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*VALUE FOR MONEY ANALYSIS FOR PPP DECISION-MAKING  
IN THE BRAZILIAN STATE OF RIO GRANDE DO SUL*

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*This paper is dedicated to Leticia, Manuela e Miguel.*

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## **ABBREVIATIONS AND ACRONYMS**

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ADSCR: Annual Debt Service Cover Ratio.

BoQ: Bill of Quantities.

BRT: Bus Rapid Transit.

DCF: Discounted Cash Flow.

EPTC: Empresa Publica de Transporte e Circulação.

FIRR: Financial Internal Rate of Return.

GDP: Gross Domestic Product.

MAP: Minimum Annual Payment.

OECD: Organisation for Economic Co-operation and Development.

PFI: Private Finance Initiative.

PPP, P3, PFI or PFII: Public-Private Partnership.

PSC: Public Sector Comparator.

PV: Present Value.

ROE: Return on Equity.

RS: Rio Grande do Sul.

SB: Shadow Bid.

SEFAZ: Secretaria da Fazenda do Rio Grande do Sul.

TJLP: Taxa de Juros de Longo Prazo.

VFM: Value for Money Analysis.

## ABSTRACT

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Developing countries have been increasingly using Public-Private Partnership (PPP) as a successful option to invest in infrastructure, not only because this modality tends to provide more quality and efficiency, but because it also allows investments even in the case of budget constraints. Additionally, declining infrastructure and increased industry specialization have also led to greater interest in the government's use of PPP.

However, any project, whether it is a PPP or a traditional procurement, should be undertaken with a robust and detailed Value for Money (VFM) analysis, in order to ensure that the project provides greater return on taxpayer investment.

In Brazil, even though the federal government and some states have developed PPP projects in different sectors of the economy, there is no national standard framework for VFM analysis. Additionally, although PPP Law 11,079/2004 demands a mandatory study to demonstrate convenience in order to begin a PPP procurement, the government on local, state and federal levels lacks a methodology.

Therefore, this study has two main goals: (1) provide a literature review about value for money analysis, and (2) analyze an upcoming PPP project (Metro) in the city of Porto Alegre, which involves financial resources from federal, state and local governments.

**Keywords:** public-private partnership (PPP, P3, PFI, PFII), traditional public procurement, value for money (VFM), shadow bid (SB), public sector comparator (PSC), cost-benefit analysis, financial assessment, infrastructure development, metrorail.

# 1. INTRODUCTION

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Several factors may impact economic growth: labor force, technology, physical capital and natural resources are some examples that can be increased or improved in order to allow society to achieve a higher standard of living.

Traditionally, part of government spending has been allocated for infrastructure investment. Water, transportation, energy and telecommunication infrastructures, when well planned, executed and maintained, play a major role in economic expansion.

However, over the last decades, the government's capacity to deliver effective, quality and efficient infrastructure has been repeatedly questioned by society. Public services are frequently seen as ineffective in resource allocation and fails in management. In Brazil, despite being the seventh largest economy in the world, there is still a huge gap that threatens to limit growth and competitiveness.

Moreover, especially after the 2008-11 financial crisis, there are many other factors that affect infrastructure investment, such as budget constraints, low public savings and high debt commitments.

As result, a growing number of developing country governments, including Brazil, have becoming even more interested in Public-Private Partnerships (PPP, also known as P3 or PFI<sup>1</sup>) to provide, finance and operate public infrastructure, services and utilities. An

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<sup>1</sup> PFI: the United Kingdom term for PPP, typically used to describe PPP as a way to finance, build and manage new infrastructure. Actually, the current version is PF2.

infusion of private capital and management can ease fiscal constraints on infrastructure investment and increase efficiency<sup>2</sup>.

Particularly, Rio Grande do Sul State (RS), the fourth highest GDP in the national ranking - corresponds to 6.44% of the National GDP - (IBGE, 2014), has never implemented a PPP. Upon analyzing RS's economy there are several factors that could justify the PPP modality of investment:

1) in RS, the ratio between the Net Consolidated Debt and the Current Net Revenue amounted 2.09 in 2013 - the largest among the States in the country, which the average ratio is 1.03 - (SEFAZ, 2014); (2) in 2014, investments represented only 6.2% of the total revenue; (3) its economy is strongly based on agriculture, which depends on efficient roads and ports for exports.

PPPs may be used in a wide range of social and economic infrastructure projects, but international experiences have shown they are mainly used to build and operate roads, prisons, hospitals, bridges and tunnels, water and sanitation plants, schools and light rail networks (International Monetary Fund, 2004).

Essentially, PPPs can make sense in a number of different situations: debt constraints, private sector expertise, value for money and non-inherently government assets<sup>3</sup>.

Although PPP has gained increasing global popularity over the years, mainly explained by risk transfers to the private sector, quality improvement, cost transfers and accelerated implementation, it is not be taken as an absolute truth that PPP is always the

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<sup>2</sup> International Monetary Fund, 2004, "Public Private Partnerships," Fiscal Affairs Department/IMF.

<sup>3</sup> Patrick Sabol and Robert Puentes. "Private Capital, Public Good: drivers of successful infrastructure Private-Public Partnerships," Brookings.

best option. In some cases, the public sector may be more efficient or even the only practical provider for the aimed project.

Therefore, in choosing to develop a project using traditional public procurement, or public-private partnerships, the decision should be based on a financial evaluation of the alternatives. Value for Money analysis, based in both quantitative and qualitative assessment, is a process to assist decision-makers in order to select the appropriate procurement approach that provides the maximum benefit for the society.

Therefore, this study has some goals: (1) make an overview of concepts and definitions about PPP and VFM; (2) understand how experient countries have developed VFM analysis; (3) Develop familiarity with how Brazil's regulatory framework conceives the topic; and (4) analyze an upcoming PPP project (Metro) in the city of Porto Alegre, which involves financial resources from federal, state and local governments. In this case study, a financial model developed by the World Bank has been used to support VFM analysis.



## 2. PUBLIC-PRIVATE PARTNERSHIP (PPP)

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### 2.1. CONCEPT AND DEFINITIONS

Goods and services can be delivered to society in different ways that may include not only the government, but also the private sector in varying degrees of participation. As noted by Musgrave<sup>4</sup>, public service provision does not imply that government is necessarily the producer of the services.

Traditional public procurement comprises not only cases where the government generates the assets to provide public services, but also when provided after governments procure from the private sector or through contracts with private companies in accordance to government specifications.

