High	400	109,152	New	Under construction	Mixed	Design-Build
	Alto Hospicio	Alto Hospicio	High	235	42,421	New	Under construction	Mixed	Design-Build
	Quillota	Quillota Petorca	High	282	73,204	New	Under construction	Mixed	Design-Build
Honduras	La Esperanza	Enrique Aguilar Cerrato	Medium	91	3,401	Expansion	Completed	Internal	Traditional
	Gracias	Juan Manuel Galvez	Medium	129	3,647	Expansion	Completed	Internal	Traditional
Nicaragua	León	Oscar Danilo Rosales Arguello Teaching	High	461	35,685	New	Cancelled**	Internal	Design-Build-Maintain
	León	Oscar Danilo Rosales Arguello Teaching	High	461	35,685	New	Under construction	Internal	Build-Equip
	Ocotal	Department of Nueva Segovia	Medium	236	25,134	New	Under construction	Internal	Build-Equip
	Corn Island	Corn Island Primary	Low	33	2,662	New	Completed	Internal	Traditional

* For the purposes of this Technical Note, case studies were classified into three levels of complexity so that they could be compared to each other. This classification does not necessarily match the classification that each country assigns to each of the projects.

** The Oscar Danilo Rosales Arguello Teaching Hospital (HEODRA) was tendered initially under the Design-Build modality. Since the awarded company went bankrupt, the contract was cancelled. Subsequently it was tendered as Build-Equip, having previously contracted the design separately. Since two execution modalities were used, both experiences are included for the same hospital.

To simplify the analysis, **six study modalities**, have been defined that arise from the combination of management and execution modalities. The modalities analyzed have been managed by both the same Sectoral Agency (Ministry of Health or equivalent) and other public agencies (e.g., Ministry of Public Works) or a management firm contracted for this purpose. In both cases executed projects are included under the traditional modality (individual tenders) and Design-Build, although the latter with differences in the timing of the design.

From the point of view of hospital complexity and type of intervention, three levels are defined depending on the area and portfolio of services of each hospital. This allows for lessons learned from the results that can be explained as a function of the size of the project.

Table 3. Study modalities.

Management		Execution	Cases
Internal	Sectoral Agency	Traditional	Honduras (2) Nicaragua (1)
Internal	Sectoral Agency	Design-Build	Chile (3)
Internal	Sectoral Agency	Build-Equip	Nicaragua (2)
Mixed	Management Firm	Design and Supervision	Bolivia (2)
Mixed	Other Agency	Traditional	Bolivia (2)
Mixed	Other Agency	Design-Build	Chile (3)

Table 4. Complexity and type of project.

Complexity	Type of Project	Cases
High	New	Bolivia (2) Chile (6) Nicaragua (1)
Medium	New	Bolivia (1) Nicaragua (1)
	Expansion	Honduras (2)
Low	New	Bolivia (1) Nicaragua (1)

In addition, it is important to consider that conclusions obtained based on case studies, while they may be guiding and direct decision-making, cannot be considered final or static. The very nature of hospital infrastructure projects, and the realities of countries, is constantly changing, so the specific context of each project should always be considered when starting and managing a project.

Some of the limitations that should be considered are as follows:

- Six out of fifteen projects have not yet been completed, and three of them have not even begun the construction phase, so variations in cost, timeframe, and scope do not cover the entire project cycle. For this reason, an attempt was made to carry out the analysis by phase (design, construction, supervision) so that some preliminary conclusions could be obtained.
- Case studies are not homogeneous amongst themselves. Some projects are for expansion and others for new construction, while others correspond to different levels of complexity. However, the analysis intended that conclusions be obtained based on parameters that are as similar as possible.
- Related to the above, the number of cases by modality or complexity is not necessarily large, so the authors acknowledge that the conclusions would be stronger if more similar cases had been analyzed. It was preferred to carry out the analysis in order to find some lessons, even if just based on one or two cases.
- Due to the passage of time for some of the projects and the fact that some key players in the process have changed, it was not possible to access all the information. Care has been taken to ensure that the conclusions reached were made based on documented evidence and confirmed data.
- The analysis does not include aspects related to the quality of the buildings, among other reasons because some have not been completed. This factor is relevant in infrastructure projects, but there are other intervening factors such as project quality and good execution or supervision, aspects not necessarily related to the execution modality.
- Finally, it is important to consider that the institutional, social, and economic reality of countries is also not homogeneous, nor are the procedures, administrative and civil regulations, and costs used for both estimating and contracting. For this reason, as indicated at the beginning of the chapter, it is important to weigh this data with the reality of each country.

6. Comparative analysis

The analysis of the different case studies and the different execution modalities has produced some relevant conclusions and others that, although they cannot be considered definitive, help to explain failures and identify opportunities for improvement in the implementation of hospital infrastructure projects.

The aspects discussed include governance, scope, timeframes, and costs.

6.1 Governance

The Project Management Institute's PMBOK, PRINCE2, ISO 21500, and other organizations specializing in project management have different definitions of project governance. There are slight differences between them, and each one presents a distinct value from the other (see BOX).

This Technical Note defines that the most important objective of governance is to **establish clear levels of authority and decision-making in a project throughout its lifecycle**; for this purpose, **governance is represented by the people, policies, and processes that provide the framework for decision-making**. Governance in a public investment project ensures that it is properly conceived and implemented in accordance with best project management practices, to ensure that the expected results and social benefits are achieved throughout its lifecycle.

For the analysis of governance in the case studies, the PRINCE2 structure was used as a reference, which establishes four levels in the structure of project management:

The **Corporate Management Level** is represented by the highest decision-making authority of the Sectoral Agency (SA). This level has the responsibility to define project expectations, secure project resources, and delegate daily project management at the lower level. This Level can be defined as the sponsor of the project and plays a fundamental role in the success of the project. When there is involvement and interest in a project at this level, there is a much higher probability of success.

In the case of public sector health infrastructure projects, this level has the participation of the highest decision-making authority of the SA (Minister of Health or Director of the Autonomous Health Institution) and may include representatives of the project's funding organizations (Multilateral Agencies) and key stakeholders (Ministry of Planning/ Finance) who will define strategic guidelines (not operational ones) and have the power to appoint managers at the lower level (Project Board).[19]

19 In the case of IDB, while the IDB participates in dialogue at all levels, it does not assume responsibility or participate in the decision-making of the project. The role of the IDB is to exercise technical and administrative supervision to ensure the proper execution of resources and the accomplishment of project products, results, and benefits.

The **Direction Level** is responsible for directing the project and is responsible for ensuring that the project meets the established goals and outcomes. This level plans, authorizes the necessary funds, approves progress, makes decisions, coordinates different participants, and gives visible and continuous support to the execution of the project, including communications with stakeholders.

Generally, this level is not one-person, but includes and coordinates several actors representing both the Management Level and the users and providers of the project's key services. In the case of health sector infrastructure projects in the public sector, generally the director of the Executing Agency (Executive), the director of the Hospital or the planning unit of the Sectoral Agency (as a representative of the user), and the management of the infrastructure unit of the Sectoral Agency itself (as an internal provider of infrastructure services) participate. In the case of mixed management projects (as presented in this Technical Note), Specialized Agencies or Management Firms are part of this level in their role as an external service provider.

The **Management Level** is generally represented by a single person: The Project Manager. This level is responsible for the day-to-day management of the project. Their main responsibility is to ensure that the project delivers the required products according to the objectives of time, cost, quality, scope, risk, and benefit. In the case of public sector health infrastructure projects, the Project Manager is generally a staff official assigned for this purpose or is delegated to a specific company responsible for managing the infrastructure project.

The **Delivery Level** is made up of the technical team, firms, contractors, supervisors, and suppliers responsible for delivering the corresponding products according to the quality, cost, and timeframes determined in their corresponding contracts.

Based on this structure, project execution falls specifically in the last three levels, leaving the Level of Corporate Management outside the direct operational responsibility in the implementation of the project. However, this Level is ultimately the responsible party for the project, especially with the financing agencies.[20]

20 Depending on the country, the degree of involvement of the Level of Corporate Management is higher or lower depending on the degree of independence that can be attributed by rule or custom to the other levels. This can be a factor that directly impacts execution times if the Management Level has sufficient delegated powers. For example, in some countries, all documents require signature from the Minister, including minor procedures or authorizations to request information from other agencies.

Figures 4 and 5 present two examples of hypothetical organization charts for project governance mechanisms, with the identification of different roles according to two of the management modalities identified in Chapter 4: internal management and mixed management.

As indicated in Chapter 4, of the universe of case studies analyzed, some were managed internally by the Sectoral Agency, and others in a mixed method, assigning some of the responsibility to an external partner

A. <u>Internally-managed projects:</u>

Chile

The management of the **Barros Luco, Puente Alto** and **Sótero del Río** hospitals was carried out directly by the Ministry of Health (MINSAL) through their respective regional Health Services, through a combination of professionals from their permanent staff along with others hired specifically for this function. MINSAL, at the central level, monitored projects through the Ministry's Investment Division.

Figure 4. Example of organization chart for project governance under the “internal management” modality.

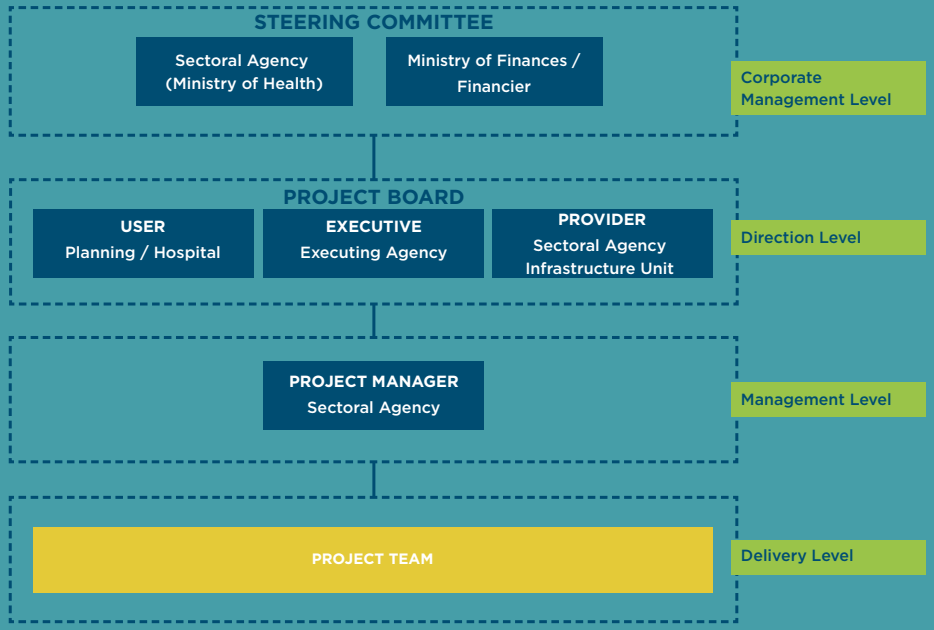
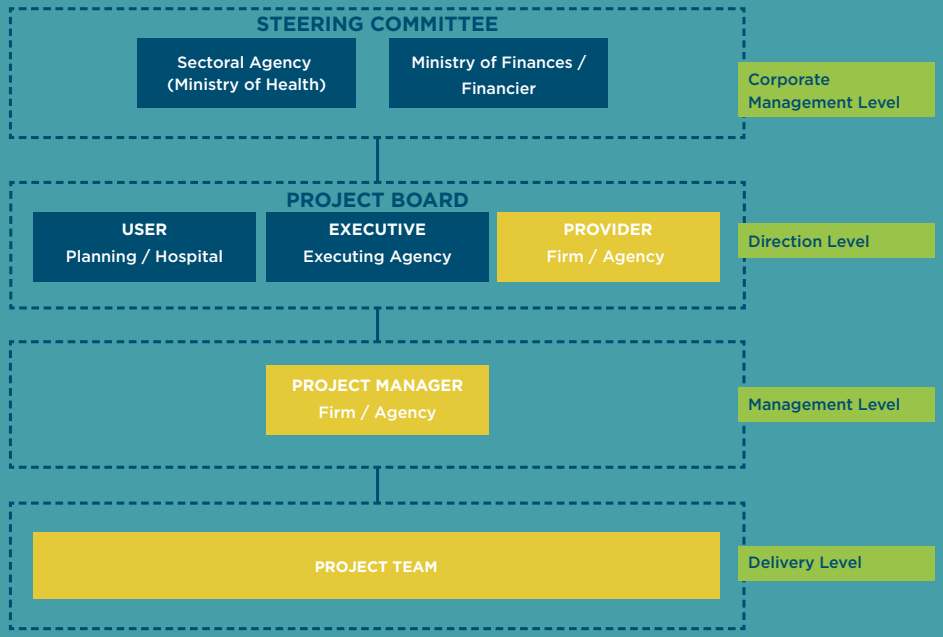


Figure 5. Example of organization chart for project governance under the “mixed management” modality.



