SERIES: Case Studies on Megaprojects

IIRSA SOUTH INTEROCEANIC HIGHWAY OF PERU

A MEGAPROJECT WITH EXPRESS PRE-INVESTMENT

Juan Alberti | Andrés Pereyra

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CASE STUDIES ON MEGAPROJECTS

SERIES

This document is part of a significant research effort made with the intention of studying megaprojects in the transport sector in Latin America and the Caribbean between 2016 and 2018. The aim of this effort has been to document best practices and lessons learned, while considering the recommendations found in the specialized literature.

This series analyzes eight megaprojects implemented in different countries in the region, from different transport subsectors: IIRSA South Inter-Oceanic Highway, Peru; Santo Domingo Metro in the Dominican Republic; Panama Canal expansion; *Transmilenio* and SITP in Bogota, Colombia; Modernization of the suburban trains in Buenos Aires, Argentina; Expansion of the international airport in Mexico City; North Section of the *Rodoanel* in Sao Paulo, Brazil, and La Paz Cable Cars in Bolivia. Each case demanded an extensive review of secondary sources, as well as interviews with the stakeholders involved in their planning and implementation.

This series of Case Studies on Megaprojects was the result of this research process. The authors would like it to be used as valuable input for countries willing to face the challenge of planning and executing transport megaprojects.

PREFACE

The pre-investment phase is the foundational stage of a project; it finishes with the structuring of the contract and the launch of the implementation phase. A pre-investment phase with comprehensive technical and economic studies leads to a better execution, as it reduces the possibility of incurring in cost overruns and prevents excessive delays, for it allows to better design contracts and reduce information asymmetry between parties.

Given their scale and their complexity, megaprojects demand very long timeframes to conduct the recommended pre-investment studies, which in many cases exceed the terms that governments remain in office. Project promoters are usually faced with the pre-investment dilemma: conducting comprehensive studies that increase the possibility of having an adequate execution, assuming the risk of political blockage by subsequent administrations, or developing very brief pre-investment processes, which speeds up the execution of the contracts, assuming the risk of increased conflicts and renegotiations in the execution phase, as well as the high probability of delays and large cost overruns.

1

RISK IN MEGAPROJECTS

Megaprojects pose a challenge given the high economic viability, environmental, social, and political risk they pose.

Transport megaprojects differ from small and medium-sized projects in the size of the investment they imply. The usual criterion to categorize megaprojects is the USD 1 billion boundary (Flyvbjerg, 2014). They are also **marked by the higher risk they imply**, as a consequence of their complexity in different aspects, which creates uncertainty regarding variables that are crucial to their development. Megaprojects are risky due to their size, their execution time, and their complexity (Sykes, 1998).

Megaprojects have a high economic **viability risk** associated with their probability of incurring in significant cost overruns and overstatements of returns. Their estimated economic viability (or economic profitability) may prove to be quite different from the actual one.

Cost overruns[1] are a recurring phenomenon in megaprojects; thus, part of these overruns should be considered inherent to them and very difficult to avoid. Given the financial magnitude of a megaproject, its cost overruns are also large, and their impact is larger than that of smaller projects, particularly regarding the fiscal consequences. The higher costs are due to delays, unexpected exchange rate variations, geological risk,

1 A precise definition of "cost overrun" can be found in the *Manual para la estimación y seguimiento del costo de un programa de infraestructura*; Inter-American Development Bank, 2016.

Megaprojects have a higher economic viability risk than usual projects. This refers to the risk that economic and social profitability could be much lower than the one expected at the time of making the decision to carry it out.

changes in the international pricing of relevant supplies, expropriations with difficult-to-estimate amounts, and to the environmental lawsuits that tend to appear along the way (Flyvbjerg, Bruzelius and Rothengatter, 2003). However, there can also be cost overruns deriving from an initial underestimation of costs due to strategic reasons, usually adding to insufficient data having been gathered prior to the contract to carry out building works (Flyvbjerg *et al.*, 2003).

Regarding benefits, it is worth noting that the projected use of the different transport infrastructures is significantly different from what happens in the end. The underestimation of costs and the overstatement of profits is more obvious in megaprojects than in smaller projects, and it translates into higher economic and financial risks. It is worth stressing that the substantial improvement in the estimation techniques as well as the computing power achieved in the last few decades have not helped to increase the accuracy of the estimation of costs and profitability (Flyvbjerg et al., 2003).

Megaprojects also involve **a particularly high environmental and social risk**. Due to their size, both the probability of their having an effective impact and the scale of that impact are usually large. The risk is mostly identified by means of environmental impact studies so that it may be formally managed and identified. However, these estimates tend to be inaccurate, and they employ a faulty timeframe. Furthermore, it is difficult to include their results in the decision-making process (Flyvbjerg *et al.*, 2003).

To the above risks, these projects add a high **political risk**, which impacts on the possibility of obtaining funding and being realized. Megaprojects require pre-investment, investment, and operation phases which tend to exceed the terms that governments remain in office. This on its own, introduces a higher political risk, understood as the risk that the project might not be executed because the incoming administration is no longer interested in it.