On the opposite side, in a simple definition, privatization represents the transfer of tasks and responsibilities to the private sector. In this way, costs and revenues are also transferred.

The space between traditional public procurement and full privatization may be filled by a range of procurements: short-term management and outsourcing contracts, concession contracts and joint ventures between public and private sectors<sup>5</sup>. In addition, it also includes public-private partnerships (PPP).

OECD defines a PPP as:

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<sup>4</sup> Richard Musgrave, 1959. *The Theory of Public Finance: A Study in Public Economy*, McGraw-Hill, New York, United States.

<sup>5</sup> OECD, 2008. *Public-Private Partnerships: In Pursuit of Risk Sharing and Value for Money*, OECD Publishing, Paris.

*“An agreement between the government and one or more private partners (which may include the operators and the financiers) according to which the private partners deliver the service in such a manner that the service delivery objectives of the government are aligned with the profit objectives of the private partners and where the effectiveness of the alignment depends on a sufficient transfer of risk to the private partners.” (OECD, 2008)*

According to the International Monetary Fund:

*“Public-private partnerships (PPPs) refer to arrangements where the private sector supplies infrastructure assets and services that traditionally have been provided by the government. In addition to private execution and financing of public investment, PPPs have two other important characteristics: there is an emphasis on service provision, as well as investment, by the private sector; and significant risk is transferred from the government to the private sector.” (IMF, 2004)*

Queiroz and Kerali (2010) emphasize:

*“PPP is based on the recognition that the private sector can contribute to reducing the overall cost of delivering infrastructure services through increased efficiency and better management of some risks (such as construction). In successful PPP projects, the private sector’s higher cost of financing and need for a return on its investment are offset by the benefits provided by the private participation.”<sup>6</sup>*

The World Bank PPP Reference Guide (World Bank, 2014) defines PPP as:

*A long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant*

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<sup>6</sup> Queiroz, Cesar and Kerali, Henry. 2010. “A Review of Institutional Arrangements for Road Asset Management: Lessons for the Developing World”. World Bank, Transportation Papers.

*risk and management responsibility, and remuneration is linked to performance.*

The common theme of each definition is the private and public sectors working together to provide public services and goods that would not otherwise be provided.

In Brazil, the concept of PPP is restricted to the definitions of the Federal Law 11,079/2004, which was created to include the possibility of paying government subsidies to the private partner, thus allowing the implementation of concessions with significant economic and social returns, but without financial feasibility. Subsidies to a PPP assure projects can be commercially financed resulting in net economic or social gain<sup>7</sup>.

## 2.2. TYPES OF PPP

PPPs take a wide range of forms varying in the extent of involvement of and risk taken by the private party. The terms of a PPP are typically set out in a contract or agreement to outline the responsibilities of each party and clearly allocate risk.

As the private sector increases its participation, it assumes increasing responsibility for the functions of design, build, operation and maintenance, and finance. TABLE 1 shows the responsibility matrix for conventional procurement and PPP options, according to the World Bank Toolkit<sup>8</sup>.

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<sup>7</sup> World Bank. 2012. *Best Practices in Public-Private Partnerships Financing in Latin America: The Role of Subsidy Mechanisms*, Washington, DC.

<sup>8</sup> World Bank. 2009. *Toolkit for Public-Private Partnerships in Roads and Highways*, Washington, DC

Category	Works and Service Contracts (conventional procurement)		Management and Maintenance Contracts		Operation and Maintenance Concessions	Build Operate Transfer Concessions	Privatization
	Type	Design – Bid - Build	Design and Build	Management Contracts	Performance-Based Contracts <sup>9</sup>	Lease or Franchise or <i>Affermage Brownfield</i>	BOT/DBFO/ BOO <i>Greenfield</i>
Design	Private by fee contract <sup>10</sup>	Private by fee contract				Private by concession contract	Private
Build	Private by fee contract						
Operation and Maintenance	Public <sup>11</sup>	Public	Private by fee contract	Private by BBC contract	Private by concession contract <sup>12</sup>		
Finance	Public	Public	Public	Public			
Own	Public	Public	Public	Public	Public	Public after contract (BOT/DBFO) or Private (BOO)	
Private Sector Revenue Options					Tolls (concession model)		
					Availability payments (PFI model)		
					Government guarantees and support Other support (eg insurance)		

TABLE 1: RESPONSIBILITY MATRIX FOR CONVENTIONAL PROCUREMENT AND PPP OPTIONS (WORLD BANK, 2009)

<sup>9</sup> Private by performance-based maintenance contract means that the private sector is paid based on the level of service of the highway infrastructure, generally comprising a standard availability fee with penalties for below-standard performance.

<sup>10</sup> Private by fee contract means that the private sector is remunerated by a predetermined fee; established at tender stage. Incentive payments may be included but will be a marginal part of overall payment.

<sup>11</sup> Public means that the public sector assumes wholly or predominantly this role or responsibility.

<sup>12</sup> Private by concession contract means that the private sector is paid based on user charges, availability payments or a mixture of both, as per the contract type

Therefore, in a comprehensive way, the different types of arrangements may be categorized as follows:

1. Design-Build (DB): The private sector designs and builds infrastructure to meet public sector performance specifications, often for a fixed price, so the risk of cost overruns is transferred to the private sector.
2. Operation & Maintenance Contract (O&M): A private operator, under contract, operates a publicly-owned asset for a specified term. Ownership of the asset remains with the public entity.
3. Design-Build-Finance-Operate (DBFO): The private sector designs, finances and constructs a new facility under a long-term lease, and operates the facility during the term of the lease. The private partner transfers the new facility to the public sector at the end of the lease term.
4. Build-Own-Operate (BOO): The private sector finances, builds, owns and operates a facility or service in perpetuity. The public constraints are stated in the original agreement and through on-going regulatory authority.
5. Build-Own-Operate-Transfer (BOOT or more commonly, BOT): A private entity receives a franchise to finance, design, build and operate a facility (and to charge user fees) for a specified period, after which ownership is transferred back to the public sector.
6. Buy-Build-Operate (BBO): Transfer of a public asset to a private or quasi-public entity usually under contract that the assets are to be upgraded and operated for a specified period of time. Public control is exercised through the contract at the time of transfer.