The governance modality is internal management: The Direction Level falls on the Investment Division (Executive) and the director of the corresponding Health Service (Supplier); at the Management Level is the Building Inspector (BI); and for the Delivery Level there is the technical team from the Health Service, the contract company (Design-Build), and the equipment supplier.

While the User's (Hospital Director) participation at the Direction Level is not clearly identified in this case, the differentiation between Executive and Provider roles is clear.

Honduras

The project governance of **La Esperanza** and **Gracias** hospitals was carried out by the Ministry of Health (SESAL) who procured all contractors through the executing agency of the Program to Strengthen the Decentralized Management of Health Services (GESALUD). The management modality of this project is internal: The Direction Level is carried out by GESALUD (Executive) and the Project Management Technical Unit – PMTU (Supplier), although the user is not identified. For direct project management, the PMTU appoints a project coordinator from within SESAL staff.

Nicaragua

In the case of **HEODRA, Ocotal**, and **Corn Island** hospitals, projects management was carried out by the Ministry of Health (MINSA), who procured all contractors, including external supervision for the purposes of controlling the construction works. The Ministry appointed a Project Manager to supervise each of the projects, although it has not always been the same professional who has fulfilled that role since the beginning of the project lifecycle.

Nicaragua's project governance model is entirely internally managed. At the Direction Level is the MINSA Physical Resources Directorate as the Supplier, and the External Cooperation Agency as the Executive, although the User is not

Table 5. Governance structure of the Barros Luco, Puente Alto and Sótero del Río Hospital projects.

Level/Role	
Direction	Investment Division of the Ministry of Health (Executive)
	Health Service Director of MINSAL (Provider)
Management	Building Inspector – BI (Project Manager)
Delivery	Regional Health Service Technical Team
	Design-Build contractor
	Medical equipment supplier

Table 6. Governance structure of La Esperanza and Gracias Projects.

Level/Role	
Direction	GESALUD (Executive)
	Project Management Technical Unit (PMTU)
Management	SESAL Project Coordinator
Delivery	Design firm
	Construction company
	Supervision company
	Medical equipment providers

identified. At the Management Level a Project Manager from the MINSA staff is appointed, and at the Delivery Level are the supervision firm, the construction contractor, and the equipment supplier.

In this case, the Direction Level did not explicitly incorporate the User (Hospital Director).

B. Mixed management projects:

Bolivia

For the hospitals in **Llallagua** and **Ocurí**, the SA assigned the management of the project to the National Fund for Productive and Social Investment (FPS). FPS hired a firm to supervise the construction work and manage the contract, as well as to oversee the installation of equipment. The governance model used for these hospital projects is mixed management. At the Direction Level was the Departmental Management of FPS, who designated an Auditor at the Management Level. For the Delivery Level, there was a team of specialists who depended on the Auditor for monitoring construction work and related contracts (without replacing the functions of supervision) that, together with the Contractor, made up the project team.[21]

In this case, it is noted that neither the Supplier nor the User (Director of the Hospital) are included at the project's Direction Level.

Table 7. Governance structure of HEODRA, Ocotal, and Corn Island Hospital projects.

Level/Role	
Direction	MINSA External Cooperation Agency (Executive)
	MINSA Physical Resources Directorate (Supplier)
Management	MINSA Project Manager
Delivery	Construction work supervision firm
	Build-Equip contractor
	Empresa supervisora
	Proveedores de equipamiento médico

Table 8. Governance structure of the Llallagua and Ocurí projects.

Level/Role	
Direction	Departmental Management of Potosí FPS (Executive)
Management	FPS Auditor (Project Manager)
Delivery	Team of FPS Specialists
	FPS Head of evaluation
	Supervision company
	Construction contractor
	Equipment suppliers

21 The FPS is a decentralized public law and development non-profit entity. It has its own legal status, technical and social administrative autonomy, national jurisdiction, decentralized operations at the departmental level, and is currently under the protection of the Ministry of Development Planning. Its main objective is to manage the resources provided to it by international cooperation agencies and the General Treasury of the Nation, for the co-financing of investment expenses of feasible projects that contribute to the socio-economic development of municipalities, which, in response to the demands of civil society, are consistent with national development policies and strategies.

For the Hospitals of **El Alto** and **Potosí**, the SA hired a management firm (referred to as the "Management Entity"), with the general objective of providing technical assistance and fiduciary support; technical, administrative, and operational development; and training and capacity-building in project management from the design through operation phases of hospital projects.

Although with slight differences, the governance model used for both projects places the General Coordinator of the Project Management Unit (PMU) as the Executive at the Direction Level. The Executive designates the Technical Coordinator of PMU as Internal Project Manager at the Management Level, the Management Entity as Supplier, and the Special Committees as Users. At the Delivery Level is the team of specialists who work under the Technical Coordinator; and despite not being included, it is inferred that the Management Entity's technical team is also at the Delivery Level, along with the construction contractor and the equipment suppliers.

The governance mechanism should be understood according to the project objective, which in this case included

Table 9. Governance structure of the El Alto and Potosí projects.

Level/Role	
Direction	General Coordinator PMU (Executive)
Management	Technical Coordinator PMU (Project Manager)
	Management Entity (Supplier)
	Special Committees (User)
Delivery	PMU Technical Team

a Management Entity as Head Advisor and as a SA capacity-building team throughout the implementation of the projects.

In accordance with the governance scheme in Figure 5, the User and the Supplier should be part of the Direction Level, not the Project Manager level.

It is important to note that the International Federation of Consulting Engineers' (FIDIC) contract model was used for these hospital projects.[22] The FIDIC model establishes the "Engineer as the person designated by the Contracting Party as such for the purposes of the Contract and as indicated in the Contract Data, or any other person designated periodically by the Contracting Party." (translated by author) Thus, the contract states that this role will be performed by the Management Entity, assuming the functions and responsibilities of the Engineer. This made it possible to establish, contractually, sound governance mechanisms.

22 Of the 15 projects analyzed for this study, only these had a FIDIC contract.

Chile

For the **Curicó, Alto Hospicio** and **Quillota Petorca Hospitals**, MINSAL signed an agreement with the Ministry of Public Works (MOP) for the management and implementation of the projects. MOP has its own regulations for the management of infrastructure projects, and so designated an Auditor General from its own staff to supervise the contracts with the support of an External Consulting firm, from the design phase and executive project through project delivery. MINSAL manages the budget

but, for very significant changes, the MOP must also submit it to the Ministry of Social Development and the Ministry of Finance.

This governance structure identifies MOP and MINSAL authorities at the Direction Level, as well as the Technical Committee, which is composed of the director of the Regional Health Service (Executive), Hospital Directors (Users), and the Regional Director of Architecture (Provider). At the Management Level is the Auditor General, and for the Delivery Level is the team of external consultants, the project supervision company, the contractor (Design-Build), and the equipment supplier.

Based on this analysis that used the PRINCE2 method as a reference, despite their differences, it can be concluded that all the cases analyzed have a governance structure according to the four levels defined by PRINCE2. Variations are found mostly in the **Direction** and **Management** Levels; the former does not always include the user and the supplier, and with the latter, the project manager's role is not always clearly defined in its role of responsibility for the project.

In the analysis, it was not possible to identify a direct relationship between project governance and execution modalities; that would be useful for verifying if certain combinations would achieve better results. However, as will be demonstrated in the following chapters, although the projects were not without problems, **deviations in cost and time were smaller in those using the mixed management modality**.

In addition, although the governance scheme of each project was identifiable, it is not possible to ascertain the appropriateness of day-to-day tasks and decision-making. Most SAs manage projects according to their organizations' traditional methods and not according to current methodologies or project management standards.

Table 10. Governance structure of the Curicó, Alto Hospicio and Quillota Petorca Hospitals projects.

Level/Role	
Direction	MOP - MINSAL
	Specific Technical Committee (CTE)
Management	Auditor General (Project Manager)
Delivery	External Consultants
	Supervision company
	Contractor company
	Equipment suppliers

MODELS OF CONSTRUCTION CONTRACTS

The IDB uses two models of tender documents, which include two different contract models for construction work.

The **small projects** documents, which are used in construction contract processes of up to 10 million USD, include a simpler contract model than the contracts included in the **civil works** documents, which are used for larger and more complex projects.[23] The differences between one model and the other are in the contract model being used.

Beyond the criterion of the amount of the contract, other factors should be considered, such as the level of complexity of the work, the needs of each project, the ability to manage and administer contracts, the origin of resources, the complexity of the hospital, and the existence or not of a design among others. Each case is unique and, therefore, each case should be decided independently as to the most appropriate contract type.

In general, FIDIC (International Federation of Consultant Engineers) contracts are used for complex projects (which require contracting through an International Public Tender), although there are other models, such as NEC (New Engineering Contract), that are permitted by IDB procurement policies. These contracts are based on international best practices in the construction sector; they establish clear rules of play, a balanced approach between the roles and responsibilities of the parties, as well as balanced risk allocation and management.

These contracts include rules for the modification of agreed contract amounts, rules for the extension of completion time, and change procedures. They also provide a multi-level dispute resolution mechanism.

23 In addition, for Design-Build contracts, IDB models maintain the same criterion. One model is used for small projects and another for civil works.

PROJECT MANAGEMENT AND GOVERNANCE

Each project is unique and different from the other, so for successful management it is important to define the relationship between actors or stakeholders, their responsibilities, and levels of decision-making.

There are globally recognized organizations dedicated to establishing project management standards and methodologies. Among the most important are the Project Management Institute (PMI), Projects in Controlled Environments (PRINCE2), the International Project Management Association (IPMA), and the Association for Project Management (APM).

In most of LAC's public sector, projects are managed on an ad hoc basis; a Director/Manager is appointed with experience in a given topic, offering a more technical approach than a project management one.

However, there are some emerging phenomena, such as the implementation of Project Management Offices (PMOs) in the internal structure of Sectoral Agencies. Their purpose is to incorporate best practices, processes, tools, and personnel into the execution of various investments, including infrastructure projects, within the times and with the characteristics defined in their planning. The PMO provides project leaders with the support they need to manage their projects using methods and processes of planning, execution, monitoring, and control.

An example of this is the government of Peru, which due to its success with organizing the Pan-American Games in Lima using this mechanism, issued a decree in 2019 for the commissioning of PMOs in public sector entities. This will concentrate efforts to ensure that investment projects are executed efficiently and in the expected timeframes, using effective mechanisms.

In LAC, most hospital infrastructure investment projects are complex, not only because of the sheer complexity of the infrastructure itself, but also because of the environments where they are implemented; the various stakeholders involved (internal and external); limited resources and tools; as well as the fragmentation of responsibilities within public administration structures.

Governance mechanisms are therefore essential for projects to minimize the technical, financial, legal, and/or sustainability risks of the investment being made, which has an impact on the provision of health services for citizens.

The PMBOK indicates that establishing the management and decision-making structure is a key aspect of the success of a project, especially in complex and high-risk projects. Not spending time and effort developing it and choosing the most suitable actors can mean the difference between project success or failure.

PRINCE2 addresses the planning, delegation, monitoring, and control of the main aspects of project performance. Project governance is among its key themes, clearly defining the different roles of the actors who participate in the management of a project, which will be discussed later and used to analyze case studies.

ISO 21500 defines "project governance" as "the framework by which an organization is directed and controlled. Project governance includes, but is not limited to, those areas of the organization's governance that are directly related to the activities of a project." (translated by author).

The **governance of infrastructure projects** includes the administrative mechanisms implemented by the Sectoral Agency during the life cycle of a project for the purposes of management; monitoring; accountability; transparency; efficient and timely decision-making for the fulfilment of the strategic objectives of the SA and the country; as well as the management of the contracts of the different parties involved; and the inter-agency coordination that is necessary for the project objectives.

