

# Road-Network Development in Quickly Growing Economies: Brazilian Case Study MG-050

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**Abstract:** Governments throughout the world have been actively engaging in public–private partnership (PPP) arrangements to upgrade and develop their road networks. The transportation sector and particularly the road sector has remarkably increased its use of PPP arrangements for building, upgrading, operating, and financing these investments due to a shortage of public spending, which is necessary to satisfy infrastructure needs of growing economies. Fast-growing economies, such as Brazil, are facing bottlenecks in their economic development due to a lack of proper transportation infrastructures. This paper discusses the use of PPP contracts in the road sector, focusing the analysis on the Brazilian case study MG-050. This road was the first PPP project in the road sector in Minas Gerais (Brazil) during the recent so-called PPP wave and can provide valuable lessons for future development of road projects, not only in Brazil but also in other fast-growing economies, such as sub-Saharan Africa, the Middle East, or Southeast Asia countries. DOI: 10.1061/(ASCE)IS.1943-555X.0000254. © 2015 American Society of Civil Engineers.

**Author keywords:** Brazil; Contracts; Public–private partnership; Roads.

## Introduction

Over the last few decades, there has been a trend for governments (federal, regional, and local) to leverage their infrastructure development projects under the model of a public–private partnership (PPP; Guasch and Straub 2009; Cruz and Marques 2013c). Attracted by access to private financing and a greater technical expertise that could lead to reduced costs and innovative solutions, this procurement model has been used both in large-scale and in local (smaller) infrastructures (Bel et al. 2013).

Several academics attribute this so-called wave of PPP projects under a more global and comprehensive change in the government's role in public service provision (Batley 1996), which represents a trend towards “contracted by governments,” as mentioned by Bettignies and Ross (2009). Although the level of maturity in PPP development is different in many countries and is typically related to political discussions on the role of the state within the economy, empirical evidence suggests that there is a world trend towards increasing the private sector participation in the public infrastructure provision (Koppenjan and Enserink 2009).

Examples of full privatization of public infrastructure in the fields of transportation (e.g., roads, rail systems, light rail, and so on) or environment (e.g., water and wastewater services) are rare, and the results are not encouraging, which subsequently guides governments towards models where both parties can coexist

such that the government can retain a certain level of control over the services and/or infrastructure or at least, a higher level of control than that in a fully privatized market (Cruz and Marques 2011).

Why are roads interesting projects to develop under PPP arrangements?

Among the several types of infrastructure networks, roads have been particularly susceptible to the use of PPP models. Considering this trend, what makes road projects good candidates to be developed under a PPP model?

There are several reasons; however, the most important reasons are related to risk and financing. Road construction is particularly vulnerable to cost overruns and delays (Flyvbjerg et al. 2004). Roads can extend hundreds of kilometers, which means holistic project management is an extremely complex task given the multiple and diverse actors involved and the dimension of the project. Furthermore, the frequent problems associated with the environment and expropriations cause severe delays and consequently, significant cost overruns. The geotechnical risk is also relevant within these projects because road projects usually demand significant excavations and landfills (Fookes et al. 1985). Construction risk also increases with the construction of bridges and tunnels which require extremely specific knowledge and are also extremely vulnerable to cost overruns and delays. A road with 100 or 200 km typically has dozens of bridges and overpasses.

The second reason (financing) derives from the physical characteristics described previously. Roads are highly capital intensive and require large up-front investments. The cost per kilometer varies from region to region, although it is not unusual for a highway with two separate lanes to cost between 2.5 and 13 million U.S. dollars/kilometer on average. This places a significant burden on the public budget, and governments frequently resort to PPP schemes to access private capital to leverage these projects (Cruz and Marques 2013c). In the majority of cases, the development of roads is also performed within a strategic plan, which may encompass several large-scale projects to be developed simultaneously; this further increases the need for capital (and also technical and managerial capacity).

There are additional reasons; however, risk and financing help explain why roads have been frequently constructed (or improved)

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Note. This manuscript was submitted on March 27, 2014; approved on March 2, 2015; published online on May 8, 2015. Discussion period open until October 8, 2015; separate discussions must be submitted for individual papers. This paper is part of the *Journal of Infrastructure Systems*, © ASCE, ISSN 1076-0342/05015002(7)/\$25.00.

through the use of PPP arrangements. The PPP model mitigates the risks of the public sector by shifting them to the private sector and also allows access to private capital, which decreases the public capital expenditure.