7. Finance Only: On behalf of the public entity, a private entity, usually a financial services company, funds a project directly or uses various mechanisms such as a long-term lease or bond issue.
8. Concession Agreement: An agreement between a government and a private entity which grants the private entity the right to operate, maintain, and collect user fees for an existing publicly-owned asset in exchange for an up-front fee and sometimes a share of revenues. Although ownership usually does not transfer, certain rights of ownership may.

### 2.3. REGULATORY FRAMEWORK

According to the World Bank Toolkit (World Bank, 2009), the legislative framework comprises two different types of laws: (1) the laws that make PPP possible, also called the “enabling” law or framework. This would be a country concession law or PPP law, and (2) the laws that may have an impact on a PPP project.

The enabling law, which is generally considered the most authoritative statement of government policy toward private participation, could either be general (PPP laws) or sector specific laws (toll road concession law, for instance).

On the other hand, the laws that impact PPP are vast. The most common are public procurement, foreign investment laws, property laws, dispute resolution, company laws, tax laws, environment laws, accounting standards and labor laws.

In addition, governments also establish procedures and create instruments and institutions, which together constitute what is called a regulatory framework. That

framework represents an important instrument when implementing government policy for the sector concerned.

In Brazil, the enabling laws are the Concession Law 8,987/1995<sup>13</sup>, the PPP Law 11,079/2004<sup>14</sup>.

The Concession Law regulates article 175 of the Federal Constitution, authorizing the transfer of investments and services to private partners. One of the most important innovations of this Law is the flexibility in specifications, due to the fact that most projects are long-term therefore new technologies and best engineering solutions can be implemented.

*“Article 175. It is incumbent upon the Government, as set forth by law, to provide public utility services, either directly or by concession or permission, which will always be through public bidding.”*

The PPP Law completed the regulatory framework for PPPs in Brazil bringing many innovations: (a) government subsidies for specific cases; (b) increase in amortization term of investment; and (c) those related to fiscal space.

Moreover, according to Ribeiro and Prado (2007)<sup>15</sup>, several other improvements have been made by the introduction of the PPP Law in the regulatory framework:

1. inversion of bidding phases, allowing the opening of the bid proposals before the pre-qualification documents;
2. additional phase to correct formal defects in the bidding documents;

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<sup>13</sup> Law 8,987/1995, accessed January 14, 2015, [http://www.planalto.gov.br/ccivil\\_03/leis/L8987compilada.htm](http://www.planalto.gov.br/ccivil_03/leis/L8987compilada.htm)

<sup>14</sup> Law 11,079/2004, accessed January 14, 2015, [http://www.planalto.gov.br/ccivil\\_03/\\_ato2004-2006/2004/lei/L11079compilado.htm](http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/lei/L11079compilado.htm)

<sup>15</sup> Ribeiro, Mauricio and Prado, Lucas. 2007. “Comentários à lei de PPP” São Paulo, Brazil: Malheiros Editores. 477p.

3. settlement of disputes by arbitration;
4. risk sharing of any type;
5. possibility of guaranteeing government payment of the subsidy, such as the PPP Guarantee Fund, which is private in nature and possesses its own capital.

According to the PPP Law, there are two types of concessions:

Types of Concession	Characteristics
Sponsored Concession	Public services or public works concession by which the private concessionaire receives both a tariff to be paid by end users and subsidies paid by the public sector.
Administrative Concession	A service provided by the private entity to the public entity without receiving any tariff or users fees. The government pays on the basis of the services received from the private partner.

TABLE 2: TYPES OF CONCESSION

An important question refers to concessions that do not receive any financial support from the government. In these cases, the Concession Law prevails.

The Federal Law 12,766/2012<sup>16</sup> brought some other important innovations to make PPPs more appealing to private investors: (a) increase in the maximum level of commitment for PPP payments for States and Municipalities from 3% to 5% of Net Current Revenue (NCR) ; (b) The minimum term for the private partner to trigger the guarantee fund reduced from 45 to 15 days from the due date for any accepted and unpaid invoices provided that there is no founded act that rejected the payment; and (c) the institution of

<sup>16</sup> Law 12,766/2012, accessed January 14, 2015, [http://www.planalto.gov.br/ccivil\\_03/\\_ato2011-2014/2012/lei/l12766.htm](http://www.planalto.gov.br/ccivil_03/_ato2011-2014/2012/lei/l12766.htm)



the payment of public resources to the private partner for investments upfront, that is, prior to the delivery of services by the concessionaire.

Finally, the RS enabling laws are the Concession State Law 10,086/1994<sup>17</sup> and the PPP State Law 12,234/05<sup>18</sup>.

Although the federative form adopted by the Brazilian State enforces the autonomy of the federative entities, it is prohibited for a state law contradict a federal law. It means that the general rules for bidding and contracting PPPs on federal, state and municipal levels, are established by the federal laws. So, the rules for bidding and contracting concessions on the state level have to be defined by each state.

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<sup>17</sup> Law 10,086/1994, accessed January 14, 2015, <http://www.al.rs.gov.br>

<sup>18</sup> Law 12,234/2005, accessed January 14, 2015, <http://www.al.rs.gov.br>

### 3. VALUE FOR MONEY

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#### 3.1. CONCEPT AND DEFINITIONS

Value for Money (VFM) analysis plays an important role in the PPP decision process. When governments think about providing infrastructure to the society using PPPs, it is usually accompanied by a VFM analysis to determine whether the “best” model for service provision is via public or private delivery.

A simple way to understand what it means is thinking about cost-benefit analysis. Governments make an assessment about what is more beneficial in terms of costs. It is used on a case-by-case basis to compare the aggregate benefits and the aggregate costs of a PPP procurement against those for conventional public alternative (IMF, 2004).

VFM is usually viewed as one of the crucial requirements before a project can go ahead with public-private partnership (PPP) procurement in many countries<sup>19</sup>.

In other words, PPPs should only be considered if it can be demonstrated that they will achieve additional value compared with other approaches, if there is an effective implementation structure, and if the objectives of all parties can be met within the partnership<sup>20</sup>.

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<sup>19</sup> Bell, R. (2002), “Keys to effective procurement. PFI: practical perspectives”, ACCA, April, pp. 24-28; Shaoul, J. (2002), “A financial appraisal of the London underground public-private partnership”, Public Money & Management, April-June, pp. 53-60; M Treasury (1997), “Appraisal and Evaluation in Central Government: The Green Book”, HMSO, London; Ismail, S. and Pendlebury, M. (2006), “The Private Finance Initiative (PFI) in schools: the experiences of users”, Financial Accountability & Management, Vol. 22 No. 4, pp. 381-404.