The governance of a public investment project ensures that it is properly conceived and executed in accordance with the best project management practices, so that the expected results and social benefits are achieved during its lifecycle.

6.2 Scope

The scope of a hospital infrastructure project is defined in the early stages and includes the description and specification of what is to be built and equipped.

While it is true that from the planning stage the scope of the project undergoes adjustments until the precise definition is found, once the design or construction is defined and contracted, it should not be altered.

Scope, along with timeframe and costs, form a triple constraint on projects, which means that if one is adjusted, one or both of the other variables is inevitably affected. Therefore, when there are changes in the scope of the project after the corresponding contracts are already signed, it opens the door to additional costs, delays, and possible contractual disputes.

The assessment of the variation in scope and its impact on project development (especially in cost and timeframes) was analyzed in the 15 case studies. However, since it is difficult to define comparable scope elements, three criteria were defined for the purposes of the analysis:

- Existence of pre-investment studies that support the design.
- Solid Terms of Reference for the contracting of construction work.[24]
- There are amendments to the contracts arising from modifications to the scope.

A. Pre-investment studies that underpin the design

For pre-investment studies, the following documents have been considered as key elements in defining the scope of a hospital infrastructure project: (i) Healthcare Planning, (ii) Functional Plan, and (iii) Architectural Medical Plan.

The importance of these elements is that they reinforce the need for the project and the characteristics of the building to be designed and built, minimizing risks of changes and adjustments during the design or construction phase.

24 This refers to the description indicating the general guidelines, requirements, technical specifications, objectives, scopes, methodology, and activities to be carried out for the development of a construction project. In the IDB's tender documents, this description is included in the Specifications Section (for small projects) or in the Job Requirements Section (for civil works). In the tender documents it is included in the contracting party's Requirements Section.

It is apparent from the analysis of the 15 cases that almost all the projects had pre-investment studies in greater or lesser detail, and practically all had Healthcare Planning. However, only three of them had a Functional Plan.[25]

The Functional Plan establishes all the necessary criteria and parameters—from planning to commissioning; operation and maintenance of infrastructure and equipment; the definition of the management model; the estimation of the necessary human and financial resource; as well as the supervision methodology of the project execution process in all its phases, which will ensure compliance with the previously defined criteria.

With no Functional Plan, in most cases it goes from Healthcare Planning straight to the Architectural Medical Plan. Also, in most cases, the latter is summarized as a succinct list of healthcare services with quantities and size of spaces. Not having a Functional Plan prevents the Sectoral Agency from estimating the investment to be made and the costs of operation and maintenance in the investments.

25 HEODRA in Nicaragua and the El Alto Sur and Potosí Hospitals in Bolivia.

Particularly in the design phase, not having such a Plan makes it difficult to have a clear understanding about the scope of the project that the designer will have to carry out.

In the specific case of Chile's six projects, although a Functional Plan was not included, a detailed preliminary design was included, which largely covers the need for the Functional Plan by providing all the criteria for the elaboration of the executive project and construction work.[26]

B. Strong terms of reference for the contracting of construction work

In order to define whether the TORs are solid or not, their contents were analyzed. TORs must include the complete design and technical characteristics of the infrastructure as required by the scope. This scope description should be tailored to each project, and not generic or copied from other projects.

Regarding case studies, the analysis determined that the TORs for the contracting of construction work for the projects in Chile (Design-Build) and Bolivia (Design and Supervision) are the ones that have the most complete TORs for the tenders of the projects.

Although in both cases the execution modalities are different, in the Chilean case preliminary designs are submitted as part of the documents in the call for tender, with a complete list of specifications, which facilitates the preparation of the tender for the tenderers and allows estimation of the scope of work more accurately. In the case of Bolivia, the documents

26 While there is no set rule, there is consensus among experts at both ministries that it is better to have a complete preliminary design. Hospitals previously developed and not included in this study were contracted only with design guidelines and each tenderer had to develop a preliminary design as its technical offer. The result was that the preliminary designs were quite different and difficult to compare to each other; in addition, the cost of developing these preliminary designs from zero is too high for tenderers.

Table 11. Projects with pre-investment studies.

Hospital	Healthcare Planning	Functional Plan	Architectural Medical Plan
Llallagua	✓		✓
Ocurí	✓		
Potosí	✓	✓	✓
Alto Sur	✓	✓	✓
Barros Luco	✓	Had a preliminary design	✓
Puente Alto	✓	Had a preliminary design	✓
Sótero del Río	✓	Had a preliminary design	✓
Alto Hospicio	✓	Had a preliminary design	✓
Curicó	✓	Had a preliminary design	✓
Quillota	✓	Had a preliminary design	✓
La Esperanza	✓		✓
Gracias	✓		✓
Corn Island	Not obtained		
HEODRA	✓	✓	✓
Ocotal	✓		Not obtained

were prepared by the Management Firm; however, having complete pre-investment studies (Healthcare Planning, Functional Plan, Architectural Medical Plan, and other previous Technical Studies) allowed to have solid TORs.

In the case of the HEODRA in Nicaragua (Build-Equip), it also had complete TORs for the tender of the construction work. This is because in the first HEODRA contract (Design-Build-Maintain), the contractor developed the Functional Plan, the Architectural Medical Plan, and the complete Design.

C. Amendments to contracts arising from changes in scope

The case study analysis identified that the six completed projects had amendments to their Construction and Supervision contracts, which involved time and cost extensions that were generated by changes in scope.[27] However, in-depth analysis of the causes of these amendments were classified into the following categories:

27 Completed projects: 3 in Bolivia, 2 in Honduras, and 1 in Nicaragua.

Table 12. Causes of scope changes.

Hospital	New requirements	Design deficiencies
Llallagua	✓	
Ocurí*	✓	
Potosí	✓	
La Esperanza	✓	✓
Gracias	✓	✓
Corn Island	✓	✓

* A change in scope was made that included, but was not limited to double glazing, radiant heating, and electrical improvements. These activities were not considered in the initial design due to budget availability issues.

- New requirements: request by the Contracting Party to incorporate services, spaces, or equipment not covered in the initial contract.
- Design deficiencies: errors or omissions in the design that must be corrected or added in the construction phase.

The new requirements could be associated with changes in sectoral policy, regulations, or aspects that were not covered by the pre-investment studies.[28] However, design deficiencies are generally associated with insufficient contracting TORs, or poor design quality or supervision.

28 In many cases, new requirements arise when there is inadequate user participation starting from the pre-investment phase and during design development; and when the pre-investment studies are not validated prior to contracting.

It is important to note that increases in contract costs and time may have other causes, like unexpected ones that result from external situations that cannot be foreseen and are not a result of new requirements or design deficiencies.[29]

In the cases of the nine hospitals in execution, a full evaluation cannot be carried out until they are completed.[30] However, reportedly, some of the projects have already identified new requirements or design deficiencies and errors in the estimated amounts of work, which at the moment is being managed under the signed contract without requiring amendments that modify costs or timeframes.

29 For example, in the case of Corn Island in Nicaragua, a supply ship carrying materials for the construction site sank; and in Bolivia, there were roadblocks as a result of social conflicts that prevented adequate supply of personnel and labor.

30 Hospitals in execution: 1 in Bolivia, 6 in Chile, and 2 in Nicaragua.

Table 13 presents a summary of the analysis of the criteria defined for the evaluation of scope changes (pre-investment study, quality of tender TORs, and contract amendments) in the case studies with relation to execution modality.

Impact on costs and time

By quantitatively analyzing how these variations in scope impacted project costs and timeframes, it can be said that, despite scope changes, projects had an average cost deviation below 10%. However, time variances average 80%, although this cannot be entirely attributable to scope changes.[31]

31 In the case of Bolivian projects, for example, there was a termination of contract with the first contractor, which included the start of arbitration and a new tender process, which significantly increased the timeline.

Table 13. Summary of results of criteria for the scope evaluation.

Hospital	Pre-investment study		Quality of the project TORs		Scope Modifications	
	Yes	No	Complete	Incomplete	Design deficiencies	New requirements
Llallagua	✓			✓		✓
Ocurí	✓			✓		✓
Potosí	✓		✓			✓
Alto Sur	✓		✓			✓
Barros Luco	✓		✓			
Puente Alto	✓		✓			
Sótero del Río	✓		✓			
Alto Hospicio	✓		✓			
Curicó	✓		✓			
Quillota	✓		✓			
La Esperanza	✓			✓	✓	✓
Gracias	✓			✓	✓	✓
Corn Island		✓*		✓	✓	✓
HEODRA 1	✓		✓			
HEODRA 2				✓		
Ocotal		✓*		✓		

* No documentation obtained.

The analysis also determined that the variations are not directly related to the execution modality, but rather to the management modality, technical capabilities, the existence or not of pre-investment studies, the strength of TORs, and contract management.

Nevertheless, it is important to consider that scope changes may also arise from changes in technology during the project execution. Therefore, a variation in scope should not always be seen as a something negative; but rather a governance scheme should be maintained to manage these changes and avoid greater impacts on project cost and timeframe.

Table 14. Summary of cost and time variances for construction and supervision due to scope changes in completed projects.

Country	Hospital	Time variances		Cost variances	
		Construction	Supervision	Construction	Supervision
Bolivia	Ocurí	193%	ND	14.00%	ND
	Llallagua	137%	85%	5.42%	17%
	Average	**165%**	**85%**	**9.71%**	**17%**
	Alto Sur * **	45%	71%	4.50%	36%
Honduras	Gracias	164%	80%	7.61%	31.35%
	La Esperanza	150%		12.21%	
	Average * **	**157%**	**80%**	**9.91%**	**31.35%**
Nicaragua	Corn Island	29%	ND	5,82%	ND

* Completion of the Potosí Hospital is pending.
** The supervision contract includes the Potosí Hospital.
*** The supervision contract includes 3 Hospitals in the Program.

THE IMPORTANCE OF PRE-INVESTMENT

The life cycle of public investment projects in health infrastructure consists of three phases: Pre-investment, Investment, and Operation.

The success of a hospital infrastructure project lies in the completion of the different phases of the investment project life cycle. This entails a cycle that repeats within each phase over the life of the project: the phase is planned, the results are executed and monitored, compliance conditions are evaluated to determine the close, so that the next phase can be begin.

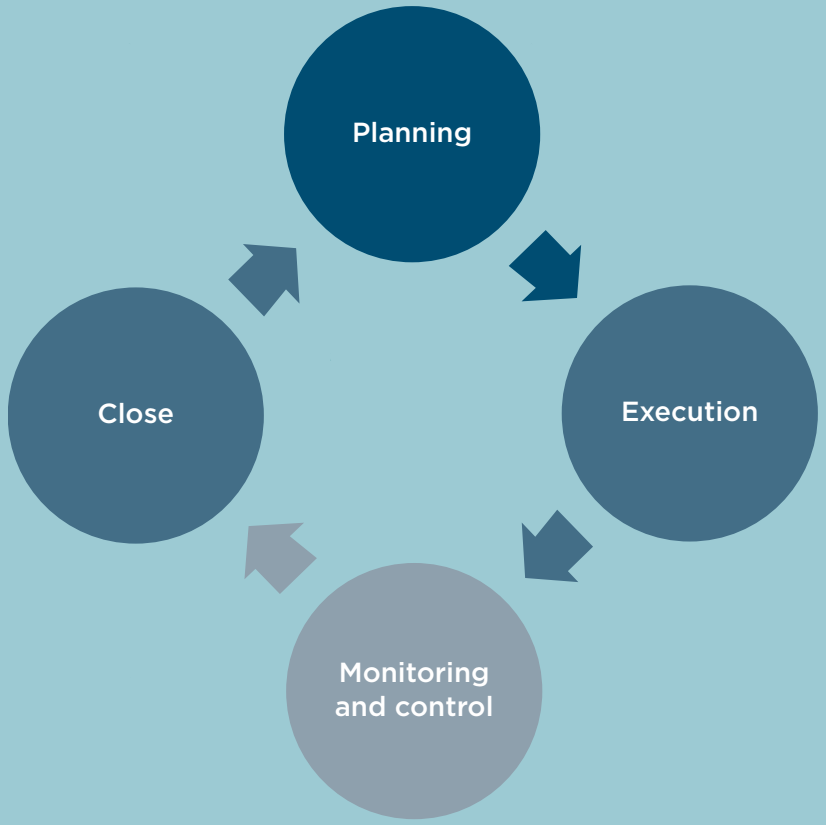
Each phase should not be viewed independently, but as a continuous and interdependent effort because the results of one phase are used as inputs for the next.