Furthermore, there is the risk posed by the new technologies used in megaprojects, which includes security, health and environmental risks (Greiman, 2013). There

There are two approaches to risk management: the predict-control approach, which identifies risks *ex-ante*, proposes risk management measures, and monitors their compliance; and the prepare-commit approach which creates flexible relations between stakeholders that facilitate the adaptation to possible risks which are intrinsic to megaprojects.

is also the risk posed by certain sudden events in the economic and social context, which create changes in the decision-making process of those who manage the planning and execution of the projects (Dimitriou et al., 2014).

There are at least two **approaches to managing megaproject risk**, which may be complementary. One is the traditional project management approach, associated with anticipating risks and trying to avoid them, known as the predict-control approach. The second one promotes a flexibility to adapt to risks that may arise, and may be called the prepare-commit approach (Koppenjan et al., 2011).

The first approach could use methodologies such as the fault, events or decision tree analysis; sensitivity analysis; scenario planning, and net present value, among others (Ebrahimnejad, Mousavi and Seyrafianpou, 2010). These analyses are used to allocate risks with different predicted impact levels and different levels of uncertainty to different stakeholders in the different contracts (Guasch, Suárez-Alemán and Trujillo, 2016). From this perspective, it is necessary to strengthen the preliminary analysis and the management of the risk associated with the economic viability and the environmental and social sustainability of the project. For this purpose, having more accurate data (medians and variances) about historical errors is essential. It is also necessary to improve the standardization of the information on previous projects, in order to develop more complete pre-investment studies that allow to better communicate their outcomes to public and private investors, congress, the media, and the general public (Flyvbjerg *et al.*, 2003).

The second approach understands that, given the nature of the project, some risks may be identified and managed beforehand, but there are other unforeseen risks that will have to be managed once they materialized (Hillson and Simon, 2012). It focuses on supply chain management, the search for associations with different stakeholders, and the search for a generic strategy to face inevitable risks (Priemus, Giezel and Bosch-Rekveldt, 2013). It intends to leave the stakeholder's terms of reference open, with the basic aim of laying down functional rules, seeking

a constant flow of information between the client, management, contractors and suppliers (Koppenjan et al., 2011).

There is clearly no specific one-size-fits-all recipe to apply the different risk management approaches in these cases, as it dependes on the particularities of the megaproject under analysis. One thing that is obvious is that the pre-investment stage is crucial for megaproject management.

2

THE PRE-INVESTMENT PHASE IN MEGAPROJECTS

The infrastructure project lifecycle can be divided in four phases: pre-investment, investment, operation, and *ex-post* evaluation. In the pre-investment phase, the authorities must choose between different options and decide if the selected one is to be implemented. It is useful to eliminate possible uncertainties and to avoid taking unnecessary risks (Cohen and Martínez, 2004).

It is as important to implement the right project as it is to implement the project correctly. On occasion, the building and maintenance cost of the projects is higher than the value they contribute to society. These are the white elephants of infrastructure (Samset and Williams, 2010).

A good pre-investment phase must provide the necessary information to manage the project's risks, within the framework of the aims pursued by the megaproject. The pre-investment phase includes all the activities ranging from the initial idea to the formal decision of funding and executing the project, and it is therefore not an ambiguous concept. It includes the usual profiling, feasibility or engineering design studies, depending on the institutional and contractual structure selected, but it may also include the discussion process and the management of the different stakeholders involved in the project.

Pre-investment includes all the activities ranging from the initial idea to the formal resolution that the project will be funded and executed.

The pre-investment phase of the project impacts heavily on the probability of executing it within the anticipated costs and timeframe. The quality of the proposed contract—risk allocation and other aspects which minimize and favor fair and expeditious procedures to bridge gaps—and the precision of the information on which such contract is based—which arises from preliminary studies—are particularly important and crucial elements to avoid long execution processes and prevent numerous cost overruns and delays.

In this respect, it is possible to draw a particularly important distinction about megaprojects: **the formal moment in which the decision to advance is made, might not coincide with the actual moment when the decision is made to finance or to execute the project**. This affects the scope and the quality of the pre-investment studies in particular.

An early decision to move forward with the project may be associated with risk management. For example, conducting the comprehensive pre-investment studies necessary to reduce the project's viability risk may take several years between the profiling, pre-feasibility, feasibility and engineering design phases (if it were necessary within the framework of the kind of funding chosen). This could impose a risk of political change that implies that the megaproject might not be feasible. Likewise, a transparent social discussion and inclusive negotiation process might give rise to reactions on the part of different pressure groups, which could be defending corporate interests other than those of the society in general, which may imply an extremely high political-corporate risk.

Governments that intend to execute a megaproject are often faced with the pre-investment dilemma: solid pre-investment studies increase the probability of executing the project with reasonable quality, costs, and within the anticipated timeframe, while they also increase the likelihood of the project suffering a political blockage, given the time they require.