<sup>20</sup> Cesar Queiroz. 2005. “Launching Public Private Partnerships for Highways in Transition Economies”, Transport Papers, The World Bank Group, Washington, DC.

There are several definitions of Value for Money (VFM). The United Kingdom's Her Majesty's (HM) Treasury<sup>21</sup> defines it as follows:

*"Value for Money is defined as the optimum combination of whole-of-life costs and quality (or fitness for purpose) of the good or service to meet the user's requirement. VFM is not the choice of goods and services based on the lowest cost bid. To undertake a well-managed procurement, it is necessary to consider upfront, and at the earliest stage of procurement, what the key drivers of VFM in the procurement process will be" (HM Treasury, 2006)*

The main point of this definition is that in determining the value pursuing a project as PPP, the government must make sure to account for the costs and savings over the lifetime of the project. Moreover, the VFM assessment should ensure that government focuses on quality of the work and the competency of the private sector, and not on the lowest bid, to meet the objectives set forth in the project statement.

Penny Jackson<sup>22</sup>, from OECD, in a different perspective, considers VFM not as a tool or method, but a way of thinking about using resources well, and emphasizes:

*"Value for money (VFM) is about striking the best balance between the "three E's" – economy<sup>23</sup>, efficiency<sup>24</sup> and effectiveness<sup>25</sup>. In addition, A fourth "E" – equity<sup>26</sup> – is now also sometimes used to ensure that value-for-money analysis accounts for the importance of reaching diferente groups."*

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<sup>21</sup> HM Treasury, 2006, "Value for Money Assessment Guidance".

<sup>22</sup> Penny Jackson, 2012, "Value for money and international development: Deconstructing myths to promote a more constructive discussion", The OECD Development Assistance Committee.

<sup>23</sup> Economy: reducing the cost of resources used for an activity, with a regard for maintaining quality.

<sup>24</sup> Efficiency: increasing output for a given input, or minimising input for a given output, with a regard for maintaining quality.

<sup>25</sup> Effectiveness: successfully achieving the intended outcomes from an activity.

<sup>26</sup> ICAI (2011), Approach to effectiveness and value for money, Report No 1, ICAI.

Generally, a PPP may provide value for money compared to traditional public procurement models if the advantages of risk transfer combined with private sector incentives, experience and innovation – in improved service delivery or efficiencies over the project life-time – outweigh the increased costs of contracting and financing. So, especially for policy-makers, the main challenge refers to how to assess the value for money of different procurement and delivery options and how to use the results of this analysis in PPP decision-making (World Bank, 2013).

While the definitions provided above do not seem to define a simple approach to compute value for money, VFM can in fact be expressed as the difference between the total cost to society of providing the project by traditional public procurement and the total cost to society of providing the same project through PPP. Compared to other financial analyses, the main challenge for decision-makers to compute VFM is how to assess the cost to society of the different procurement and delivery options. Also critical is how to use the results in PPP decision-making.

The World Bank Institute clarifies that VFM is not the only parameter to consider before undertaking a PPP project:

*VFM analysis is only a part of a typical PPP project appraisal process. Other PPP appraisal criteria typically include the economic viability of the project, its commercial viability (that is, whether the project is likely to be able to provide adequate return to attract good-quality investors); and its affordability, or fiscal responsibility. (World Bank, 2013)*

## 3.2. ASSESSMENT COMPONENTS

There are several possible approaches to VFM analysis. Ultimately, choosing an approach depends on the level of maturity to estimate costs, the number of prior well-developed PPP projects, and also the knowledge about which is the most accurate methodology according to the singularities of each government.

VFM analysis usually involves financial comparison of the present cost of PPPs with that of traditional public procurement. But the financial point of view is not the only important framework to evaluate the best approach to implement a project, i.e., a couple of other conditions need to be checked in order to discern if the project achieves the value for money.

Therefore, there are usually two components to a VFM analysis:

- Qualitative Assessment: appraisal of key points that cannot be valued.
- Quantitative Assessment: comparison of estimated risk-adjusted costs.

### 3.2.1 Qualitative Assessment

VFM analysis involves more than spreadsheets, but sense-checking the rationale for using PPP. The purpose is to raise elements to understand if the project is of a type likely to be suitable for private financing, and whether the conditions are in place for a PPP to achieve value for money.

In general, qualitative assessment aims to identify factors that will influence the project in terms of (P3 Toolkit, 2012):

- 1) **Viability**: the ability of formulating a sound contract, which means, if the public sector identifies its objectives and desired outcomes and assesses its ability to

translate them into output specifications that will form the basis for a PPP contract agreement. It also includes if all the important topics are considered, such as regulatory, social equity, performance standards, incentives and efficiency.

- 2) **Performance:** the opportunity to encourage risk sharing and innovation, which means the assessment whether PPP will be a better option in aspects such as innovation or faster delivery of service.
- 3) **Achievability:** the capability delivering the project. Here, the main issues are related to competitiveness and attractiveness (sufficient numbers of private companies interested in the project), enough evidence to demonstrate that it is feasible to deliver the desired output, risk evaluation based on the market interest and also the agency's own limitations.

In many cases, qualitative factors may greatly influence decision-making, although it seems to be less empirical than financial analysis. Therefore, a special recommendation of (Penny Jackson, 2012) is that the results of the qualitative assessment may be weighted more heavily than the results of the quantitative assessment when: (1) the differences between the quantitative results for the conventional option and the PPP option are marginal, or (2) when there is a high level of uncertainty around input variables used in the quantitative assessment and the outputs are highly sensitive to those input variables.

### 3.2.2 Quantitative Assessment

Many public agencies around the world, especially in developed countries, have used quantitative assessment to improve their analysis. One important advantage is that it

includes all factors that can be valued and, as consequence, make it more attractive and relevant in a cost-benefit analysis perspective.

Essentially, quantitative assessment involves comparing the total cost of a proposed PPP (or actual bids received) with a “Public Sector Comparator” (PSC)<sup>27</sup>. Usually, the costs of PPP project and traditional public procurement are compared in order to evaluate which one generates the “best” value.

Most governments adjust the fiscal cost comparison for the government’s risk exposure in each case - that is, build into the “PSC” the cost of bearing those risks that would be transferred to the private partner under a PPP model (World Bank, 2013).