Brazil is a country with enormous economic potential but also with a strong infrastructure deficit, particularly its transport infrastructure, which hinders economic development (Wang 2002; Esfahani and Ramirez 2003).

The development of PPP projects in Brazil is also linked to a larger public reform. As many other fast-growing economies, Brazil is undergoing a profound reform in the organization and delivery of public services. Matias-Pereira (2008) claims that the public sector reform is placing citizens at the center of public service delivery, and efforts are underway to increase efficiency towards lower-cost, higher-quality services. Mobility is the top priority of the current government's policy because this has been one of the major reasons for protests and demonstrations in the country since 2009.

Over the last decade, there was a political direction, both at the federal government and at the state government levels, towards increasing private sector participation in delivering public infrastructure. Therefore, in 2004, the federal government of Brazil enacted Law No. 11.079/2004 which established the general standards of PPP arrangements with the specific legal regime for contracting.

The case of MG-050, which developed in Minas Gerais, is a particular case because it was one of the first PPP (so-called sponsored) contracts in the country. The MG-050 case was considered a successful case and thus influences policy towards PPP projects in the road sector which will most likely continue in the coming years. This paper will analyze the implementation of the MG0-50 project, particularly regarding the contractual arrangement, and will identify its primary strengths and weaknesses. This analysis will provide valuable empirical evidence towards formulating better public policies.

This paper is organized as described next. After this brief Introduction, an overview of the road sector in Brazil is provided, which focuses on its current needs and challenges; afterwards, a discussion on the specific Brazilian legal PPP framework is presented, and then the case study (the MG-050 concession). The main conclusions and policy implications will be given in the final section.

## Challenges of the Road Sector in Brazil

In Brazil, the road sector has a key role in cargo transportation, which is primarily due to the absence of effective transport alternatives on railways. Between 1990 and 2000, roads accounted for over 70% of the general cargo, which excludes the transportation of iron accomplished via railways. The reliance of the Brazilian transport cargo on road infrastructure is more acute than in other countries. For example, in the United States, Australia, and China, the share of road transport in freight is 26, 24, and only 8%, respectively (Bartholomeu and Filho 2009).

Despite the excessively high share of cargo in the road system, the physical network has severe quality and capacity problems; only 12% of the existing roads are considered adequate pavement.

Between 2004 and 2008, the Brazilian economy recorded growth rates between 3.2 and 6.1%. During the same period, the interstate road transport passengers decreased by 12.6% (Silva 2012). The number of passengers using air transport services (domestic passengers) has increased over 5% per year in the same period between 2004 and 2008 (Mckinsey 2010).

This deficit in road infrastructure has negatively impacted both the mobility of people and cargo. In the first case, the negative externalities are related to excessive time spent on traveling and most importantly, high levels of fatalities and injuries associated with road accidents. In the second case, the impact is a direct increase in logistical costs, which leads to higher prices and loss of competitiveness in international markets for exported goods. According to Véron and Cellier (2010), the logistical costs in Brazil still account for 15–18% of the gross domestic product (GDP), which is twice the average of that in Organization for Economic Cooperation and Development (OECD) countries.

The need for investments in the current road sector is estimated at approximately 90 billion U.S. dollars, and the cost of constructing new roads is estimated at 19 billion U.S. dollars. In 2007, the Brazilian government announced a massive program for investments in infrastructure of approximately 317 billion U.S. dollars; however, only 6% of the budget was allocated to the transportation sector, which is clearly inadequate to satisfy existing needs (PAC 2009).

## Brazilian Legal PPP Framework

The state government is responsible for the development of PPP projects and the creation of legal conditions to foster the implementation of this procurement model. In other countries with a federal organization, such as Canada or Australia (although the models are not the same), the public administration level typically has the responsibility of defining the legal structure to implement PPP projects and in leading the development of PPP programs. The development of PPP projects by the central government occurs primarily in countries without state governments. In these cases, the local governments are usually responsible for developing small (essentially local) PPP projects, whereas the central government is focused on developing large-scale projects, such as interregional roads.

The level of maturity in PPP development is distinct across the several states of Brazil. The state of Minas Gerais was the first to enact PPP legislation and is considered the so-called leading state in implementing this procurement model.