The scope of a hospital infrastructure project begins with the pre-investment study of the projects that are planned, either individually or within the framework of a Master Plan of Investment in Health Infrastructure, with a time projection defined by the SA. The pre-investment study defines the scope and feasibility of the project to be implemented (including the description and specifications of what is to be built and equipped), as well as includes control mechanisms that ensure that the actors involved throughout the project lifecycle are aligned with the project's objectives.

As part of the pre-investment Study, the Functional Planning document should be generated, which prescribes all the elements necessary to physically materialize all the data generated in the Study.

The Pre-Investment Phase is critical for avoiding setbacks and risks in the following phases. In the Investment Phase, adequate quality control of designs in form, content, and documentary consistency is indispensable for mitigating the risks of cost and timeframe deviations due to changes in scope during construction. These changes may arise from needs not considered during project execution or from omissions by the designer in the documentation, which obliges the Contracting Party to request changes during construction.

Figure 6. Project cycle.



Source: Authors.

6.3 Timeframe

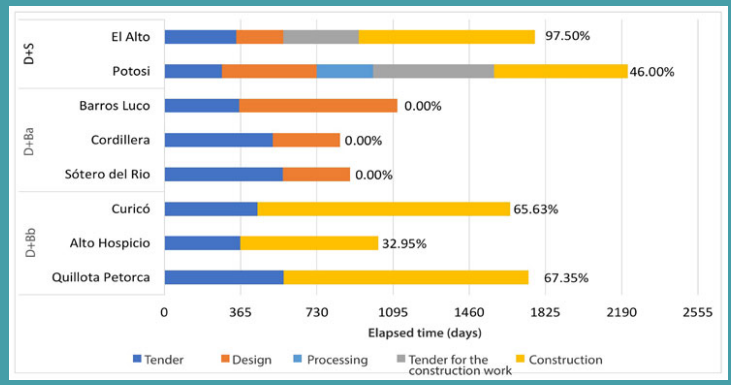
The project execution timeframe was analyzed for the 15 case studies, seeking to draw conclusions that might be related to the execution modality. In this context, the timeframe analysis involved two key moments in the process: the tender process and the construction process.

As a first approach, the analysis is carried out considering two groups of projects: on the one hand, those that included design, construction, and/or supervision in the same contract (most of them are still in execution); and on the other hand, those that were implemented using the traditional method (which are all completed).

The first group includes six projects implemented in Chile and two in Bolivia. The comparison is advantageous as they all start from a similar situation, lacking a design at the time of contracting. The analysis has focused on the tender process since it is not possible to analyze the final execution period of these incomplete projects.

The second analysis group includes the projects executed under the traditional modality, which are completed. They also share the feature of being smaller and less complex. In these cases, while construction times can be analyzed, it is not easy to analyze the initial timeframes, as historical information is partial.

Figure 7. Elapsed time (calendar days) and physical construction status (%) in Chile and Bolivia projects.



Source: Authors

A. Tender timeframes

In the first group—the Bolivia hospitals developed under the Design and Supervision modality—the process begins with contracting of the Management Entity through a tender; then that Entity carries out the pre-investment studies and design, then tenders the construction, and begins supervision when the construction work begins.[32]

In the case of the Chile hospitals (Design-Build), there is only one tender, which means time is saved. However, although the six hospitals were contracted under the same modality, the three carried out under internal management included the elaboration of the design after the contract was signed, and the three carried out under mixed management included the elaboration of the design in the tender stage.[33] [34]

Figure 7 shows how in these cases, although there is no substantial difference in the time spent on the tender process, in those carried

32 El Alto Sur and Potosí.

33 Barros Luco, Cordillera Province, and Dr. Sótero del Río.

34 Curicó, Alto Hospicio, and Quillota Petorca.

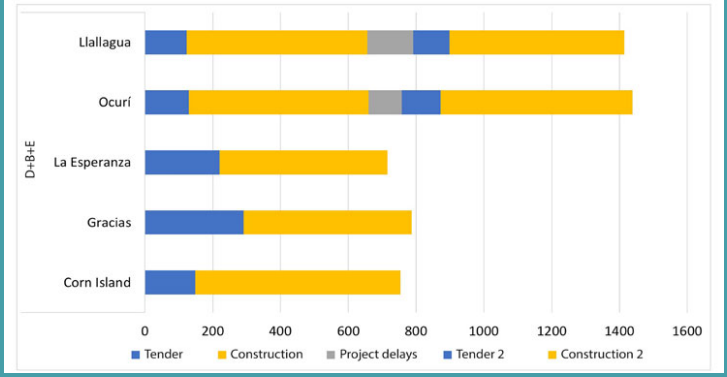
out under mixed management, once the contract has been signed the construction work is initiated immediately since the design was developed by the tenderer at the tender stage.[35] This situation is also advantageous when comparing the Bolivia cases, especially the case of El Alto Sur, where from the call for tenders by the Management Entity to the start of the construction work, double the time passed.[36]

Figure 8 shows the time elapsed between the call for tender of the construction work until their completion, which on average was around 162 days.[37]

By further analyzing the tender timeframes, the process is separated into two stages. The first (Tender Stage) extends from the call for tenders to the submission of tenders. The second stage (Processing Stage) includes the evaluation of tenders, award of the winning tender, signing of the contract, approvals and, in general, all the procedures carried out prior to the start of contract execution. The duration of this stage is counted from the opening of tenders until the start of construction work.

Figure 9 shows the scheduled and actual timeframe for the tender stage, identifying a certain relationship between the timeframe and the complexity of the respective project.

Figure 8. Elapsed time (calendar days), completed projects.



Source: Authors

For hospitals of less complexity and size, the scheduled time ranges from 30 to 60 days. For hospitals under the Design-Build modality, there is a longer timeline for the preparation of the tender, both real and scheduled; this is because the proponent must develop the preliminary design of the hospital at the tender stage.[38]

35 On average, the tender timeframe is between 460 days versus 481 days.

36 930 days. The increase in time was due to a delay in the award. This occurred because the best offer received was above the stated price, and until total budget availability could be ensured, the award of the contract was not made.

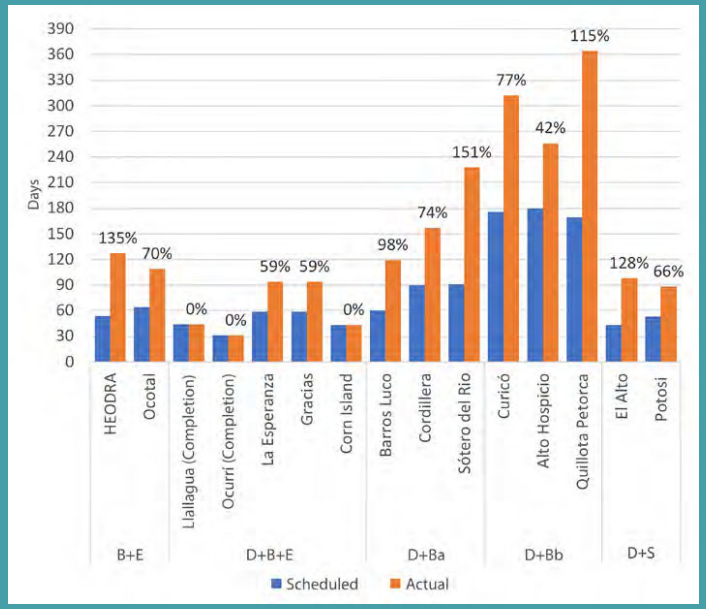
37 The timeframes were: Llallagua 123 days, Ocurí 129 days, La Esperanza 220 days, Gracias 291 days, Corn Island 148 days, Llallagua 107 days (completion), and Ocurí 114 days (completion). In the case of the Llallagua and Ocurí hospitals, the first construction contract was terminated, so it was necessary to call for a second tender to complete the construction of both hospitals.

38 Five hospitals: Llallagua 44 days (completion), Ocurí 31 days (completion), La Esperanza 59 days, Gracias 59 days, Corn Island 43 days.

On average, the increase in timeframe was 72%, noting that the only hospitals in which the tender timeframe was not changed were the primary level ones in Llallagua and Ocurí in Bolivia, and Corn Island in Nicaragua.

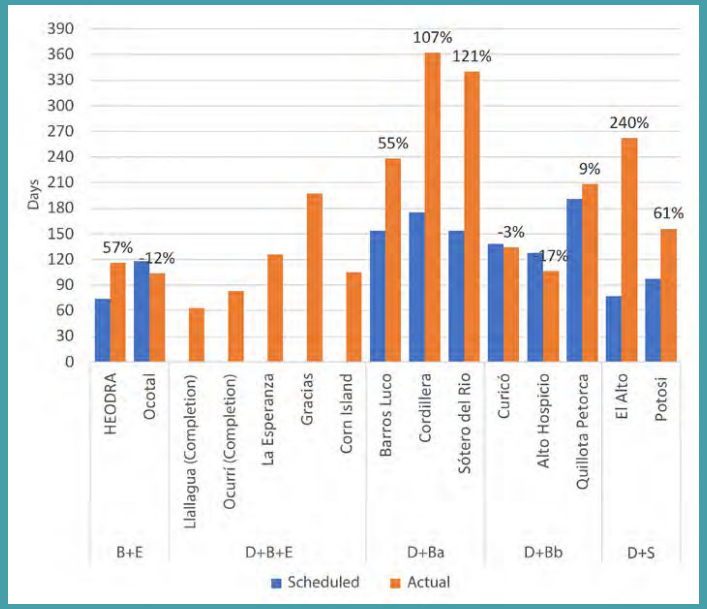
In relation to the processing stage, the average effective duration is 173 days and unlike the tender stage, there is no clear relationship between the timeframes and the size or complexity of the projects. The additional time in this stage has great variability, and in some cases, the actual timeframe was shorter than the scheduled one.

Figure 9. Scheduled and actual timeframe of the tender stage and percentage increase.



Source: Authors

Figure 10. Scheduled and actual timeframe of the processing stage and percentage increase*.



Source: Authors

* In the case of Chile hospitals, information related to the timeframe of the processing stage could not be obtained.

B. Construction timeframe

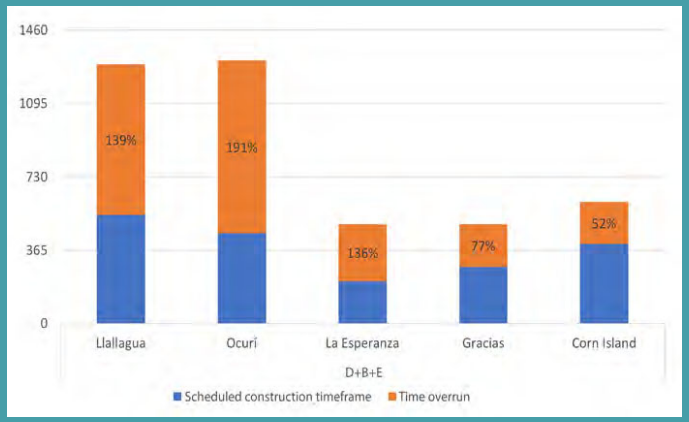
The analysis of construction timeframes can be carried out only for completed contracts and, therefore, has only been possible in projects carried out under the traditional modality. As shown in Figure 11, in all cases the construction time exceeded the scheduled timeframe.[39]

In conclusion, considering the two stages as a whole, it can be confirmed that, for most tenders, the processing stage took longer than the tender stage (57%).

At the same time, as shown in Table 15, when comparing the scheduled and actual timeframe of the tender with the initial estimated duration for the construction work, it is observed that on average the scheduled tender timeframe is equivalent to 18% of the scheduled duration of the construction work, and the actual timeframe reaches 40% of the scheduled timeframe.

39 It is important to note that in the cases of Bolivia, the longer timeframe is explained in part because the initial contracts of the Llallagua and Ocurí Hospitals were cancelled, and the work began again at a later time.

Figure 11. Scheduled and actual timeframes (consecutive days).



Source: Authors

Table 15. Relationship between tender timeframes and scheduled timeframe for construction work.