In a simple manner, two spreadsheets can be built:

- One to calculate all the risk-adjusted costs involved if a project were to be owned, financed and implemented by the public sector. This spreadsheet, also known as the Public-Sector Comparator (PSC), will be used as a baseline against which any PPP project will be compared.
- Another spreadsheet to calculate all the costs and revenues if the project were to be developed by the private sector, known as the Shadow Bid (SB).

There is an important aspect that must be considered in order to make the correct comparison: the scenario in both cases has to be similar. For example, the technical specifications of the “public” and “private” projects should be the same.

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<sup>27</sup> PSC: refers to a model of the project if implemented through traditional public procurement.

### 3.2.2.1 Public Sector Comparator (PSC)

The most common quantitative tool for value for money assessment<sup>28</sup> of a PPP project is derived from the approach originally used in the United Kingdom's PFI Program in the early 1990s, called "Public Sector Comparator (PSC)". It is a hypothetical scenario to reflect all the cash flows in the conventional approach to be used as a benchmark to compare with the PPP approach.

Calculating PSC is not an easy task; actually, it can be complex. According to The World Bank<sup>29</sup>, the starting point is typically the best estimate of the capital cost and lifetime operations and maintenance cost of implementing the project under public procurement. In order to provide a fair comparison, there are some adjustments to be done.

The U.S. Department of Transportation has developed a Guidebook<sup>30</sup> that recommends some useful tips to develop the PSC:

1. The PSC is calculated on a cash flow basis rather than an accrual basis. Therefore only cash flows are included, whereas costs that do not qualify as cash flows, such as depreciation, are not included in the PSC.

2. The PSC should reflect the financial consequences of a conventionally delivered project alternative as realistically as possible. This is accomplished by using cash flows reflecting the situation as if the PSC will be implemented. Realistic efficiency savings should be included. However, unfounded wishful thinking about cost savings has no place in the

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<sup>28</sup> James Leigland and Chris Shugart, 2006, "Is the public sector comparator right for developing countries - Appraising public-private projects in infrastructure". GridLines, PPIAF, Note no. 04, April 2006, accessed February 21, 2015.

<sup>29</sup> World Bank, 2014, "Public-Private Partnerships : Reference Guide, Version 2.0", accessed February 21, 2015

<sup>30</sup> P3 Toolkit, 2012 [2], "Guidebook for Value for Money Assessment", Innovative Program Delivery and U.S. Department of Transportation (Federal Highway Administration), accessed February 21, 2015.



cash flow analysis. In addition, it is important to note that the PSC is a reflection of the expected costs and not the available budget. Finally, estimates should reflect fully loaded cost estimates for internal costs, including so-called 'hidden costs' such as overhead and pensions.

3. For the PSC to provide an appropriate benchmark for the shadow bid or actual bids, it must contain a realistic and fair reflection of the value of all risks attached to delivering the project, according to the same scope and requirements that are applicable to the shadow bid. All risks should be categorized as to whether they are retained or transferable after they have been identified and valued.

An interesting methodology has been used by the U.S. Department of Transportation. The PSC estimates the overall cash flows of the conventional approach, both for costs and revenues including adjustments for the value of risks. FIGURE 3-1 shows the PSC cash flows beginning with the major building blocks and then adjusting the cash flow based on timing and escalating factors. It is divided into five components:

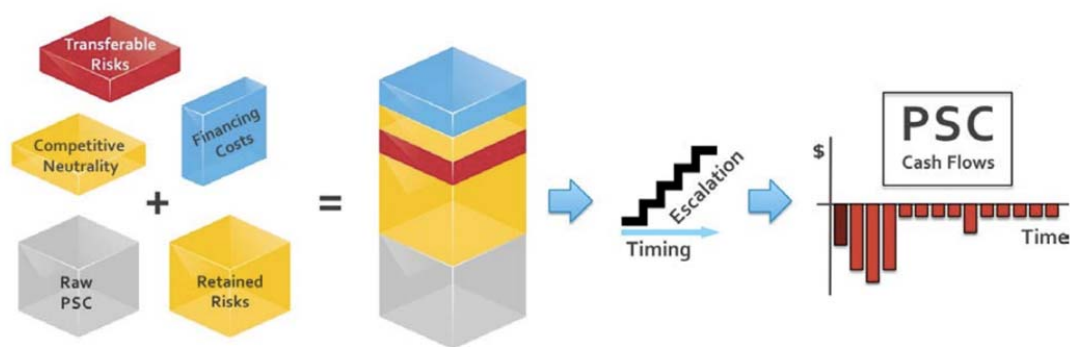


FIGURE 3-1: PSC CASH FLOW (P3 TOOLKIT, 2012 [2])

1) **Raw PSC:** includes all investment, operating and maintenance costs, and also

revenues within the project. The costs may be assigned in direct or indirect costs. It accounts for all life-cycle costs including public procurement costs, public oversight costs, and both capital and operating costs associated with building and maintaining the project and delivering the service over the same period specified in the PPP project. An important assumption is that the same level of specifications and standards used in PSC would be required in the PPP scenario.

- 2) **Competitive Neutrality:** some adjustments, identified by the public sector, must be done in order to remove all the advantages and disadvantages available to the basis of the different status as public and private sector entities. It means that the competitive neutrality adjustment allows comparability between both approaches. Usually, the main competitive neutrality inclusions fall into two categories: difference in state tax obligations or difference in state regulations costs. On the other hand, disadvantages of the public sector can include accountability costs, public scrutiny, and reporting requirements that would not be necessary under the PPP approach. Another adjustment that may be required refers to insurance costs paid by a private entity if the risk that is being insured against is not already accounted for under retained risks.
  
- 3) **Transferable Risks:** the identification and valuation of risks play a major role in PSC calculations. Although this task may be challenging, it is essentially important when the purpose is to achieve the optimal risk allocation by

determining which party would be best able to manage each risk. As a result, the risks are divided in two categories (transferable and retained risks). Transferable risks are those that are likely to be entirely (it may also be shared to a certain degree) transferred from the public to the private sector and may be measured by the price a private entity would request for accepting the risk.

- 4) **Retained Risks:** those risks or responsibilities retained by the government. Typically, they will be the same for the PPP and the PSC, but it is recommended to include all the risks and demonstrate them separately in the PSC in order to create a complete overview.