The first piece of legislation enacted in Brazil was passed in Minas Gerais in 2003 through Law No. 14.868. Later, in 2004, the state of Santa Catarina established Law No. 12.930, and in the same year, the State of São Paulo (Law No. 11.688), State of Goiás (Law No. 14.910), and the State of Bahia (Law No. 9.290) were next. The local governments can also legislate PPP schemes but must comply with the state and federal legislations.

MG-050, which was built in the state of Minas Gerais, is regulated by Law No. 14.868. The PPP legislation establishes two types of concessions, as follows: (1) sponsored concession, and (2) administrative concession. The sponsored concession concerns those projects that require a public subsidy, which in the case of roads, requires a payment to compensate for insufficient tolls collected or to replace those tolls (shadow regimes). When there are no payments by the public sector, the concession is an administrative concession. In this case, the sources of revenue are exclusively the charges paid by users to the concessionaire.

The rationale for these two types of concessions is to differentiate projects that are economically viable with the user charges from those that require public compensations. Although the main principles of PPP projects should be applied to both types of projects, they are entirely different from the perspective of public budget management.

## Case Study: MG-050

### Main Features

The PPP project of MG-050 includes the upgrade, expansion, maintenance, and operation of this highway until 2032. The contract was established in 2007 with a total investment of 341 million U.S. dollars (2006 prices). Approximately 170 million U.S. dollars in construction and reconstruction works were spent within the first 5 years of the contract.

The highway has an overall length of 372 km and links the metropolitan region of Belo Horizonte to the border with the state of São Paulo. Throughout its extension, there are six toll plazas. The catchment area of this project includes 50 municipalities and a population of 1.3 million inhabitants (metropolitan area of Belo Horizonte and the south and center–west region of Minas Gerais).

### Main Stakeholders

The MG-050 project involves several stakeholders. Fig. 1 illustrates the main stakeholders in the MG-050 concession and schematically presents the primary relationships between them.

The grantor is the Secretary of State for Transportation and Public Works. The regulator is claimed to be the Department of Roads. The Department of Roads is not a regulator strictus sensus because it is under the functional dependency of the Secretary of State for Transportation and Public Works. Additionally, the role of the Department of Roads is more of contract management than of regulation, which raises several concerns, particularly if potential conflicts arise between the concessionaire and the grantor; there is no independent regulation. From the perspective of the user's protection, it would also be important to ensure that a proper regulatory agency was in place.

The concessionaire is a joint venture entitled Concessionária Nascentes das Gerais with two shareholders, as follows: (1) Atlantia (Italian road operator), and (2) Bertin (Brazilian infrastructure group). The Brazilian legislation establishes a third-entity, a so-called independent controller, whose function is to monitor the contract execution. This independent controller has the responsibility of elaborating periodical performance reports. Those reports are the basis for establishing premiums (or penalties) in payments. In the case of MG-050, the independent controller is an international audit firm. Although the existence of this controller increases the degree

of independence and transparency in monitoring the contract, this should not be considered to be any form of regulation; rather, it is a mechanism to guarantee adequate contract management, particularly where contract monitoring is concerned.

Another important group of stakeholders is the user group; users are the ultimate beneficiaries of the service for which they pay a user fee, which in this case, is a toll fee (primary source of revenue for the project). Nevertheless, this stakeholder does not have a formal, legal existence and rarely takes an active role in the project decision. This aspect is a critical issue that has been debated in academic literature (El-Gohari et al. 2006). How to ensure that the expectations of the users are met and that their interest is protected? Several researchers claim that the solutions for this gap can be found in an active, transparent public participation process (for details, see Fairbanks and Plowman 2007; da Cruz and Marques 2013); however, the federal government should also be accountable to safeguard public interest, i.e., the users.

Between the federal government and the special purpose vehicle (SPV) there is a concession contract which validates the PPP arrangement. As explained previously, the concession is not financially sustainable on a stand-alone basis and requires compensation from the federal government to the concessionaire. The independent controller must monitor the contract execution and support the federal government in defining the premiums or penalties to apply. The legislation also establishes the creation of a guarantee fund to ensure that the federal government will comply with its financial obligations. In the case of MG-050, the guarantee fund is a state-owned company (Minas Gerais Economic Development Company). The guarantee fund is a mechanism to mitigate the risk of the government not fulfilling its obligation regarding financing. The private sector perceives a certain level of risk in the governmental compensation and therefore there is a third-party guarantee to mitigate this risk.