Project name	Scheduled Tender Timeframe/Scheduled Construction Timeframe	Actual Tender Timeframe/ Scheduled Construction Timeframe
El Alto	18%	54%
Llallagua (Completion)	ND	16%
Ocurí (Completion)	ND	17%
Potosi	21%	34%
Barros Luco	10%	16%
Cordillera	18%	36%
Sótero del Río	13%	31%
Curicó	22%	31%
Alto Hospicio	26%	30%
Quillota Petorca	28%	44%
La Esperanza	ND	105%
Gracias	ND	104%
HEODRA	12%	23%
Ocotal	17%	20%
Corn Island	ND	37%
Average	18%	40%

CAUSES OF VARIATION IN CONSTRUCTION TIMEFRAMES

By analyzing the causes that explain the extension of construction timeframes, the following could be identified:

- **New requirements:** Request for work or equipment not covered by the design or the initial contract.
- **Design failures:** Design errors or omissions that must be corrected in the construction phase.
- **Site problems:** Unforeseen problems with soil mechanics, water tables, sanitation, demolitions, etc.
- **External factors:** reasons not attributable to the contractor or contracting party, such as strikes, weather, etc.
- **Contracting party delays:** delays in the delivery of land, partial approvals, etc
- **Contractor delays:** delays due to the contractor not providing the personnel or resources for the execution of the construction work as planned.
- **Abandonment of the original company:** serious breach of the contractor that paralyzes the project and generates long project delays since they involve termination of contracts and a new procurement.

According to the analysis, design flaws are the most frequent cause of amendments that increase contract timeframes.
In this case, delays are added to the responsibility of the contractor in starting the work.

6.4 Costs

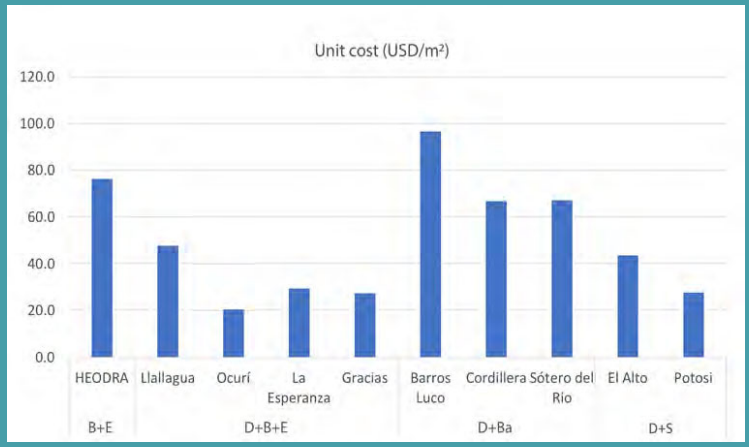
In the 15 case studies, the design, construction, and supervision costs were determined for the cost analysis.

A. Design cost

The design cost data was obtained for 10 cases. When analyzing the unit costs of design (measured in USD per m² of construction area), as shown in Figure 12, two groups can be observed: the first formed by the Barros Luco, Cordillera, and Sótero del Río hospitals in Chile and HEODRA in Nicaragua, of greater complexity, which have an average cost of 76.7 USD/m²; the remaining, medium- and low-complexity hospitals average 32.7 USD/m².

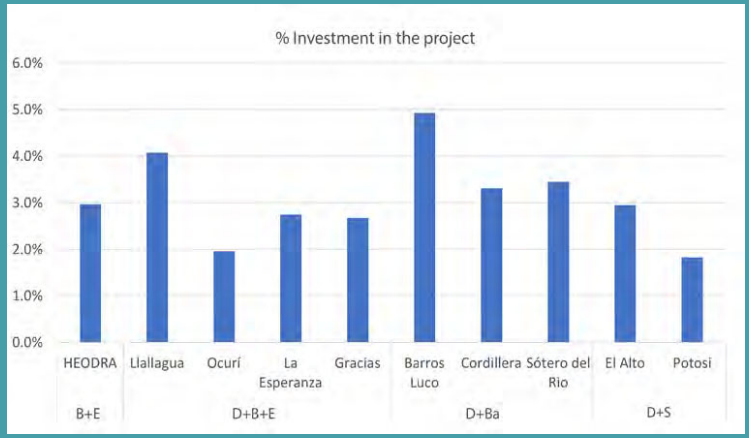
On the other hand, if the cost is observed as a percentage of the construction work contract, a somewhat more uniform situation can be seen. Figure 13 shows that in most cases this value is between 2% and 4%, with the exception of the Barros Luco Hospital, in which the cost of design equals almost 5% of the amount of the construction work. This allows to conclude that the design cost depends more on the size and complexity of the project than on the execution modality.

Figure 12. Unit cost of design (USD/m²).



Source: Authors

Figure 13. Design cost as a percentage of the construction work contract.



Source: Authors

When attempting to analyze variations in design contracts, information was only obtained for four hospitals. In the case of the El Alto Sur and Potosí hospitals, contract increases are due to requests for changes, such as the addition of a second radiotherapy bunker.

The case of HEODRA is unique, since a design, construction, and maintenance contract was initially signed by a consortium consisting of an architecture firm and a construction company. Due to financial problems at the construction firm, the contract was terminated in the middle of the design process, so the same design firm was subsequently hired to finish the project, for a lower total amount than initially contracted.

Another notable case is that of the hospitals in Chile. Contracted through the Design-Build modality, the design is developed by each participant in the tender and presented as its technical offer.[40] This in no case means that the design is "at no cost" to the contracting party, since each tenderer will seek to recover their investment with the profits from the contract, if awarded.

40 Curicó, Alto Hospicio, and Quillota Petorca.

Given that under these conditions participating in the tender is a risky investment (only one of the participants will recover their investment in the development of the design), the Contracting Party offers a payment of 0.6% and 0.4% of the indicated project budget to the tenders ranked in 2nd and 3rd place, respectively, in order to reduce that risk and incentivize participation.

Finally, only one case (Corn Island) had the design executed by MINSA personnel, so it is not possible to determine its cost.

B. Construction cost

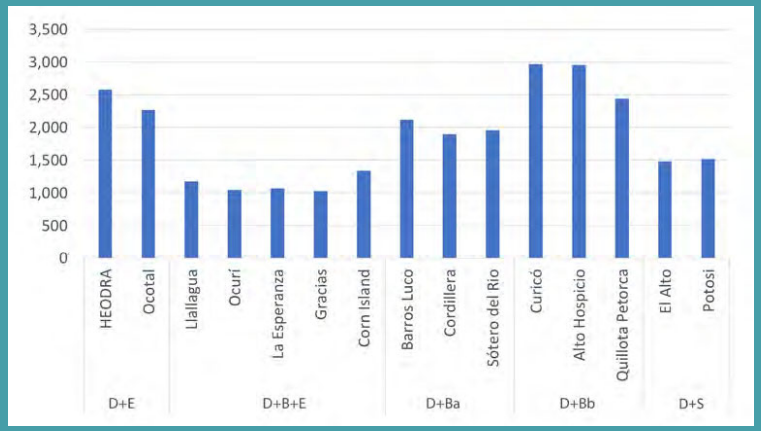
The analysis of construction costs shows great variation, as shown in Figure 14. Construction costs depend on many

Table 16. Cost bariations in design contracts.

Country	Project name	Awarded design	Actual executed design	Cost variation
Bolivia	El Alto	935,185	1,034,644	11%
Bolivia	Llallagua	452,430	452,430	0%
Bolivia	Potosí	750,635	882,975	18%
Nicaragua	HEODRA	2,238,200	1,521,976	-32%

Source: Authors

Figure 14. Unit cost of construction (awarded value) (USD/m²).



Source: Authors

factors, including the characteristics and complexity of each project, as well as country-specific conditions.

However, it can be noted that less complex hospitals are among the most economical, while the most complex are the most expensive.[41] [42]

Figure 15 reflects a similar situation, in which it can be observed that unit cost tends to increase with the constructed area (a proxy for complexity).[43]

When analyzing the cases of projects contracted in Chile under the Design-Build modality, it can be observed that, although all have similar complexity, those that included the design in the tender phase were awarded at a cost 40% higher than the others.

However, this observation is partial since the project is not complete in any of the cases; the cost comparison must be made on the final value, including any additional costs that may arise.[44]

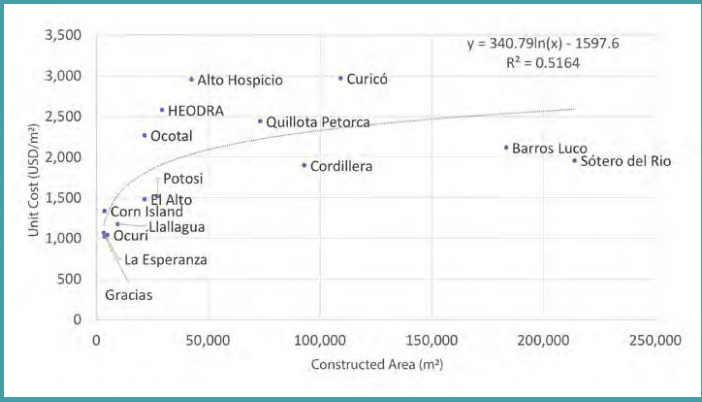
41 Llallagua and Ocurí in Bolivia and La Esperanza and Gracias in Honduras.

42 Six hospitals in Chile and HEODRA and Ocotal Hospital in Nicaragua.

43 This analysis has been carried out considering the amounts awarded and not the final costs, because the latter are not available for all hospitals studied.

44 Up to the date of this report, no contract modifications have been made involving an increase in cost in hospitals managed by the MOP, while the hospitals managed by MINSAL are still in the design stage.

Figure 15. Unit cost of construction (awarded) vs constructed area.



Source: Authors

VARIATION OF COST THROUGHOUT THE PROJECT LIFECYCLE

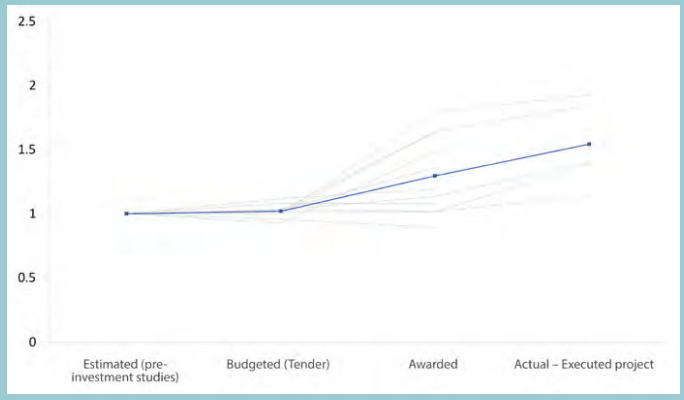
Figure 16 and Table 17 show how the construction cost estimate evolves as the project lifecycle progresses. The first variation occurs between the estimated value in the pre-investment study and the budget recorded in the construction tender documents.[45] On average, no significant variation is recorded at this stage. However, the first relevant variation occurs between the budget and the amount actually awarded—on average it can be observed that the amount awarded is 15% higher than the tender budget, but there is great variability, with observed values between -7% and +61%. Finally, there are cost increases during the execution of the work.

For this study, there are only final cost data for six cases, which average 54% over what is estimated in the pre-investment study and 16% over the contracted value. This can be explained because it is precisely at the construction stage where the greatest scope modifications occur, either due to design deficiencies or new requirements.

45 The exception is the Potosí hospital, where there were significant changes in the design and definition of the project compared to what is contemplated in the loan agreement.

Figure 16. Relative change in the cost of construction*.

* Each thin line corresponds to a project in the sample, and the thick line indicates the average.



Source: Authors

Table 17. Construction cost variations between stages.