The pre-investment dilemma may be regarded as the compromise between the viability risk and the political risk. It is common for developing countries to prioritize the mitigation of political risk over the mitigation of the economic viability risk; this results in insufficient pre-investment studies, and limited negotiation processes with stakeholders, in favor of a fast decision to develop an alternative to the project and an expeditious process to sign the contract. In these cases, the projects implemented (which otherwise might not be implemented) are very likely to face higher cost overruns and bigger delays, which affects the quality of the product or service.

Many countries have developed institutional mechanisms aimed at respecting the sequence of pre-investment studies, and thus guarantee the selection of an economically viable alternative[2]. However, in the case of megaprojects, these mechanisms are usually skipped or respected but with incomplete pre-investment studies, only to comply with the bureaucratic steps required to reach a formal decision.

Pre-investment studies in general, but particularly for megaprojects, often face difficulties when it comes to forecasting costs, thus affecting their economic viability risk. Apart from the potential honest mistakes that may arise in the process of forecasting said variables given their complexity, there is often strategic manipulation for the megaproject to remain in the process until it is formally approved (Flyvbjerg, Garbuio and Lovallo, 2009). The political relevance and the methodological difficulty of producing forecasts combined, create a significant ethical problem for those in charge of their development. In the field of megaprojects it is usual for planners, economists, engineers and other potential technicians in charge to have to revise their forecasts because they do not meet the requirements of their political superiors (Wachs, 1990).

2 Usually known as National Public Investment Systems (SNIP for its Spanish acronym).

The risk management strategies applied tend to be inconsistent. This increases the materialization of risks and intensifies their impact.

This specific risk structure poses the extra challenge of preventing lock-ins that may increase the economic viability risk in particular and potentially generate white elephants. The situation in which the decision makers show growing commitment with an ineffective course of action is actually known as "lock-in." They commit to a project when they should be re-evaluating it (Cantarelli, Flyvb- jerg, Wee and Molin, 2010).

This phenomenon is not always associated with an early commitment to the project, which might even be beneficial for its viability. It refers to the excessive commitment to a project that is bad for the parties involved because it is not useful, and its cost-benefit structure is not particularly reasonable[3]. Some indicators of this blockage are: escalating commitment, inflexibility and closure of other alternatives, the existence of sunk costs, and the need for justification (Cantarelli and Flyvbjerg, 2013).

Several studies have acknowledged the importance of the pre-investment phase (Lessard and Miller, 2001; Meier, 2008; Morris, 2009; Alberti, 2015). In megaprojects, where risks are particularly relevant, the pre-investment phase becomes more important. It is crucial that from an early stage, the priority given to risk management is consistent with its management focus, which is not always the case. For example, it is usual for the management of political risk to be prioritized through the use of a predict-control approach, while it would be logical to promote a prepare-commit strategy.

The following is the case of a megaproject with a pre-investment phase which prioritized political risk management, and which resulted in the materialization of other risks, such as the economic viability risk, which was in turn reinforced by an inadequate risk management strategy.

3 In this paper, "risk" should not only be understood as economic risk, it also covers political, social, environmental, and others.

3

IIRSA SOUTH INTEROCEANIC HIGHWAY OF PERU:

AN EXAMPLE OF EXPRESS PRE-INVESTMENT[4]

BACKGROUND

In the second half of the 20th century, the Peruvian economy recorded low growth levels. In terms of GDP per capita, it grew at a rate of 1 percent per annum between 1950 and 2001, with significant stagnation starting in 1975, high volatility, and showing relative recovery in the 1990s.

In the 1990s, the Andean region had reached a certain consensus regarding the need to strengthen its regional integration. Due to the high associated costs of transporting products among other issues, trade within the region was relatively low.

Against this backdrop, there began the construction of road infrastructure which was expected to bring the region together and invigorate trade. The progress made in this direction gave way to efforts aimed at increasing

4 This case was built based on secondary sources and interviews with stakeholders who took part in the different stages of the project, persons of reference in the public sector, and experts from the different sectors.

The project was born with significant political momentum, explained by the impulse that the integration infrastructure could give to such growth.

the region's exchange with Brazil, under the claim that this would lead to an increase in foreign investment, particularly from Asia.

The project designed to build an inter-oceanic highway originated in IIRSA, a presidential initiative. Within the framework of the initiative, the main integration projects were agreed upon: for Peru, the initial stages would be IIRSA South and IIRSA North, and both would be granted in concession.

The project originated with great political momentum. However, until the initiative was signed, it was not part of the government's plans, at least not with that level of priority. It was the political momentum, based on the integration project, that moved it to the first place.

IIRSA South was divided in five sections: San Juan de Marcona-Urcos; Urcos-Inambari Bridge; Inambari Bridge- Iñapari; Inambari Bridge-Azángaro, and Matarani-Azángaro, Ilo-Juliaca.

Sections 1 and 5, 763 km and 752 km long, respectively, had already been paved and the project would focus on their maintenance. Sections 2, 3, and 4, stretching 300 km, 403 km, and 306 km, respectively, were the most significant ones in terms of costs and complexity.