Just to give an example on how risks can be calculated, Partnerships Victoria [8] provides a simple way, as shown in equation below:

$$\text{Value of Risk} = (\text{consequence} * \text{probability of occurrence}) + \text{contingency factor}^{31}$$

EQUATION 1: VALUE OF RISK

- 5) **Financing Costs:** are the costs associated with financing a project. In the case of PPP, it is usually taken with debt and equity. On the other hand, for a conventional procurement, it is generally associated with bonds supported by project revenues, or supported by other specific or general public sector obligations. Two approaches may be used to consider the extension to which financing is taken:

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<sup>31</sup> Contingency factor should be included in the risk valuation to account for any unobservable costs that could lead to the undervaluation of identifiable and unobservable risks (Partnerships Victoria, 2001).

- a. Analysis based on operational cash flows, which includes arrangement fees and underwriting fees, but not the debt service.
- b. Analysis based on financing cash flows, which includes all financing cash flows, replacing the operational cash flows that are being financed.

Anyway, these costs are incorporated into the PSC and the PPP as cash flows separately from the types of life-cycle costs<sup>32</sup>.

Finally, when all the costs, revenues and risks are identified and calculated, it is time to design cash flows with all the inputs on a timeline, considering timing and escalation index.

When it comes to timing, some parameters must be defined such as the construction schedule, the timing of major maintenance, and the annual growth factor for toll revenues.

On the other hand, escalation means that for every cash flow one should determine whether escalation is expected, and if so, what the appropriate index should be.

#### *3.2.2.2. Shadow Bid (SB)*

The shadow bid is defined as the estimated cost to the public sector if the same project were to be delivered by the private sector as a PPP option. Actually, all the cost, revenue, and risk estimated may be gathered from the PSC to be used as data input to the Shadow Bid Model (SB).

In fact, the shadow bid could be considered as the public sector's estimate of the best bid price that it may receive if the project is structured as a PPP.

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<sup>32</sup> An overall cost estimate for the sum of all project elements (including costs of risks) anticipated throughout a project's life. It accounts capital expenditures, costs associated with operation and maintenance, and also project development (P3 Toolkit, 2012).

Some issues must be considered when translating the information from PSC to SB in order to ensure the comparability. For instance, the scope is one important aspect to be considered. It means that all the requirements, such as quality, efficiency, risks, toll revenues, financing and timing of delivering should be equal.

SB uses many of the same assumptions incorporated in the PSC model, but some values may change. For example, the private sector may manage the costs more efficiently than the public sector, which thereby allows reducing construction or operation and maintenance costs. TABLE 3 summarizes the differences between the PSC and SB:

Assumption Type	PSC vs Shadow Bid
<b>Construction, Operations, and Maintenance Costs</b>	The bundling of project delivery phases under a single contract may allow the private sector to more efficiently manage project costs.
<b>Financing Costs</b>	The Shadow Bid will likely assume higher financing costs to account for equity returns and higher interest rates demanded for non-recourse debt.
<b>Taxes</b>	The tax burden to the private partner may be different under the P3 procurement model, so corporate tax rates (and depreciation adjustments to income) will need to be considered for the Shadow Bid.
<b>Risk Adjustments</b>	The private sector may be more capable of managing certain transferrable risks than the public sector, so private delivery should lower the costs associated with those risks.
<b>Competitive Neutrality</b>	The costs of the PSC may be adjusted to neutralize the public sector advantages that are not equally available to private bidders, such as tax exemptions and the ability to self-insure risks.

TABLE 3: DIFFERENCES BETWEEN THE PSC AND THE SB (P3 TOOLKIT, 2012)

### 3.3. VALUE FOR MONEY ANALYSIS

In order to determine the value for money of any delivery method, the cash flows over time cannot simply be added together. It means that the amount of money in the

future does not equate the present value. So, a discount rate is used to calculate the present value in order to make a fair comparison.

The discount rate is applied according to the equation below:

$PV = \sum_{t=0}^T \frac{CF_t}{(1+r)^t}$	<p>Where:</p> <ol style="list-style-type: none"> <li>1) PV = Present Value</li> <li>2) t = time</li> <li>3) CF<sub>t</sub> = Cash Flow at a certain point in time (t)</li> <li>4) r = discount rate</li> </ol>
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EQUATION 2: PRESENT VALUE

If the present value of the PSC is greater than the present value calculated for SB, it means that the best choice for the public sector, disregarding the qualitative assessment, is to develop the project through PPP. So, the decision-making process can be viewed as shown in TABLE 4.

SCENARIO	BEST OPTION
<b>If PSC &gt; SB</b>	Private-Public Partnership (PPP)
<b>If SB &gt; PSC</b>	Traditional Public Procurement

TABLE 4: VFM AND THE BEST OPTION

Therefore, the Value for Money (VFM) is defined as:

$\mathbf{VFM = PSC - SB}$	<p>Where:</p> <ol style="list-style-type: none"> <li>1) PSC = present value of the public procurement option; and</li> <li>2) SB = present value of the PPP Bid Price.</li> </ol>
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EQUATION 3: VFM EQUATION

The SB, as well as for the PSC, can be developed and compared during the initial project financial assessment and feasibility study, prior to determining the procurement

method and issuing solicitation for qualification or bids.

A reasonable methodology to define the better timing for analyzing value for money has been used by U.S. Department of Transportation, as presented in the FIGURE 3-2.