### Tender Process

The tender was a competitive bidding divided into two phases, as follows: (1) one that included the prequalification of the bidders (technical expertise was required for the operation and maintenance of highways with a minimum of 50 km and 10,000 vehicles/day) and the analysis of the technical proposal for the contract execution, and (2) one that corresponded to the analysis of the business plan. The criterion for selecting the best proposal was the lowest

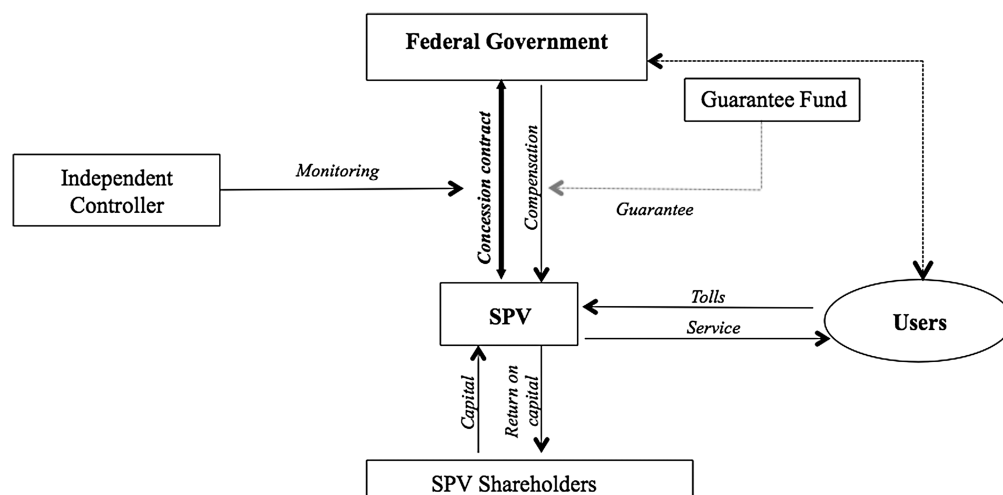


Fig. 1. Main stakeholders in MG-050 concession



compensation requested by the bidders. The initial viability studies indicated an amount of approximately 1.2 million U.S. dollars/month (in 2006 prices) paid by the public sector.

### Type of Concession

The initial traffic forecast that supported the economic and financial viability study indicated that the amount of revenue from tolls would be insufficient to ensure the economic and financial equilibrium of the concession. Therefore, it required public compensation, which placed this project within the scope of a sponsored concession.

Public compensation is not fixed because it depends on quantitative objectives to compensate or punish, so to speak, the concessionaire performance. These objectives and the respective weights fall within the following areas:

- Operational (70%),
- Environmental (10%),
- Social (10%), and
- Financial (10%).

For each of these dimensions, there is an associated set of performance indicators.

### Contract Structure

The concession contract of MG-050 is a case of a design-build-operate-transfer (DBOT) contract in a so-called brownfield project. Despite the fact that there was an existing infrastructure, the level of reconstruction and upgrading was higher compared with that of typical brownfield projects. Table 1 provides a summary of

**Table 1.** Contract Structure of MG-050 Concession

Contractual clause	Content
1	General background and legal framework
2	Overall scope
3	Contract duration
4	Asset ownership
5	Concession description Capital structure Social and environmental management Safety plan
6	Financing
7	Expropriation
8	Responsibilities over technical design
9	Responsibilities over construction
10	Responsibilities over operation
11	Key performance indicators
12	Payments to the concessionaire
13	Guaranties and insurance
14	Monitoring of the concessionaire
15	Liabilities
16	Contract termination
17	Conditions for public intervention
18	Asset reversal
19	Penalties and premiums
20	Users rights and obligations
21	Obligations of the concessionaire and the public partner
22	Changes in contract
23	Dispute resolution
24	Intellectual and industrial property
25	Arbitrage
26	General dispositions

the contract structure, which illustrates its primary contents. A detailed analysis on how risks are allocated within this contractual structure will be given in the next subsection.