At the technical level, the project's viability risk was anticipated by both the government and external agents. For instance, the Ministry of Economy and Finance expressed its concern that the road would demand a large portion of the budget. This gave way to a discussion about the actual need for the project, basically related to the funding necessary for its implementation. At the same time, some divisions of the Ministry of Transport and Communications expressed concern about the suitability of the timing of the project. Nonetheless, the president and his ministers continued to project the need for the project, claiming that it would generate integration and potential growth, and it was decided to take the idea forward.

The execution of the project was decided before conducting the technical and economic studies that are usually demanded by the public authorities in Peru, in order to begin the works as soon as possible.

At the same time, regarding the project's environmental and social risk, the project's substantial impact on the area surrounding the highway was identified from the very start. The potential direct environmental effects of the construction and operation stage included, among other things: more deforestation, changes to the landscape, interruption of animal migration, interruption and deviation of watercourses, alteration of surface run-off, increase in indiscriminate hunting and fishing, contamination of soil and water from waste. The project's potential indirect environmental impact included: an increase in the deforestation and degradation of the forest from legal and illegal agriculture and mining, an increase in abusive hunting and fishing, loss of biodiversity, soil and water erosion from agrochemicals, among others.

The project's potential social effects included: a negative impact on native communities, prostitution, insecurity, drug and weapon trafficking, expropriation, relocation and affectation suits, changes in the use of the land, disorderly occupation of the road, and destruction of archaeological remains, among others. However, these aspects were not explored in depth, and the environmental and social risk remained in a secondary role. Proof of this is that the execution of the project began before the environmental impact evaluation was completed. Furthermore, the environmental impact evaluation was developed in sections, probably identifying the direct impacts of the execution of the works, but without identifying the indirect impact of the project, which is significant.

PRE-INVESTMENT PHASE

The scheme of governance used to implement concession contracts is still being used. The participating stakeholders are: *Proinversión*, for the structuring and the award of the contract; the Ministry of Transport and Communications, as the owner of the project, managing the contract through its Concessions Department, with a technical counterpart called *Provías*, and the Supervising

Regardless of the high environmental risks identified, the execution began before the environmental impact evaluation was completed.

The economic studies in the pre-investment stage were not thorough enough.

Organism of Investment in Public Transportation Infrastructure (OSITRAN, for its Spanish acronym), which supervises execution of the project.

There were very high expectations at first, because the highway was expected to be transnational, and to move large volumes of soybeans coming from Brazil. However, this perception started to change after the first profile and feasibility studies.

A pre-feasibility study was conducted in 2003 which discarded the use of this highway by freight coming from Brazil; the soybeans produced in the north-east of the country would continue to use the Madeira-Amazon waterway. The profits were estimated based on the savings in operating costs for local users, passenger's savings in terms of shorter travel times, and indirect benefits, the most significant of which had to do with the estimated increase in timber production in the Madre de Dios region.

Despite it not having been particularly thorough, a feasibility study was conducted in 2004. It considered other benefits, including the regional agricultural and cement production which could be exported to Brazil, and more activity in the transport sector, with the same increase in timber production and the new tourism flow considered in the previous study.

At that time, the overall estimated cost of the project was close to USD 944 million. Section 1 required an investment of USD 64 million. The investment, for Sections 2, 3, and 4 were expected to be around USD 242 million, USD 309 million, and USD 194 million, respectively. Finally, the total of the works for Section 5 was estimated at USD 135 million. The economic analysis gave an internal rate of return of 24.7 percent for the total of the project.

This information led to the 2005 decision of exempting the project from the requirements of the National Public Investment System (SNIP, for its Spanish acronym) by decree, despite the initial intention of following the usual

The decision to execute the project was made prior to the completion of the usual pre-investment studies. In order to speed up the signature of the contract, the project was authorized to skip the step that involved the SNIP.

It was decided that the project would be structured as a PPP, to accelerate the execution of the contract and for tax reasons.

path for investment projects: profile, pre-feasibility and feasibility studies, technical file, and the tender.

The basic preliminary studies were conducted but there was no technical file. The decision had been made, and it was understood that the preliminary process would delay the implementation of the project. The political promoters of the project used the international commitments as an argument to justify this decision.

The fact that the project was exempted from meeting the basic requirement of the SNIP, prompted the general perception that it was not profitable and that this exemption was justified by the concern that the SNIP might stop the project, delay the start of its execution, or that it would be obvious that the project to be executed was not profitable and that it would have a significant social and environmental impact. It was also believed that the political momentum of the project was influenced by an understatement of costs and an overstatement of demand in the studies.

Despite the fact that it did not include the engineering component, once the feasibility study was developed, it was decided to move forward, and the structuring stage began. Such progress, at this stage of the pre-investment phase, was made possible by the political empowerment and the favourable context that supported the different interest groups which would benefit from the works. Peru was also beginning a path of growth, which created a particularly optimistic scenario regarding its ability to face the cost of developing its infrastructure.