	Project name	Pre-investment to tender	Tender to award	Award to Executed	Pre-investment to executed
Bolivia	El Alto	3.1%	10.0%	23.7%	40% *
	Llallagua	3.2%	-1.5%	12.2%	14%
	Ocurí	1.5%	-0.3%	37.4%	39% **
	Potosi	241.9%	7.5%	Ongoing	Ongoing
Chile	Barros Luco	-4.2%	-7.2%	Ongoing	Ongoing
	Cordillera	11.8%	6.4%	Ongoing	Ongoing
	Sótero del Río	8.2%	-0.4%	Ongoing	Ongoing
	Curicó	2.8%	58.7%	Ongoing	Ongoing
	Alto Hospicio	-7.4%	60.6%	Ongoing	Ongoing
	Quillota Petorca	3.0%	31.5%	Ongoing	Ongoing
Honduras	La Esperanza	ND	ND	12.2%	84%
	Gracias	ND	ND	7.6%	92%
Nicaragua	HEODRA	ND	11.6%	Ongoing	Ongoing
	Ocotal	ND	6.9%	Ongoing	Ongoing
	Corn Island	ND	ND	4.0%	ND
Average		2.4% *	15.3%	16.2%	54.0%

Source: Authors

* In this case, during the construction process, new requirements were added, such as the construction of a second bunker that was not considered in the original scope, and the construction contract was extended for the contractor to acquire all the hospital equipment that required pre-installation (laundry, kitchens, sterilization, surgical lamps, certain radio-diagnostic equipment, etc.).
** The execution of the first contractor's guarantee for abandonment of the work allowed the executor to have financial resources to increase the scope of the work with new items, particularly in electrical systems, heating and insulation of facades, and double glazing of windows.
*** Excludes Potosí Hospital.

CAUSES OF VARIATIONS IN THE COST OF CONSTRUCTION

By analyzing the causes that explain the cost variation of contracts, the following could be identified:

- **New requirements:** Request for work or equipment not covered by the design or the initial contract.
- **Design failures:** Design errors or omissions that must be corrected in the construction phase.
- **Site problems:** Unforeseen problems with soil mechanics, water tables, sanitation, demolitions, etc.
- **External factors:** reasons not attributable to the contractor or the contracting party, such as strikes, weather, etc.
- **Contracting party delays:** delays in the delivery of land, partial approvals, etc.
- **Contractor delays:** delays due to the contractor not providing the personnel or resources for the execution of the construction work as planned.
- **Abandonment of the original company:** serious breach of the contractor that paralyzes the project.

The most common cause of increased contract costs are design flaws, followed by new requirements and external causes. With respect to the first two, it is not always clear if a new requirement corresponds to an increase in the scope of the project or responds to an omission of an element in the original design.

Regarding external causes, they generally refer to strikes and blockades that prevent the arrival of supplies or the execution of construction work, and weather conditions.

Problems with the site were only mentioned in one project, which corresponds to problems with the water table. It should be noted that several hospitals are still under construction, so in the future they could present other findings.

C. Cost of supervision

While case studies are not homogeneous, on average the cost of supervision reaches 2.7% of the cost of the construction contract. However, as shown in Figure 17, there is a wide margin of variation ranging from 0.9% in the Potosí Hospital, to 6.3% in the case of the Llallagua Hospital.[46]

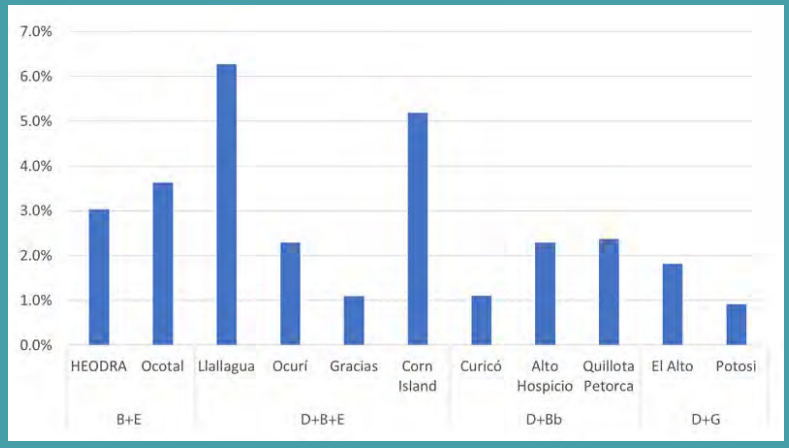
The same figure shows that high-complexity hospitals have a proportionately lower supervision cost than medium- and low-complexity hospitals, which may be explained by economies of scale, since in proportion to the higher cost of work the percentage of supervision is inversely proportional.

These percentages are for reference only, as it is necessary to take into account that all these analyses were carried out with the awarded amounts, both for supervision and construction contracts.[47] In addition, only the amounts from external supervision contracts are considered; there are also personnel from the Executing Agency participating in the supervision, which is not considered.

46 In this case and that of the hospital of El Alto Sur, the amount corresponds to the portion dedicated to supervision of construction work within the contract of the Management Entity.

47 Only data were available on the final amounts executed for two hospitals.

Figure 17. Cost awarded for supervision as a percentage of the value awarded for construction.



Source: Authors

UNIT PRICES VS LUMP SUM

For the execution of public works, different models of contracts are generally used, which can determine the method of payment as “lump sum” or “unit prices”.[48]

In the **Lump Sum** contract, the Contractor commits to delivering a completely finished project in an operational state against a fixed price, in accordance with the timeframes agreed in the contract. This contract is recommended when the quantities and qualities of the project are perfectly defined in the technical specifications, plans, descriptive reports, and measurement reports of the construction work.

The tenderer submits the offer with a fixed and all-inclusive price, with a breakdown of items that support that amount and for a defined execution period. The tender is based on a design supplied by the Contracting Party in the tender specifications documents, but the risks of errors in that design are assumed by the Contractor who must therefore carry out during the tender process a complete and thorough study of the project provided to him by the Contracting Party and add to it everything that is considered to be missing. The amount of the offer will be considered “closed” once the contract is signed (with the exception of the price adjustment clauses by polynomial formula).

It is important to mention that any additional work requested by the Contracting Party to the Contractor will not be included in the contractual price and may be quoted by the Contractor at unit prices different than those in the signed contract; therefore, the use of this type of contract requires a well-defined project with little chance of omissions/errors and changes, as any variation will generate additional costs to the Contracting Party.

48 In some countries, lump sum is also known as fixed price or flat rate.

In the **"Unit Price"** contract, the amount of the project is paid to the contractor for work performed, which is measured at a frequency determined in the contract. There is a document (usually called a project budget) that integrates the description of the item or category, the unit of measure, the quantity, and the cost of each unit price, that together generate the project budget.

The tenderer proposes unit prices for each of the items in the offer, according to the technical plans and specifications and the indicated quantities. During the project, these activities must be certified as complete, and the price to be paid is that which has already been agreed.

Table 18 summarizes the advantages and disadvantages of each type, as well as the projects where their use is recommended.

Table 18. Lump sum contracts and unit prices.

	Lump Sum	Unit Prices
Advantages	• The contractor can estimate a cost quite close to reality or at least with a very small percentage of variation. • During the tender stage, the contractor assumes responsibility for the measurement and evaluation of the project and its own costs, which exempts the contracting party from subsequent claims regarding costs not considered or underestimated. • During the execution of the project, the work of measuring progress is facilitated, since the final cost of each unit is known and therefore each monthly certification of work can be paid based on the percentage executed	• It allows for the budget to be adjusted to the project in detail and to know the cost of each component and each activity. • It allows for controlling the progress of work and estimating payments in detail. • The list of quantities provides base prices in the event of changes by the contracting party during the execution of the project. • It allows for the adjustment—increase or decrease—of volumes for the work items covered by unit prices.
Disadvantages	• The establishment of a fixed price obliges the Contracting Party to change almost nothing once the award has been made; if the Contracting Party makes changes, the Contractor can take advantage of the situation to improve their contractual position.	• It is subject to market variations with an impact on unit prices. • The main responsibility for measuring the work executed rests on the Supervision of the construction work. In complex projects, this activity can be complicated and requires many resources.
Recommended use	• Generally, in complex hospital projects in which there is a complete and very well-developed design. • When the intention is to transfer full responsibility to the contractor, even if this costs a little more money.	• Generally, in projects where there is a high degree of vagueness or uncertainty, unfinished designs, as well as in emergency response projects. • When the contracting party can supervise not only project quality but also project quantities, and the billing of the contractor.

7. Conclusions and recommendations

The study has shown that the execution modalities of the projects in themselves do not make one better than the other. All the projects, in one way or another, have had some kind of deviation in scope, timeframe, and cost in relation to what was planned. The use of a modality depends in large part on the complexity of the infrastructure, the technical capabilities of the Executing Agency, and the legal and institutional framework that governs the country.

It is important to mention that in any execution modality (traditional, Design-Build, design and supervision, Build-Equip, or any other), it is necessary to analyze the project throughout its life cycle, and to carry out the process within a phase in an orderly and consistent manner.

7.1 Aspects to consider in all projects

In this study it has been possible to identify some aspects that are essential for the proper execution of hospital infrastructure projects, regardless of their execution modality:

1) 1Pre-investment studies for designs. Projects must have all studies prepared in the Pre-Investment Phase, including the Functional Plan. It is recommended that the Entities include the development of this document within the scope of the pre-investment studies of each project.

2) Tenders and contract administration. It is important to have complete tender documents, specifications, and Terms of Reference for designs, construction work, and supervision that clearly define the scope of the projects without ambiguity; signed contracts must be properly managed and administered, with simple and transparent operational procedures, and establish the roles and responsibilities of each stakeholder.

3) 3Project governance mechanism. It is advisable to implement project management standards or methodologies, with clear and appropriate governance structures with their different levels, so that the entire project cycle is covered, from its conception to its operation.

7.2 Recommendations according to execution modality

As mentioned earlier, there is not one execution modality that can be determined as better than the other. However, some advantages and disadvantages of each have been identified that must be taken into account both when choosing a modality and implementing it.

A. Traditional Modality

In the case of the traditional modality, in which design, construction, and equipment are separated into consecutive packages, the main weakness is the lack of integrated project lifecycle management. The recurring problem in these projects is that, when design flaws become apparent during construction, there is no longer anyone to turn to because the firm that made the design ended its contract and its guarantee expired.

In the event that the Executing Agency does not have the technical capacity to supervise the designs, it is recommended that external firms be hired for such activity to ensure the quality of the projects in form and content. These firms can perform the task or support the Executing Agency's team in supervising the design.

It is also recommended that there be a possibility that the designer does not completely disassociate during the construction process, so that they can respond or support any situation that arises during the process.[49] It is suggested that the designer sign a Declaration of Good Performance of the Contract, which obliges the firm to remain available during the execution of the construction work, in which change requests may be submitted that require a prior pronouncement from the firm that made the design.[50]

49 In some countries, the Good Design Guarantee is used; however, the IDB does not recommend such guarantees in consulting contracts. Generally speaking, IDB procurement policies recommend Guarantees of Compliance in contracts. However, for contracts with consulting firms (such as those that usually do design) this solution is not recommended since its compliance is often subject to interpretation, is easy to misuse, and tends to increase costs for the consulting industry without producing obvious benefits, and the costs are transferred to the Borrower.

50 This requirement must be set forth in the Terms of Reference and in the Contract with the firm so that they can include it in their expense budget or set a fee that can be paid during development with which the payment would be related to a service actually provided.

B. Design-Build

The fact that the most common cause of variations during construction is design flaws makes it attractive for contracting parties to think of models that integrate design and construction.

In this modality, two conceptually different models were observed, both implemented in Chile. One of them develops the design during the tender, so that each tenderer presents its own design in the technical proposal. In the other, the design is executed by the winning company once contracted.

While the cases studied have not yet completed their contracts, the results so far have also been dissimilar. In the first, it has been possible to significantly reduce the time from the call for tenders to the start of work and, at least to the date of this report, there have been no cost or time increases. However, these projects were awarded at an amount much higher than budgeted in the tender (40% on average) and also higher than that of the other projects. To understand this, two possible hypotheses are identified:

1) The model in which the design is made with the proposal effectively manages to transfer the design risk to the contractor, and so the contractor responds considering these risks in its price. This would explain why offers for these hospitals were much higher than the estimated budget and why changes to contracts have not involved cost increases.

2) The costs of developing the design project during tendering are a very high barrier to competition, as only a few companies could take that risk. This lower competition would have caused prices to be higher.

At the same time, in Design-Build contracts, where the design is carried out in the execution of the contract, delays and conflicts can occur at the design stage. In these cases, there is a tension between a contracting party who wants to obtain the best possible hospital and a contractor seeking to make a profit off the construction contract. Both are subject to a contract value that is already fixed. In the first case, this dispute is minimized, as the design would be "closed" at the time of award of the contract.

In these cases, it is essential to have well-defined design criteria in the tender specifications and to define the role of the contracting party in the review and approval of deliverables. In these cases, the use of technology such as BIM helps to avoid conflicts and facilitate the revision of designs.

Final conclusions on these two models can only be obtained when both groups of hospitals are built.