### Contract Risk Analysis

An efficient allocation of risks in a PPP contract is the fundamental objective when designing contracts. The principal-agent theory argues that each agent should be responsible for the risks under its control (Jensen and Meckling 1976). The primary objective of developing a PPP project should be to ensure value for money (VFM). The VFM could be seen as a measure of utility for public spending (for more details, see Cruz and Marques 2013c). If the project developed under the PPP model, which accounts for a life-cycle cost analysis, is less expensive than the alternative under traditional public work contracts, then it provides VFM. To ensure that VFM is achieved, it is vital to properly allocate risks to the private sector, particularly those that the private sector is able to manage (avoid or mitigate; Grimsey and Lewis 2002, 2005; Meda 2007; Marques and Berg 2011). In the case of the MG-050 project, there was no VFM evaluation (Peci and Sobral 2007), which constrained the analysis and conclusions regarding the benefits of using this procurement model. The VFM tests allow understanding the merit of PPPs when compared with traditional public procurement contracts; however, there is some criticism regarding the theoretical calculation of VFM (for more details, see Cruz and Marques 2013c, d).

To perform a risk analysis, it is first necessary to identify all potential sources of risks. An exhaustive list of risks and the respective analysis is a time-consuming and cost-consuming task but is essential for the success of the project. For the purpose of the risk sharing analysis of the MG-050 contract, the primary risks that are indistinct from most road concession contracts were identified. Although the list is not exhaustive, it provides a fair overview of the main sources of uncertainty. The risks considered were the following: (1) political, (2) financial, (3) legal, (4) force majeure, (5) expropriation, (6) design and construction, (7) operation, (8) demand, and (9) environmental. Next, for each risk, the respective allocation or mechanism for risk sharing will be discussed.

**Political risk:** This risk is assumed by the public sector and concerns political changes regarding the project (e.g., changes in design, nationalizations, and so on).

**Financial risk:** Risk associated with the interest rates for loans necessary to finance the project are entirely assumed by the concessionaire. However, inflation rates that can significantly impact the costs of the project, particularly in a fast-growing economy such as Brazil, are handled by the public sector because the toll values will be updated automatically according to inflation.

**Legal risk:** This risk concerns the changes in the legislation that could impact the financial and economic equilibrium of the concession. In the case of MG-050, all legal risks are retained by the public sector, which includes two distinct groups of laws, as follows: (1) general economic laws, and (2) sector-specific laws. Group 1 concerns general labor, fiscal, or commercial laws. Group 2 addresses sector-specific laws, e.g., the regulatory framework.

**Force majeure risk:** These risks are insurable, are held by the private sector, and the remaining risks will be supported by the public sector.

**Expropriation risk:** The process of expropriation is a responsibility of the private sector, which strictly is in accordance with legislation. The public sector will only assume responsibilities if it has direct liability for any kind of delay.

**Design and construction risk:** These risks are entirely assumed by the concessionaire.

Operation risk: This risk is a responsibility of the concessionaire.

Demand risk: This risk is shared between the concessionaire and public sector. Variations within a band of plus or minus 10% of the initial forecast are assumed by the concessionaire. Both parties in a 50:50 share will support any change higher than these triggers, meaning that the loss of revenue when the traffic is lower than 10% will be supported by 50% of the public sector, which will also be entitled to 50% of the extra revenues when the traffic is higher than 10% of the initial forecast.

Environmental risk: This risk concerns the impacts on the environment related to the construction and operation of the project. The concessionaire handles these risks. These impacts solely concern local impacts and exclude global impacts, such as greenhouse gas emissions, which are a negative externality imposed on the overall society.

Table 2 presents the risk matrix for the MG-050 project which highlights the allocation of each particular risk.

### Economic and Financial Reequilibrium

The economic and financial reequilibrium (EFR) model, which is detailed in Cruz and Marques (2013b), is a model found in other geographies besides Brazil (e.g., Spain and Portugal) and is used to reduce contract incompleteness. Given the difficulty and high transaction costs involved to write complete contracts (Tirole 1986, 1999), the parties agree on a model to ensure that any new circumstance can be dealt with. The rationale of the model is that any risk retained by the public sector that affects the concession should be compensated. By clearly defining the rules for compensation, the public sector prevents the high costs that renegotiation generally represents (Guasch et al. 2007, 2008; Engel et al. 2006, 2009; Cruz and Marques 2013a). The compensation is calculated by changing the base case scenario to accommodate the change and determine the economic value that must be compensated to maintain the economic return of the concessionaire. This compensation could be accomplished in several distinct ways.