It was decided that the project would be structured in the form of a PPP, in order to accelerate the process and for tax reasons.

The Ministry of Transport and Communications had the will and the expertise for the execution of traditional public works, but that meant time for the preparation of engineering studies. As stated above, the only information available was the one included in the feasibility studies.

The Ministry of Transport and Communications had the will and the expertise in the execution of traditional public works, but that required time for the preparation of engineering studies. If it was to be done as a public works contract, it would take an estimated two years to put together the engineering studies, after which the project would be launched to the market. In order to promote an expeditious execution, the choice was to enter into a PPP contract.

The PPP structure also allows to delay payments and lifts the restriction imposed by the recording of the expenditure in the current period. This seems reasonable in the light of a term of significant economic growth.

If it was to be done in the form of a public works contract, it would take at least two years to put together the engineering studies, after which the project would be launched to the market.

A strong argument used to justify the choice of a PPP structure for the project was that it would be possible to market the project sooner. With this procedure, the concessionaire would be able to put the engineering study together and build the project faster. Some stakeholders understood that this implied a more streamlined process, and it was also believed that it would be more effective.

At the same time, the concession was also attractive because it delayed the payments. Around the year 2004, when the decision was made, the growth path was beginning to be consolidated but it was still incipient. An additional advantage was the guarantee that the maintenance of the highway would be given financial priority due to the commitments that would be undertaken with the concessionaires.

Because it was one of the first large concessions in Peru, its biggest challenge was the lack of experience. Despite the fact that there was some experience in self-sustaining concessions, this was not the case for co-financed concessions. This was one of the first concessions of the latter type.

Sections 2, 3, and 4 were granted in concession in 2005, and Sections 1 and 5, in 2007. It was a Design, Build, Operate & Transfer (DBOT) contract. Under these contracts, the concessionaires had the right to collect the Annual Payment for Works (APW) and the Annual Payment for Maintenance and Operation (APMO). The contract laid out construction, operation, and maintenance obligations, secured by a Construction Works Performance Bond, and a Concession Contract Performance Bond.

At the beginning of the contract development phase, it was proposed that the risks should be taken by the concessionaire. The problem was that, with the limited information available

Shorter deadlines mean that the risk is allocated to the contracting party, including the construction risk, which is usually assumed by the contractor.

then—due to the very basic studies conducted prior to the execution stage—, the estimated cost was particularly high. Such risk transfer would have made the contractor take insurance for the different risks associated with geology and construction, which was virtually impossible.

Thus, the scheme was changed, and most of the construction risks were transferred to the awarding party. The rationale behind this was that it would otherwise not be possible to develop the project with the expected modality, and within the the set timeframe.

This meant that much of the risk associated with the geological component or with larger measurements was absorbed by the government. In this spirit of minimum risk transfer, open clauses were included that implied that any additional works identified would be awarded to the concessionaire as a supplement to the firm payment. This possibility was stated in the concession agreement, and actually functioned as an incentive for the concessionaire to propose more work, even if the Ministry of Transport and Communications was not bound to accept it. However, with limited technical capacity for such a large project, this way of working involved a high risk for cost overruns.

Thus, a flexible contract was drafted in order to secure the feasibility of the concession. This project did not use the risk allocation matrix as a concession development tool. *Proinversión*[5], the agency in charge of promoting private investment in Peru, structured the contract, launched the bidding process, and obtained the award.

In order to reduce uncertainty and facilitate access to financing, it was provided in the contract that the government would include the obligation to pay the Annual Payment for Works (APW) in the National General Budget

5 Specialized technical organization subsidiary to the Ministry of Economy and Finance, a legal entity with technical, functional, administrative, economic, and financial autonomy

The geological risk was allocated to the government, and any additional works would be paid to the contractor at a price to be agreed on, introducing incentives unsuitable to the increase in the construction cost.

The risk allocation of the contract was incomplete, and it was of little value to the decision-making process during the execution.

The financial scheme was innovative and it facilitated access to the capital market.

Act, in the form of half-yearly payments for 15 years, adjusted according to the price levels and in US dollars. Three stages were defined, with a maximum execution term for the start of the payments of the corresponding fraction of the APW; the first one at 12 months, the second one at 30 months, and the third one at 48 months.

Based on the above APW structure, financial instruments called Progress Certificates and CARAPW (Certificate of Acknowledgement of the Rights under APW) were implemented. The former were documents acknowledging the gradual compliance of the concessionaire's construction obligations. A Progress Certificate was issued for each construction milestone or for progress that implied the payment of a fraction of the APW Progress Certificates. This would enable the project to obtain new financing options which would generate the income necessary to develop new construction milestones.

The second certificate, known as CARAPW, was a document under which the government undertook to pay a given amount to the holder, on a given date. The logic was that each Progress Certificate generated by the contractor implied the collection of 30 APW Progress Certificates that the government then wrote off by delivering 30 CARAPW, to be sold in the capital market.