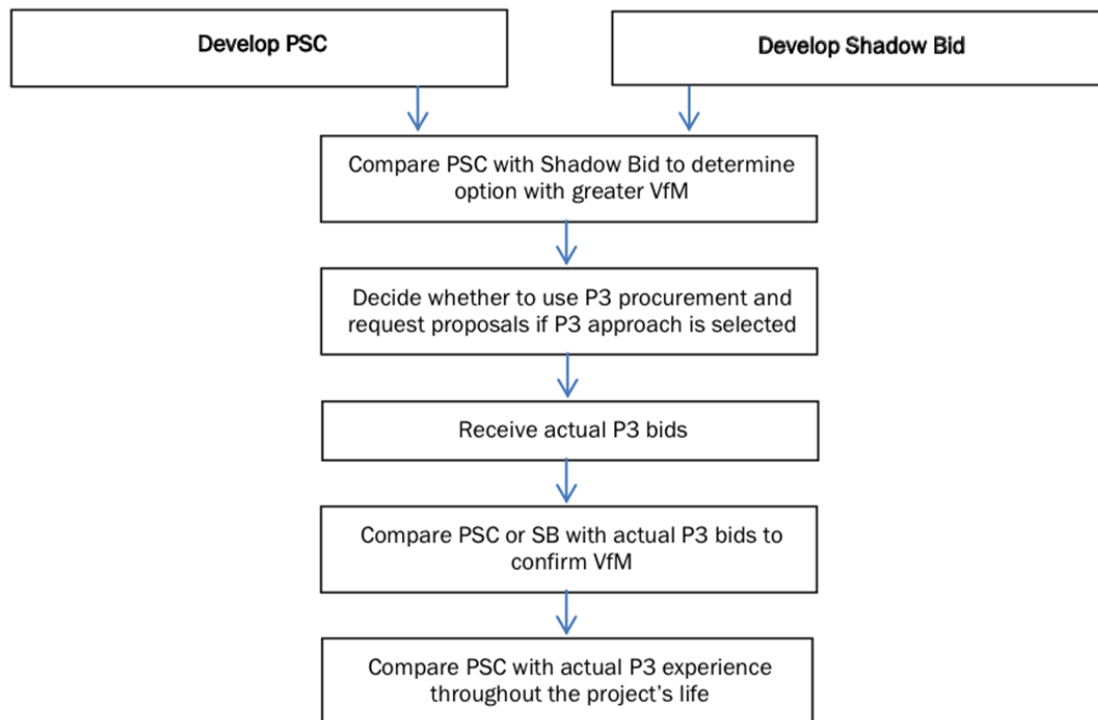


FIGURE 3-2: HOW A PSC AND P3 ALTERNATIVES ARE COMPARED AT DIFFERENT STAGES IN PROJECT DEVELOPMENT<sup>33</sup>

In this particular case, after the reception of the Bids in response to Request for Proposals (RFP), although already having made a prior analysis to decide which option generates the greatest VFM, it is recommended to compare PSC or SB with actual bids, in order to confirm VFM. Otherwise, the risk for awarding the contract as a PPP may lead to a wrong decision.

It is not unusual, according to international experiences, that, after the comparison

<sup>33</sup> P3 Toolkit, 2013, "Financial Structuring and Assessment for Public-Private Partnerships: A Primer", Innovative Program Delivery, accessed February 21, 2015.

between previous VFM analysis and the preferred bid, the savings represents a low percentage of overall cost (marginal savings). For this reason, qualitative factors often may feature an important role in final decision-making.



## 4. LEGAL FRAMEWORK IN BRAZIL AND RS

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Article 4 of PPP Law 11,079/2004<sup>34</sup> established some guidelines for entering into a PPP contract.

*Art. 4<sup>a</sup> Na contratação de parceria público-privada serão observadas as seguintes diretrizes:*

- I – **eficiência** no cumprimento das missões de Estado e no emprego dos recursos da sociedade;*
- II – respeito aos interesses e direitos dos destinatários dos serviços e dos entes privados incumbidos da sua execução;*
- III – indelegabilidade das funções de regulação, jurisdicional, do exercício do poder de polícia e de outras atividades exclusivas do Estado;*
- IV – **responsabilidade fiscal** na celebração e execução das parcerias;*
- V – transparência dos procedimentos e das decisões;*
- VI – **repartição objetiva de riscos** entre as partes;*
- VII – **sustentabilidade financeira e vantagens socioeconômicas** dos projetos de parceria.*

Moreover, the VFM analysis was consolidated in article 10, item I, subparagraph a, which establishes that PPP procurement authorization must be motivated on a previous technical study.

*Art. 10. A contratação de parceria público-privada será precedida de licitação na modalidade de concorrência, estando a abertura do processo licitatório condicionada a:*

- I – autorização da autoridade competente, fundamentada em estudo técnico que demonstre:*

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<sup>34</sup> Brasil, 2004. Lei 11,079/2004, accessed February 27, 2015. [http://www.planalto.gov.br/ccivil\\_03/\\_ato2004-2006/2004/lei/L11079compilado.htm](http://www.planalto.gov.br/ccivil_03/_ato2004-2006/2004/lei/L11079compilado.htm)

*a) a conveniência e a oportunidade da contratação, mediante identificação das razões que justifiquem a opção pela forma de parceria público-privada;*

Here, there are two key points: (a) technical study, which means a comparison between the likely costs for traditional and PPP procurements; and (b) this study must be presented previously to the bidding process – *ex ante* evaluation.

In RS, article 23, item II, of PPP State Law 12,234/05<sup>35</sup>, established the feasibility technical study as one of the basic conditions to include the PPP project in the PPP Program RS conceived in article 16 of the same Law.

*Art. 23 - São condições básicas para inclusão de projetos no PPP/RS:*

*II - estudo técnico de sua viabilidade, mediante demonstração das metas e resultados a serem atingidos e os respectivos prazos de execução, bem como os critérios objetivos de avaliação de desempenho a serem utilizados;*

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<sup>35</sup> Rio Grande do Sul, 2005. Lei 12.234/2005, accessed February 27, 2015. [http://www.al.rs.gov.br/legis/M010/M0100099.ASP?Hid\\_Tipo=TEXT0&Hid\\_TodasNormas=48330&hTexto=&Hid\\_IDNorma=48330](http://www.al.rs.gov.br/legis/M010/M0100099.ASP?Hid_Tipo=TEXT0&Hid_TodasNormas=48330&hTexto=&Hid_IDNorma=48330)

## 5. INTERNATIONAL EXPERIENCE

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In many countries, VFM analysis is critical for choosing whether to implement a project in PPP method. In United Kingdom, Australia and Canada, for instance, the VFM analysis must be conducted before a public agency can procure an infrastructure project as PPP. The comparison shows up that, although the United Kingdom experience had served as the primary reference in the beginning, each country has developed a methodology that better fits to its particularities.

In a study<sup>36</sup> published by OECD in 2011, it was pointed out that 19 of 20 surveyed countries apply some kind of VFM assessment to proposed PPPs. However, even in countries with well-established PPP programs, the approach to and use of this analysis is evolving, and is often the subject of controversy and debate. Latin American countries are trying to move towards a more systematic VFM analysis and PPP project selection approach but are facing challenges in developing and implementing appropriate Technologies.

TABLE 5 summarizes, in a very comprehensive way, considering the typical features of quantitative and qualitative assessment, the VFM methodology implemented around the world. The Partnership Victoria's<sup>37</sup> method was used as a reference to compare with other experiences.