The MG-050 contracts states that in the case of EFR, the outcome is one of the following options:

- Contract extension,
- Changes in the investment plan,
- Changes in tolls, and
- Changes in the performance objectives.

Unlike the majority of EFR models found in other concessions, in the case of the MG-050, there is no direct compensation from the

federal government to the concessionaire. The reason for the absence of this compensation mechanism is most likely to avoid a future so-called extra burden on the public budget. In these cases, changes will most likely result in increases in the toll levels raising several questions. The users do not have any direct impact on the design and implementation of the project but will most likely bear the costs of renegotiation through toll increases. Somehow, the so-called failures of the government (and/or the concessionaire) will impact the users.

## Case Study Discussion

### Concessionaire Performance

The MG-050 project is often seen as a so-called landmark in PPP development in Brazil. It was the first sponsored concession, and its successes and failures will influence the future development of PPPs in the road sector in a market with a strong potential for growth.

The overall performance of the concessionaire has been decreasing. Based on the performance evaluation system (described previously), the overall score of the concessionaire dropped from 97% in 2008 to 79% in 2012. One of the primary reasons for the decrease in performance was the quality of service. Users were unsatisfied with the service and believed they were overpaying given the current poor physical conditions of the road. The contract allows adjusting the public compensation to the level of quality of service offered which, for example, in October 2013, represented a decreased of public compensation by 14%.

Nevertheless, there seems to be a healthy communication between the stakeholders involved. In 2012, a 3-day seminar was held with representatives from the grantor and concessionaire to discuss critical issues of the concession, such as the following: (1) performance targets, (2) investment plans, (3) quality of service, and so on. This communication strategy is a strength of the project; however, as mentioned previously, the quality of service is still far from adequate.

### Demand Forecast

Demand risk is the main risk of any road concession. Particularly, when the government assumes a portion of the demand risk (e.g., through the definition of a band system), there are significant liabilities that can arise, which is even more acute considering the

**Table 2.** Risk Matrix for the MG-050 Concession

Risk classification	Risk allocation		Observations
	Public	Private	
Political	Yes	No	—
Financial	Yes	Yes	Interest rates for loans are assumed by the concessionaire, but the variation on inflation rates are borne by the public sector
Legal	Yes	No	—
Force majeure	Yes	Yes	Concessionaire assumes the risks that are insurable, and the public sector assumes the remaining risks
Expropriation	Yes	Yes	Concessionaire assumes the majority of the expropriation risk, but the public sector can be held responsible for any action that can cause delays in expropriation
Design and construction	No	Yes	—
Operation	No	Yes	—
Demand	Yes	Yes	Variations within a band of plus or minus 10% of the initial forecast are assumed by the concessionaire, but the variations are higher both parties split the gain, or loss, in 50:50 share
Environmental	No	Yes	—

**Table 3.** Forecast versus Real Traffic in MG-050 Concession (Adapted from Minas Gerais Government 2012)

Year	Forecast (millions)	Real (millions)	Difference (%)
2008/2009	18.543548	17.344602	-6.91
2009/2010	19.035997	18.663267	-1.96
2010/2011	19.507570	19.839343	1.70
2011/2012	20.015997	20.266059	1.25

well-discussed problem of optimism bias. Fortunately, in the case of MG-050, the demand was not overestimated, which has allowed for the demand risk to be entirely supported by the concessionaire thus far.

As illustrated by Table 3, the difference between the forecast and actual traffic is lower than usual concerning road projects (for more details, see Flyvbjerg et al. 2004). The difference has never exceeded the 10% established in the contract as the limit for the full risk assumption by the concessionaire. Once the 10% limit is reached, the losses (or revenues) will be shared by both parties, something that did not occur in this particular case.

One of the main strengths of this project is the accuracy of the traffic forecasts, which provided a robust basis for maintaining the economic and financial equilibrium of the concession. The optimism of traffic forecasts is clearly one of the main problems of road PPP development worldwide. However, the risk-sharing mechanism for demand risk results in a certain equilibrium because both parties can benefit from traffic growth (above the 10% interval), and both parties will be equally responsible for traffic downturns. Nevertheless, there is some overprotection of the concessionaire regarding the legal risk because any change in general labor or commercial laws will be compensated by the public sector.