The financial mechanism was innovative. The aim of both instruments was to seek funding in the capital market, mainly from insurance companies and the pension system. Against this backdrop, the concessionaire would only need to use its own funds to fund the works in the first construction milestone. The funding was completed with bridge loans, short-term lines of credit from the Andean Development Corporation for USD 200 million, aimed at providing liquidity for the first Progress Certificate, once the concessionaire had invested and executed the amount corresponding to the first milestone.

All the funding was structured based on these firm payments. However, if they changed, there would be a problem with the financial structure. It was useful to

The pre-investment phase had significant impact on the project outcome, particularly due to the high level of uncertainty remaining at the start of the contract, highlighted by the allocation of risk mostly to the contractee, all of which derived from the intention of speeding up the launch of the execution.

achieve the project's bankability, but it caused some drawbacks because it built on a study that was incomplete from the engineering perspective.

RESULTS

The pre-investment phase had significant impact on the outcome of the project, particularly due to the high level of uncertainty remaining at the start of the contract, highlighted by the allocation of risk mostly to the contractee, all of which stems from the intention of speeding up the launch of the execution.

This was clear in the treatment of larger measurements, the development of additional works, and the management of critical points, for example.

Regarding larger measurements, in the tender, the offers had to consider the budget for works proposed by the Ministry of Transport and Communications, with the total measurements for each item and each section, based on the initial basic project of reference. Because the initial information was insufficient, the contract had to be explicit regarding any potentially substantial changes, within the framework of the financial structure mentioned above. The final contract pointed out that any variations in the measurements would imply an adjustment of the APW, but that it was not to exceed 10 percent. If it did, a new comprehensive evaluation would have to be made, and the works would be considered pending to be covered by the existing budget, outside the APW.

The problem was that when the works began in the mountain range, a series of geological faults appeared, which required solutions different from the ones originally planned, with a substantial increase in the measurements, resulting in a gradual increase of the cost overruns until they reached the ceiling of the CARAPW. Basically, the estimated cost was insufficient due to the lack of geological data for the area. Regarding the treatment of this topic, the contract also provided that the unit prices in the

The initial geological studies were particularly incomplete considering the high existing risk. Additionally, the contract was also incomplete in terms of the unit prices to be paid for the tasks that had not been initially anticipated. These two elements combined, introduced a particularly high cost overrun risk.

feasibility study had to be respected regardless of the fact that they only included the measurements estimated at the beginning. However, it noted that new unit prices needed to be approved for the new measurements that were finally communicated.

On the other hand, it was decided that additional works would be generated, which were not part of the initial study, such as the crossing of the city of Puerto Maldonado or the Billinghurst bridge; they were authorized by OSITRAN because they were required. This resulted in delays caused by the review of the design of the works, which translated into higher cost overruns. Another particularly relevant issue was the treatment of the critical points, which emerged in significantly larger numbers than expected in the initial studies. For example, based on the studies, it was decided to cut the hillsides in Section 4, but this kept causing landslides. In this section, the highway bordered the river, and it was destroyed by the landslides. This made the building period longer and the works more costly than initially planned.

Given the nature of the project, final studies were conducted for each section. Progress was made with cost overruns, and even if one section was not completed, they kept advancing in parallel with the design and construction of other sections. This revealed the gap that existed between what had been projected and what was actually necessary, for there were half-finished works in several sections.

The initial estimated price of the works was close to USD 940 million. However, at the time of their execution, and with the final studies, the actual cost turned out to be much higher, close to USD 2 billion. This meant a significant challenge for the country.

The explanation for this increase was in the engineering of the project, but the financial structure available had only secured funds for the initial estimate. On the other hand, a concessionaire had been awarded the contract for a 25- year period. A particular challenge at that moment was to decide how to proceed from the financial point of view and with the contract, considering that the same

concessionaire would have to be paid USD 1 billion more, in a discretionary way.

It had to be done in this manner due to the construction risk and because of the maintenance contract. If any further problems were to arise, and there was more than one contractor, it would be possible to argue that the emerging problems had been caused by the previous contractor. The only effective way to award a supplementary sum to the same concessionaire was by passing a law. The discussion was then moved to the sphere of the Ministry of Transport and Communications, the Ministry of Economy and Finance, and Congress.

The decision to follow the legislative path had to do with the fact that decision-makers did not want to show that the contractor was being favored in a discretionary way. The issue was successfully resolved, and the additional funding was requested because it was difficult to oppose the project from the political perspective. The concessionaires, for their part, did not raise any issues, and they did not threaten to abandon the project because it was good business.

It was thus awarded to the same concessionaire, and it was decided that the method of payment would be changed to direct funding. The difference between the initial estimation and the actual final cost was paid by means of direct payments from the government. It was financed with two sovereign guaranteed loans for USD 500 million (of the approximately USD 1 billion remaining), signed in 2008 and 2010.