In another sense, the case of the first HEODRA tender reveals other potential weaknesses of this modality, such as that the failure of one of the partners affects the entire contract.[51] The Bank has developed new tender documents for this modality, which began to be implemented in 2019 and are being used in several LAC projects whose contracts will begin in 2021.[52]

51 In this case, it was the construction firm that could not fulfill its commitments, which could be supplemented by directly hiring the same design firm to complete the design.

52 From a procurement point of view, the Bank has been developing some suggestions to avoid certain risks in the different modalities, motivated, among others, by the situation arising from the first HEODRA Design-Build process. Among them, the following can be mentioned: (i) Carry out a process of prequalification for companies, and when they appear in APCA, evaluate the financial side independently per partner. If they are subsidiaries, evaluate both the subsidiary and the parent and/or corresponding company, to avoid problems of financial bankruptcy of the parent company that affects the subsidiary; (ii) Include declarations for non-compliance in other construction processes as a requirement to qualify; (iii) If equipment is included, identify two categories: construction equipment whose guarantee is 100% assumed by the Contractor, and medical equipment in which the Contractor's Supplier issues the guarantees requested in the technical specifications directly in favor of the Contracting Party; and iv) Condition the payment of the supervision firm contract on the fulfillment of milestones by the Contractor.

C. Management Firm

This management modality used in Bolivia for the hospitals in Potosí and Alto Sur through the procurement of the Management Entity—an association of companies specialized in different areas of a health infrastructure project—means that the project has a multidisciplinary team that not only manages it, but also strengthens the capacities of the technical teams of the SA.

This has not guaranteed the avoidance of delays and cost increases in relation to what was originally planned; however, this modality allows for continuity throughout the project cycle. Indeed, when a modification to the design was required (by a new request from the Contracting Party) it was made by the Management Entity (albeit at an additional cost). However, other design modifications due to flaws identified during the development of the project, were made by the Management Entity within the framework of its responsibility and without additional costs for the Contracting Party.

Some countries limit this type of participation, as there is a potential conflict of interest since the design Entity is also supervisor of the project, and in the face of a claim by the builder for additional costs due to some design flaw, there is no impartiality. Identifying whether a problem is due to a design flaw, poor execution, or extra requirement is sometimes a technically complex problem.

In these cases, it is recommended to have dispute resolution mechanisms in contracts, which consider the participation of independent experts. However, it is important to note that in the cases studied, this was not reported to be a relevant problem in practice.

D. Build-Equip

The cases analyzed with this modality are still in place, so there is no sufficient quantitative information to date to carry out an analysis. In fact, hospitals under the Build-Equip modality had not begun the equipment acquisition stage at the time of the preparation of this study.

However, after the completion of the projects, a comparative analysis should be carried out with other modalities, especially in relation to costs. There may be higher costs in the purchase of equipment as the main contractor acts as an intermediary with the acquisition of equipment. The risk of lack of coordination between facilities may be reduced and so also the commissioning times. Other aspects to evaluate will be: (i) the effectiveness of the equipment installed by the contractor having technical representation in the country where the project is developed; and (ii) how to minimize the risk that when the time actually arrives to install the equipment, it will respond to the technological reality and is not obsolete, since it was originally quoted a few years earlier.

7.3 Recommendations for better project governance

Project governance is a key element, which must be designed from the start of the project and maintained and improved throughout the project lifecycle. Analysis of case studies has shown that the greatest gaps are at direction and management levels, with confusion of roles or concentration of decisions that do not help with the proper management of the same. This also contributes to a lack of coordination in the effective and efficient management of the project by the contracting Entities.

In this context, the following actions are recommended to improve project governance:

1) Adopt a project governance mechanism from the outset. For each Sectoral Agency and for each project there should be adopted a specific governance mechanism, which ensures the proper separation of roles and responsibilities, and the coordination between them.[53] The PRINCE2 scheme was used as a reference in this Technical Note.

2) Strengthen technical teams and executing agencies in project management. This can be done through technical assistance consultancies, with training, provision of tools, and specialized human resources so that it is possible to generate sustainable value within the institutions.

3) Monitor and correct during execution. It is important to have independent execution monitoring mechanisms with the aim of learning, correcting, and continuously seeking improvement of processes; and with the goal of improving potential changes and generating lessons learned for the future.

An additional recommendation is in line with Peru's experience: Sectoral Agencies form Project Management Offices (PMO) with project management methodologies, tools, and procedures in order to obtain impactful results in their investment projects.

53 Program operational manuals could be important tools for better governance management, clearly establishing responsibilities, approval flows, roles, and coordination.

7.4 Recommendations for the Bank's project team

Given the volume of projects managed by project teams, it is highly recommended to implement tools for information/ documentation management, standardization of project documentation files, and execution reports throughout the project cycle, from the pre-investment stage to the close of contracts.

In this way, by having organized data and information from the projects, on the one hand, one can carry out better monitoring of the projects and, on the other, carry out quantitative research that allows to better understand the executed projects, as well as improve project processes and management.

RECOMMENDATIONS THROUGHOUT THE PROJECT CYCLE

Table 19. Summary of recommendations for improvement in common situations.

Area	Common situations	Recommendations
Planning projects	• Incomplete pre-investment studies.	• Strengthen the teams that carry out the pre-investment studies including the development of the Functional Plan.
Project management	• EAs' lack of capacity as a project management organization.	• Implement the Project Management Office (PMO). • Evaluate the EAs' technical capabilities to establish internal or external project management.
Governance	• Lack of mechanisms appropriate for the purpose of the project.	• Adopt a project governance mechanism, including all necessary roles at all 4 levels of management. • Train project actors in roles and responsibilities
Design	• Little or poor supervision of design. • Redesigns during the construction period, result of flaws in the original design. • Redesign during the construction period, result of new requirements. • Designers assume no responsibility for errors detected on site.	• Use firms that perform or support design supervision. • Ensure that the user participates in the development of the requirements and the design process and endorses them before proceeding with procurement. • Have the support of the designer during the construction work.
Tender documents for construction and supervision	• Incomplete documents with information lacking. • Contracts do not clearly establish roles and decision-making.	• Include all documents from the Pre-investment Study. • Verify the project documents are complete and the scope is perfectly defined • Ensure that contracts include the governance mechanism and operational procedures
Supervision	• Termination of contracts with firms	• Procurement of technically and financially skilled firms specializing in supervision of health infrastructure.
Construction	• Termination of contracts with contractors.	• Procurement of technically and financially skilled companies specialized in the construction of health infrastructure. • Use contract models according to the magnitude of the work.

8. Glossary

Contracting Party: A contractual term representing the contracting party of the project; it may be the Sectoral Agency, Executing Agency, or the Management Firm.

Contractor: Company or association of companies contracted for the execution of the project construction work.

Cost: These are all expenses incurred to perform a particular task, job, or project.

Design Firm: Firm or association of firms contracted for the development of the project design, including the executive project or technical files.

Executing Agency: It is the state agency or team assigned to carry out project execution. It will be responsible for defining the strategy and conducting the corresponding procurement and supervision of infrastructure projects, in accordance with the requirements of the Sectoral Agency.

Execution Modality: Mechanism under which the different infrastructure project activities (design, construction, equipment, and maintenance) are contracted, individually or jointly.

Functional Plan: Document that defines the scope and criteria for executing an infrastructure project in all its phases.

Governance: Project management and decision-making mechanism. Governance establishes the levels of responsibility and coordination of project decisions.

Management Firm: Firm or association of firms contracted by the Sectoral Agency or the Executing Agency for project management or technical assistance to the Agency for such management. It generally includes responsibilities in design, procurement, and supervision of construction work.

Management Modality: The management and contractual structure under which the project is developed. It considers the different actors taking part in the project, their respective roles and responsibilities, as well as the institutional and contractual relationships between them.

Scope: Description of the work to complete a project successfully and meet its objectives. Scope also defines, depending on the case, the result of a design or construction work.

Sectoral Agency: Refers to the Ministry or Secretariat of Health in its role as sector regulator and planner, which establishes needs and priorities, and represents the owner or beneficiary of the project. In turn, it receives and accepts the built infrastructure in the end.

Terms of Reference: Description indicating the general guidelines, requirements, technical specifications, objectives, scopes, methodology, and activities to be carried out for the development of a construction project.

Timeframe: The time it takes to implement a project or one of its stages.

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10. Annex 1 - Project summaries

Project name	01 - El Alto Sur Hospital				
Country	Bolivia	City	El Alto		
Sectoral Agency	Ministry of Health and Sports				
Execution period	Start	10/30/2015	Finish	Ongoing	
Level of care	Level III				
Type of intervention	New				
Number of beds	153	Construction area	21,474	Ratio m²/bed	140
Execution Modality	Design and Supervision				
Initial Designs Budget (USD)	2,494,328	Final designs budget	Incl. in Supervision	Variation (%)	ND
Initial construction budget (USD)	31,749,058	Final construction budget	Ongoing	Variation (%)	Ongoing
Initial timeframe (days)	670	Final duration	Ongoing	Variation (%)	
External supervision	Yes				
Initial Supervision Budget (USD)	2,494,328	Final supervision budget	3,203,437	Variation (%)	28%
Equipment Budget (USD)	19,202,867				
Project Description	The hospital will have 35 specialties such as gynecology-obstetrics, gynecological oncology, digestive surgery, urology, otolaryngology, ophthalmology, pediatrics, internal medicine, geriatrics, cardiology, hematology, clinical oncology, pneumology, nephrology, gastroenterology, endocrinology, and physiotherapy among others.				

Project name	02 - Madre Obrera Hospital				
Country	Bolivia	City	Llallagua		
Sectoral Agency	Ministry of Health and Sports				
Execution period	Start	10/16/2015	Finish	04/29/2019	
Level of care	Level II				
Type of intervention	New				
Number of beds	81	Construction area	9,649	Ratio m²/bed	119
Execution Modality	Traditional				
Initial Designs Budget (USD)	ND	Final designs budget	ND	Variation (%)	ND
Initial construction budget (USD)	11,131,644	Final construction budget	Pending	Variation (%)	Pending
Initial timeframe (days)	540	Final duration	1,291	Variation (%)	139%
External supervision	Yes				
Initial Supervision Budget (USD)	697,889	Final Supervision budget	814,949	Variation (%)	17%
Equipment Budget (USD)	ND				
Project Description	Second Level Hospital specializing in Consultation and Hospitalization in: Pediatrics, Gynecology-Obstetrics, General Surgery and Internal Medicine; with anesthesiology support and complementary diagnostic and treatment services.				

Project name	03 - Hospital San Salvador									
Country	Bolivia		City	Ocuri						
Sectoral Agency	Ministry of Health and Sports									
Execution period	Start	10/19/2015			Finish	29-04-2019				
Level of care	Level II									
Type of intervention	New									
Number of beds	33	Construction area		4,893	Ratio m²/bed		148			
Execution Modality	Traditional									
Initial Designs Budget (USD)	ND	Final designs budget		ND	Variation (%)		ND			
Initial construction budget (USD)	5,087,591	Final construction budget		Pending	Variation (%)		Pending			
Initial timeframe (days)	450	Final duration		1,309	Variation (%)		191%			
External Supervision	Yes									
Initial Supervision Budget (USD)	100,000	Final Supervision budget		ND	Variation (%)		ND			
Equipment Budget (USD)	2.037.634									
Project Description										

Project name	04 - Potosi Hospital									
Country	Bolivia		City	Potosí						
Sectoral Agency	Ministry of Health and Sports									
Execution period	Start	03/29/2018			Finish	05/20/2019				
Level of care	Level III									
Type of intervention	New									
Number of beds	276	Construction area		27,204	Ratio m²/bed		99			
Execution Modality	Design and Supervision									
Initial Designs Budget (USD)		Final designs budget		Included in Supervision	Variation (%)		ND			
Initial construction budget (USD)	41,165,545	Final construction budget		Ongoing	Variation (%)		Ongoing			
Initial timeframe (days)	720	Final duration		Ongoing	Variation (%)					
External Supervision	Yes									
Initial Supervision Budget (USD)	2,035,149	Final Supervision budget		2,764,720	Variation (%)		36%			
Equipment Budget (USD)	9.880.097									
Project Description										

Project name	05 - Barros Luco Hospital				
Country	Chile	City	Santiago		
Sectoral Agency	Ministry of Health				
Execution period	Start 12/15/2017		Finish	Ongoing	
Level of care	Tertiary				
Type of intervention	Replacement				
Number of beds	967	Construction area	183,203	Ratio m²/bed	189
Execution Modality	Design-Build				
Initial Designs Budget (USD)	17,678,120	Final designs budget	Incl. in construction	Variation (%)	ND
Initial construction budget (USD)	359,535,477	Final construction budget	Ongoing	Variation (%)	Ongoing
Initial timeframe (days)	2,190	Final duration	Not started	Variation (%)	
External Supervision	No				
Initial Supervision Budget (USD)	ND	Final Supervision budget	Ongoing	Variation (%)	ND
Equipment Budget (USD)	9,771,896				
Project Description	The project includes the design, construction, and habilitation of the Barros Luco Trudeau Hospital, whose architectural-medical program consists of: - 131 medical consultation rooms - 57 consultation rooms for other professionals - 76 procedure rooms -- 11 emergency consultation rooms – 21 elective wards - 5 major outpatient surgery wards - emergency wards - 39 dialysis chairs - 6 comprehensive delivery rooms – 35 dental armchairs - support areas and administrative areas - parking lots.				