### Renegotiations

The contract has been renegotiated six times, as illustrated in Table 3. Nevertheless, these changes did not involve any change in the tolls or compensation paid by the public sector. The compensation has suffered changes related to penalties for performance. At least two changes [(1) the second change, and (2) the sixth change] have involved changes in the investment plan; however, it is not public whether these changes have affected the overall amount of investment or if they had some impact over the public compensation (Table 4). Furthermore, there has been an active public debate on the delays of certain investments and a claim by the concessionaire that those delays are related to the inability of the public administration to cope with its responsibility in changing the location of power stations and water mains. The need for an EFR was announced in 2014; however, the process is unfinished.

**Table 4.** Renegotiations of the MG-050 Concession

Changes in contract	Year of concession	Civil year	Reason for renegotiation
First	2	2008	Changes in design of the road
Second	3	2009	Changes in the investment plan
Third	3	2009	Changes in the legal designation of the grantor
Fourth	4	2010	Limitation of the concessionaire responsibility over the occupancy of lateral roadway for the purpose of construction works
Fifth	4	2010	Changes in the list of key performance indicators
Sixth	6	2013	Changes in the investment plan

### Critical Analysis

One of the primary strengths of this project is the accuracy of traffic forecasts, which provides a robust basis for maintaining the economic and financial equilibrium of the concession. However, the risk-sharing mechanism for demand risk presents some equilibrium given that both parties can benefit from traffic growth (above the 10% interval), and both parties will be equally responsible for traffic downturns. Nevertheless, one can argue on the so-called fairness of a 10% interval because it is a relatively low interval for traffic variations in the long term. It would be possible to achieve a more effective risk sharing if the interval was higher because it would accommodate larger traffic variations. Regarding the legal risk, there is some overprotection of the concessionaire because any change in the legislation will be compensated by the public sector.

The ultimate goal of the PPP project is to deliver a service that upholds certain quality standards. Regarding the quality of service, the MG-050 project has been subjected to criticism by users who consider that the level of tolls charged does not correspond to the quality of service provided. There are delays in certain investments, and the contract has been changed to accommodate some of these delays acknowledged by the concessionaire.

The MG-050 contract has a clear model for managing the contract with periodical reports for the grantor to assess the concessionaire performance. This is a positive aspect of this case study; however, it seems that the grantor has been unable to effectively apply penalties to the concessionaire, which is considered to be one of the major problems in contract management. Although the levels of information asymmetry are reduced by the existence of a monitoring scheme, there are difficulties in guiding the concessionaire performance via penalties. In this case, this is even more important given that the investment plan is overdue.

### Conclusions

The development of PPP arrangements should be based on the search for VFM in the public infrastructure provision. Although this is a generally accepted principle, frequently, there is no equilibrium in the risk sharing between the public and private sector, such that the public sector assumes most of the risks. The development of concessions in Brazil will continue to grow; however, at the time the MG-050 contract was signed, the federal administration did not have relevant experience. Nevertheless, the mechanism for sharing the demand risk, which is probably the most important in road concessions, is equally shared by both parties. Even more relevant is the fact that there was not excessive optimism in the traffic forecasts.

However, there are some negative perceptions by the users. The MG-050 has suffered from public contestation over the years due to the increase in tolls and the delay in investments. The investment plan has been revised several times, and the concessionaire has acknowledged those delays. In spite of this, to the best of the writers' knowledge, no penalties were applied, which means that the users are paying for a service that is not being properly provided. This risk affects many PPP projects in different sectors. Privatization of public services often implies an increase in prices, and when the concessionaire provides the service at a lower quality level than what is expected, the users are penalized. If the concessionaire performs poorly, there is a deduction in the public compensation although the level of tolls for the users remains the same.

In this case, as in many other countries, there is no independent regulatory body. The establishment of a contract should not limit the existence of a regulator; however, in opposition, a proper regulation should be in place to ensure that negotiations between the



grantor and concessionaire, or even toll increases, are safeguarding the stakeholders, particularly the users, for which there is no active protection mechanism.

In this contract, the existence of a regulator would be particularly relevant because the rules for the EFR do not allow for direct compensations and therefore it is most likely that any change in investment will be accommodated by toll increases. The establishment of the regulatory body and also the regulatory model is crucial before concession contracts are established and should not be created ad hoc when most concessions have been awarded.

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