All this was possible because at the time of the renegotiation, the country was consolidating a period of strong growth, and it had higher income. In 2006, the GDP grew to reach a 7.7 percent rate; it reached 8.9 percent in 2007, and 9.8 percent in 2008. The financial costs were high, so it was no longer reasonable to leverage with foreign debt.

In short, a law was passed which provided that the government would pay the difference between the initial estimations and the provisions of the concession

agreement. Considering that the above risk transfer existed with a unit price scheme, there were incentives for the concessionaires to claim as much as possible, and that is what actually happened.

Regarding the economic viability risk of the project, a study conducted by *Universidad del Pacífico* in January 2008, shortly after the concessions of Sections 1 and 5 were granted in 2007, and prior to the signature of the new loans, anticipated that the project would continue to be profitable. With the new costs, however, its profitability is likely to have been reduced significantly.

The project's environmental and social risk was managed reactively, rather than proactively. For example, one of the drawbacks that were likely to arise from the project—and which actually arose—was the increase in informal mining and deforestation activities. This was an essential multi-sector phenomenon, and it would be an error to pin it on the transport sector exclusively. However, informal mining operations had difficulty transporting their production, and these improvements to the road infrastructure made it easier.

At the same time, informal mining in itself triggers the increase of prostitution networks and other relevant public health issues, such as the use of drugs and alcohol. The situation started deteriorating in the development stage of the project, and it could have been managed more effectively. Eventually a mitigation program was developed, but it was too late and it lagged behind, for the highway advanced faster than the program once the concession was awarded.

DISCUSSION

A series of lessons learned may be drawn from this megaproject.

Firstly, the project was not framed within a general government transport policy. It was mainly a presidential initiative. In this context, a political decision was made to advance to the structuring phase without any engineering

The project was given high priority by the Office of the President, which fast-tracked its approval. This strategy made it possible for the project to move on to its execution phase, all the while increasing its economic, environmental viability, and social sustainability risk.

The express pre-investment resulted in an incomplete financial structure, which required constant re-negotiation as a consequence. Cost overruns were so high, that Congress had to take part in their approval.

studies, relying only on the information provided by the initial feasibility studies, and exempting the project from having to meet the demands of the SNIP. This change in the rules of the game was made to speed up the project, but it increased its economic viability risk and the environmental and social sustainability risks.

There was no thorough viability analysis and no detailed analysis of the opportunity cost of the project because there was no engineering design. There was no environmental impact assessment either. This had substantial consequences from the practical point of view. Not conducting a detailed study resulted in a financial structure that was not strong enough to respond to the project's actual needs in terms of resources, which had to be solved by means of contributions made by the government; this was only possible after the project was launched, given the change in the economic context.

The limited scope of the studies in the pre-investment stage also hindered the risk transfer in the structuring phase, and it forced the government to allot cost overruns to stakeholders who were not part of the initial tender. Thus, the project had to be discussed in Congress, and this was only possible due to the social support and the pressure exerted by the region to advance with the promises that had been made.

At the same time, from the analysis of the structuring phase, there arises a series of lessons learned. The case shows that it was necessary to keep a large portion of the project's risks arising from the structuring of the contract and from the financial structure, within the sphere of the government. The rationale behind this was that the project would not have moved forward otherwise.

However, the use of the risk allocation matrix to organize this issue in the contract was barely sufficient, and it is likely that this had an impact on the inclusion of a series of open clauses that worsened the core issues stemming from a lack of information. It is worth noting that the project's financial structuring uses an innovative mechanism, which would lay the foundations to develop future projects, despite the

Not having relevant pre-investment studies did not prevent the project from making progress.

Regarding economic efficiency, it is likely that the significant differences in costs were not settled by higher profits than expected. This does not imply that other aims included in the project's policy rationale have not been met.

It is not strictly necessary to conduct pre-investment studies focused on managing the viability and sustainability risks inherent to the megaproject. It might find an acceptable political justification with the support of influential interest groups, within a relatively favourable economic context, and an institutional environment that could easily adapt to the created interests.

fact that this particular one finally underwent alterations that led to it being considered government sovereign debt, thus losing some of the advantages of developing the project under public-private participation mechanisms.

This case study about the IIRSA South Interoceanic Highway of Peru shows that it is not essential to conduct technical, economic, environmental, and social analyses priori to the development of a megaproject.

It was not strictly necessary to conduct pre-investment studies that focused on managing the viability and sustainability risks inherent to the megaproject. In this case, the one thing that was crucial was to have an acceptable political justification and the support of influential interest groups, within a relatively favorable economic context, and an institutional environment that could easily adapt to the created interests.

However, the case also shows that the poor management of economic, environmental, and social risk has an impact on the project that is eventually selected, as well as an impact on its success, measured both in terms of project management (cost, time, scope) and in terms of its efficiency and sustainability.

Regarding economic efficiency, it is likely that the significant differences in costs were not settled by higher profits than expected. This does not mean that other aims which were also stated in the project's policy rationale were not achieved.