Project name	06 - Provincia Cordillera Hospital				
Country	Chile	City	Santiago		
Sectoral Agency	Ministry of Health				
Execution period	Start 02/26/2019		Finish	Ongoing	
Level of care	Tertiary				
Type of intervention	New				
Number of beds	394	Construction area	92,886	Ratio m²/bed	236
Execution Modality	Design-Build				
Initial Designs Budget (USD)	6,201,771	Final designs budget	Incl. in construction	Variation (%)	ND
Initial construction budget (USD)	187,528,002	Final construction budget	Ongoing	Variation (%)	Ongoing
Initial timeframe (days)	1,460	Final duration	Not started	Variation (%)	
External Supervision	No				
Initial Supervision Budget (USD)	ND	Final Supervision budget	Ongoing	Variation (%)	ND
Equipment Budget (USD)	21,129,417				
Project Description	Care will be carried out in the following relevant areas: 13 emergency rooms; 10 surgical wards; 394 beds (150 surgical, 90 adult-medium complexity, 24 adult ITU, 12 adult ICU, 12 pediatric ITU, 24 short term adult psychiatric, 12 medium term adult psychiatric, 12 short term child/adolescent psychiatric, 10 seniors); 24 hemodialysis armchairs; 90 home hospitalization spots. The Architectural Medical Program is developed in a central building with 9 floors and 3 underground levels.				

Project name	07 - Dr. Sotero del Rio Hospital					
Country	Chile	City	Santiago			
Sectoral Agency	Ministry of Health					
Execution period	Start	02/26/2019	Finish	Ongoing		
Level of care	Tertiary					
Type of intervention	Replacement					
Number of beds	710	Construction area	213,861	Ratio m²/bed	301	
Execution Modality	Design-Build					
Initial Designs Budget (USD)	14,343,545	Final designs budget	Incl. in construction	Variation (%)	ND	
Initial construction budget (USD)	416,597,004	Final construction budget	Ongoing	Variation (%)	Ongoing	
Initial timeframe (days)	1,825	Final duration	Not started	Variation (%)		
External Supervision	No					
Initial Supervision Budget (USD)	ND	Final Supervision budget	Ongoing	Variation (%)	ND	
Equipment Budget (USD)	91,654,948					
Project Description	The hospital includes 119 consultation rooms for specialty medicine; 123 consultation rooms for other health professionals; 101 procedure rooms; 37 dental care rooms; 32 emergency care rooms; 39 surgical wards; 5 comprehensive delivery rooms; 710 beds (including 187 critical beds); 32 hemodialysis armchairs; 180 home hospitalization spaces. The Architectural Medical Program is developed in 1 central building with open and closed care, and support units; and in two support buildings.					

Project name	08 - Curicó Hospital					
Country	Chile	City	Curicó			
Sectoral Agency	Ministry of Health					
Execution period	Start	09/10/2016	Finish	Ongoing		
Level of care	Tertiary					
Type of intervention	Replacement					
Number of beds	400	Construction area	109,152	Ratio m²/bed	273	
Execution Modality	Design-Build					
Initial Designs Budget (USD)	N/A	Final designs budget	Incl. in construction	Variation (%)	ND	
Initial construction budget (USD)	323,808,460	Final construction budget	Ongoing	Variation (%)	Ongoing	
Initial timeframe (days)	1,460	Final duration	Ongoing	Variation (%)		
External Supervision	Yes					
Initial Supervision Budget (USD)	3,556,800	Final Supervision budget	Ongoing	Variation (%)	ND	
Equipment Budget (USD)	ND					
Project Description	The hospital will have 7 floors and 2 underground levels. It is projected to require a total investment (civil works plus hospital equipment) of 165 billion *pesos*. As for infrastructure, Curicó Hospital will be equipped with 400 beds. It will have 7 surgical wards, 3 wards for Major Outpatient Surgery (CMA) and 5 comprehensive delivery rooms. Emergency services will have 8 rooms and 2 wards, while the outpatient center will have 79 rooms between specialty consultations, procedures, and care from other professionals.					

Project name	09 - Alto Hospicio Hospital					
Country	City	Iquique	Iquique			
Sectoral Agency	Ministry of Health					
Execution period	05/16/2018	Finish	Ongoing	En curso		
Level of care	Tertiary					
Type of intervention	New					
Number of beds	235	Construction area	42,421	Ratio m²/bed	181	
Execution Modality	Design-Build					
Initial Designs Budget (USD)	N/A	Final designs budget	Included in construction	Variation (%)	ND	
Initial construction budget (USD)	125,395,237	Final construction budget	Ongoing	Variation (%)	Ongoing	
Initial timeframe (days)	1,200	Final duration	Ongoing	Variation (%)		
External Supervision	Yes					
Initial Supervision Budget (USD)	2,877,142	Final Supervision budget	Ongoing	Variation (%)	ND	
Equipment Budget (USD)	14,180,129					
Project Description	A hospital of high complexity, with 235 beds, 7 wards, 3 comprehensive delivery rooms, 12 dialysis chairs, 7 dental chairs, 16 medical consultation rooms, 10 exam rooms for other professionals, 14 procedure rooms, 9 emergency consultation rooms.					

Project name	10 - Quillota Petorca Hospital					
Country	Chile	City	Quillota			
Sectoral Agency	Ministry of Health					
Execution period	Start	01/23/2017	Finish	Ongoing		
Level of care	Tertiary					
Type of intervention	New					
Number of beds	282	Construction area	73,204	Ratio m²/bed	260	
Execution Modality	Design-Build					
Initial Designs Budget (USD)	N/A	Final designs budget	Included in construction	Variation (%)	ND	
Initial construction budget (USD)	178,468,343	Final construction budget	Ongoing	Variation (%)	Ongoing	
Initial timeframe (days)	1,295	Final duration	Ongoing	Variation (%)		
External Supervision	Yes					
Initial Supervision Budget (USD)	4,231,398	Final Supervision budget	Ongoing	Variation (%)	ND	
Equipment Budget (USD)	ND					
Project Description	The project calls for the construction of the new Quillota Petorca Bi-Provincial Hospital, which will have 282 beds, 9 wards, an emergency unit with 9 rooms, 3 comprehensive delivery rooms, and an outpatient center that includes 32 health care rooms.					

Project name	11 - Enrique Aguilar Cerrato Hospital					
Country	Honduras		City	La Esperanza/Intibucá		
Sectoral Agency	Ministry of Health					
Execution period	Start	01/4/2016	Finish	06/15/2017		
Level of care	Level III					
Type of intervention	Expansion					
Number of beds	91	Construction area	3,401	Ratio m²/bed	37	
Execution Modality	Traditional					
Initial Designs Budget (USD)	ND	Final designs budget	ND	Variation (%)	ND	
Initial construction budget (USD)	3,632,678	Final construction budget	3,814,068	Variation (%)	5	
Initial timeframe (days)	210	Final duration	495	Variation (%)	136%	
External Supervision	Yes					
Initial Supervision Budget (USD)	343,023	Final Supervision budget	ND	Variation (%)	ND	
Equipment Budget (USD)	1,417,409					
Project Description	The project involves the construction of the Maternal and Child Health Unit, originally 3,646.55 m².					

Project name	12 - Juan Manuel Gálvez Hospital					
Country	Honduras		City	Gracias/Lempira		
Sectoral Agency	Ministry of Health					
Execution period	Start	03/15/2016	Finish	08/30/2017		
Level of care	Level III					
Type of intervention	Expansion					
Number of beds	129	Construction area	3,647	Ratio m²/bed	28	
Execution Modality	Traditional					
Initial Designs Budget (USD)	ND	Final designs budget	ND	Variation (%)	ND	
Initial construction budget (USD)	3,732,261	Final construction budget	3,757,567	Variation (%)	1	
Initial timeframe (days)	281	Final duration	496	Variation (%)	77%	
External Supervision	Yes					
Initial Supervision Budget (USD)	343,023	Final Supervision budget	ND	Variation (%)	ND	
Equipment Budget (USD)	1,516,227					
Project Description	The project involves the construction of the Maternal and Child Health Unit, originally 3,646.55 m².					

Project name	13 - Oscar Danilo Rosales Arguello Teaching Hospital (HEODRA)					
Country	Nicaragua	City	Leon			
Sectoral Agency	Ministry of Health					
Execution period	Start	06/24/2019	Finish	Ongoing		
Level of care	Level III					
Type of intervention	New					
Number of beds	461	Construction area	29,316	Ratio m²/bed	64	
Execution Modality	Design-Build and Build-Equip					
Initial Designs Budget (USD)	ND	Final designs budget	ND	Variation (%)	ND	
Initial construction budget (USD)	75,526,076	Final construction budget	Ongoing	Variation (%)	Ongoing	
Initial timeframe (days)	1,080	Final duration	Ongoing	Variation (%)		
External Supervision	Yes					
Initial Supervision Budget (USD)	3,032,857	Final Supervision budget	Ongoing	Variation (%)	ND	
Equipment Budget (USD)	N/A					
Project Description	The hospital consists of six buildings, 461 beds, 11 operating rooms, an imaging area, hospitalization, clinical laboratory; in addition to providing specialties in maxillofacial, oncology, plastic surgery, intensive care, and hemodialysis.					

Project name	14 - Nueva Segovia Department Hospital					
Country	Nicaragua	City	Ocotal			
Sectoral Agency	Ministry of Health					
Execution period	Start	12/13/2018	Finish	Ongoing		
Level of care	Level III					
Type of intervention	New					
Number of beds	159	Construction area	21,504	Ratio m²/bed	135	
Execution Modality	Build-Equip					
Initial Designs Budget (USD)	ND	Final designs budget	ND	Variation (%)	ND	
Initial construction budget (USD)	48,734,861	Final construction budget	Ongoing	Variation (%)	Ongoing	
Initial timeframe (days)	1,080	Final duration	Ongoing	Variation (%)		
External Supervision	Yes					
Initial Supervision Budget (USD)	2,150,000	Final Supervision budget	Ongoing	Variation (%)	ND	
Equipment Budget (USD)	N/A					
Project Description	The project consists of different structural bodies, and according to the functional medical program, the hospital spaces are as follows: administrative services unit, outpatient services unit, emergency unit, surgical services unit, obstetrics unit, hospitalization unit, support services, diagnostic services, therapeutic support services, general services, and exterior works.					

Project name	15 - Corn Island Primary Care Hospital					
Country	Nicaragua	City	Corn Island			
Sectoral Agency	Ministry of Health					
Execution period	Home	10/23/2015	The end	06/19/2017		
Level of care	Level I					
Type of intervention	New					
Number of beds	33	Construction surface	3,622	Ratio m²/bed	110	
Execution mode	Traditional					
Initial Design Budget (USD)	ND	Final budget designs	ND	Variation (%)	ND	
Initial budget works (USD)	4,836,020	Final budget works	Pending	Variation (%)	ND	
Initial timeframe (days)	397	Final deadline	605	Variation (%)	52%	
External Supervision	Yes					
Initial Supervision Budget (USD)	250,420	Final budget sup.	Pend.	Variation (%)	Nd	
Equipment Budget (USD)	876,072.74					
Project Description	The project consists of a construction area of 2,662.02 m² on a 11,428.39 m2 lot with capacity for 33 beds, and its exterior buildings.					

Social Infrastructure

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