Regarding sustainability, being subject to the political calendar in a context of weak coordination between institutions could create a megaproject with a negative environmental and social impact. This megaproject possibly improved the economic development of the area, but the lack of coordination between institutions had a substantial impact on the aforementioned terms.

Notwithstanding, it is also clear that the project helped the development of a region that used to have access issues, even if to serve this purpose an infrastructure with international

The decision makers seemed to have used a not so reasonable combination of risk management methods.

projection was implemented in a place that actually needed better domestic accessibility. However, part of the problem is that this commitment to development had a particularly different opportunity cost than originally announced, and a negative environmental and social impact.

The decision makers involved in the project seemed to have used a not very reasonable combination of the risk management strategies analyzed above. Given the lack of a real prediction effort, it is clear that a predict-control approach was not used. However, there was no evidence of the use of a prepare-commit strategy either, given the clear effort to negotiate aspects related to the existence of risks inherent to the project in the pre-investment phase, with the different interested parties.

In short, it is reasonable to assume that the way in which the IIRSA South Interoceanic Highway of Peru was developed, with an express pre-investment phase that made it feasible only from the political perspective, may have had an impact on its economic viability, and on it social and environmental sustainability.

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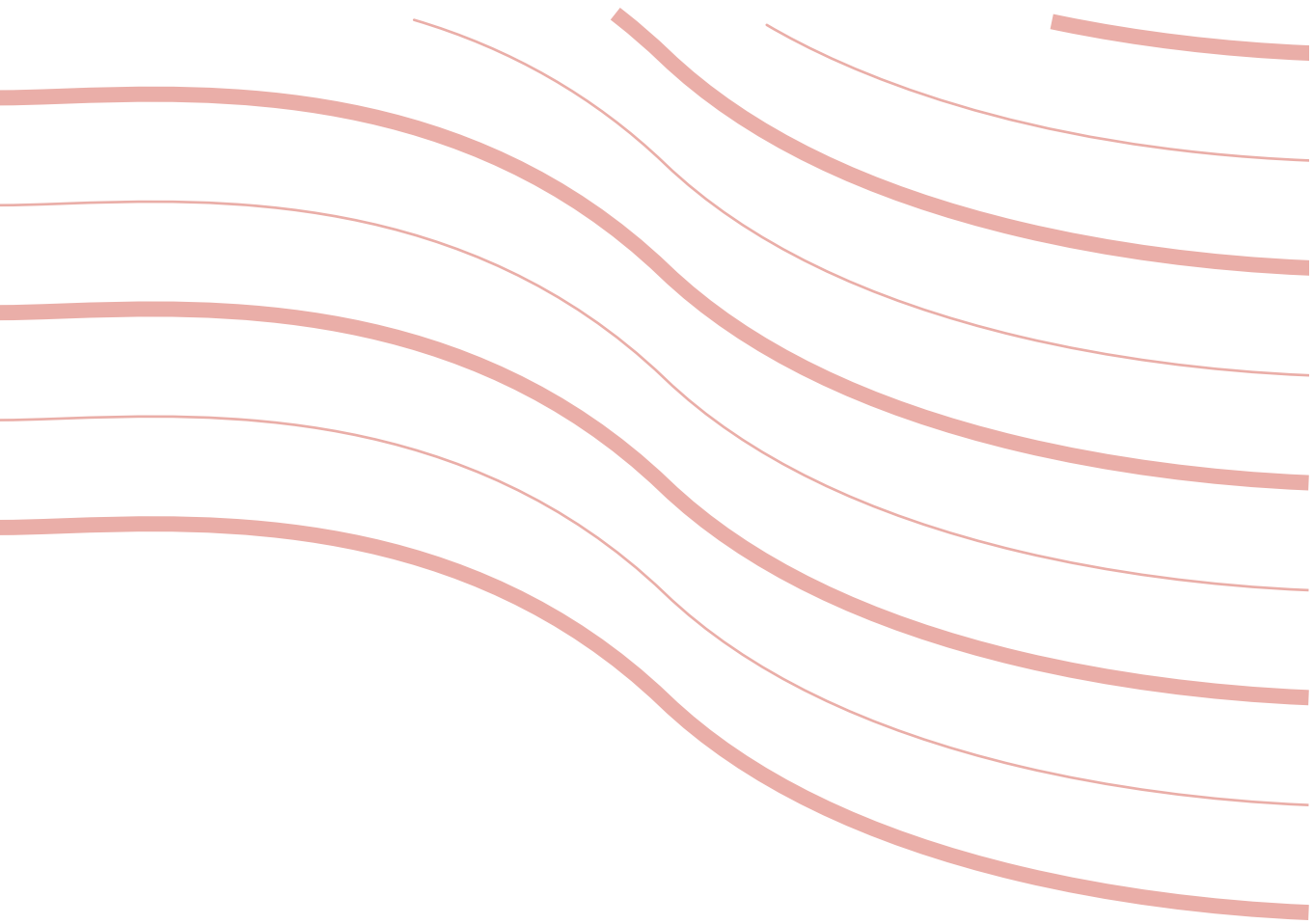


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