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<sup>36</sup> Philippe Burger and Ian Hawkesworth (2011) *How to Attain Value for Money: Comparing PPP and Traditional Infrastructure Public Procurement*, OECD Journal on Budgeting Volume 2011/1.

<sup>37</sup> The state of Victoria is a pioneer in PPPs, creating one of the first subnational units—Partnerships Victoria—in 2000. Victoria is Australia's most urbanized state, with 70 percent of its population concentrated in the Greater Melbourne

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Metropolitan area. Partnerships Victoria was established in the Commercial Division of Victoria's Department of Treasury and Finance. It is the PPP unit and the name of the state of Victoria's PPP policy. The PPP unit is a full service agency,

QUANTITATIVE ASSESSMENT COMPONENTS							
AGENCY	TIME FRAME VFM ANALYSIS CONDUCTED	PUBLIC SECTOR COMPARATOR OR SIMILAR	ADDITIONAL COMPONENTS	RISK MANAGEMENT	DISCOUNT RATE	QUALITATIVE ASSESSMENT	HOW THE VFM IS USED IN JUSTIFYING PROJECT
<b>Partnership Victoria</b>	Development of PSC conducted prior to invitation to bid. However formal VFM test conducted after submission of bids to compare them against the PSC	Raw PSC + Competitive Neutrality + Risks (transferable and retained)		Risk identification and then valuation. Risks are valued as cash flow items.	Risk-free discount rate of 3% (in real terms) plus a risk premium that is dependent classification of the risks into very low, low, or high risk band	Identify material factors that have not been included in the PSC	PSC is used as the benchmark to evaluate bids. However, both qualitative and quantitative factors are considered in the final decision to award the contract.
<b>UK's HM Treasury</b>	VFM approached in three stages of procurement process: (1) during the annual budgeting round, (2) used to outline business case prior to invitations to bid, (3) used after bids submitted in selection process. Continuous assessment of VFM until contract/financial close.	Has prepared a spreadsheet for comparing the Conventional Procurement Option (PSC) to the PFI option.	The quantitative spreadsheet HM Treasury provides also has a flexibility factor to incorporate a probability factor for change of the scope or deal, etc	In United Kingdom, value of risks is factored into project costs and then risk-free discount rate is applied to cash flows. In spreadsheet, accounts for uncertainty through factor called "optimism bias," removes the need to risk adjust the conventional procurement option.	Risk-free discount rate of 3.5%.	Considers three factors: viability, desirability, and achievability of the project during three phases: program level assessment, project level assessment, and procurement level assessment.	PSC as benchmark is created and compared with PFIs. However, affordability calculations are conducted prior to VFM and must be met to proceed with procurement process. The decision to undertake PFI investment, once affordability has been confirmed, is taken on VFM (quantitative and qualitative)

							grounds alone
<b>Partnerships British Columbia (2005)</b>	PSC development begins prior to invitation to bid. Formal VFM test conducted after bids submitted. VFM is updated after winning bid selected but prior to financial close to account for the modifications in the agreement	A PSC is constructed.	Not available	Risks and consequences identified using simulation tools.	Discount rate used is based on the private sector WACC, which reflects the minimum rate of return investors would require in deciding to invest in a project. WACC = public cost of debt + project risk premium.	Nonquantifiable factors such as how the bid is able to achieve the goals and scope of the project	PSC costs and its baseline-required improvements are used as the benchmark to evaluate bids. Cost is not the only factor.
<b>Netherlands Ministry of Finance: Public Private Partnership and Asset Management</b>	PPC assessment is conducted in very early stages in order to determine which tender process (conventional or PPP is preferred for project). PSC drawn up after invitation to bid and is used in selection.	PSC is similar to base. It includes Crude PSC (same as Raw PSC) + risks + supplementary financial costs & incomes (similar to competitive neutrality.	Not available	PSC risk analysis phase consists determining the risks & categorize into transaction (during bidding process), realization (design & construction), and exploitation (operation). Afterwards risks are valued.	The discount rate applied to government projects is the same as the nominal interest on government bonds for a similar period as the duration of the project. For the PPP the market-related spread risk is incorporated into the discount rate as a surcharge to the risk-free interest rate.	After comparison of PSC and PPP, the PSC team deliberates over outcome. Specific considerations unspecified; varies by team and project.	A PPC conducted prior to invitation to bid. PPC qualitatively and quantitatively compares public and PPP procurement option. PSC created after PPC and used as a benchmark for choosing between bids.

<p style="text-align: center;"><b>South Africa National Treasury PPP Unit</b></p>	<p>VFM considered prior to invitation to bid. But formal VFM test (quantitative comparison) done after invitation to choose between submitted bids</p>	<p>Construct a base PSC costing includes all capital and operating costs risk-adjusted PSC model includes a costing for all the risks associated with the project</p>	<p>Also construct a PPP reference model which is a hypothetical private party bid to deliver the specified outputs and has a specific procedure for checking affordability</p>	<p>Same as base. The risk-adjusted PSC is just Base PSC+risk. They then check this risk-adjusted PSC for affordability by comparing with budget.</p>	<p>National treasury does not prescribe specific discount rate, but it is assumed to be the same as the risk adjusted cost of capital to government. Government bond yield has been used by some institutions.</p>	<p>Prepares needs analysis: evaluate how the project aligns with goals and budget of agency.</p>	<p>A risk-adjusted PSC and risk-adjusted PPP are compared and VFM determined. But benchmark value is affordability limit. Project must meet affordability to be viable.</p>
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TABLE 5: VFM ASSESSMENT BEST PRACTICES <sup>38</sup>

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<sup>38</sup> Dorothy Morillos, Adjo Amekudzi, Catherine Ross, and Michael Meyer, 2009. "Value for Money Analysis in U.S. Transportation Public-Private Partnerships", Transportation Research Record: Journal of the Transportation Research Board, No. 2115, Transportation Research Board of the National Academies, Washington, D.C., 2009, pp. 27-36.

## 6. FINANCIAL MODEL

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### 6.1. TOOLKIT FOR PPP

The World Bank, supported by the Public-Private Infrastructure Advisory Facility (PPIAF), developed a Toolkit for Public-Private Partnership in Roads and Highways (P3 Toolkit, 2013), which is intended to be a key reference guide for public decision-makers in developing countries, to promote private sector participation and financing through PPP procurement.

The Toolkit includes a financial model (in graphical and numerical format) that was originally developed for financial assessment of PPP toll road, but Mladenovic and Queiroz (Mladenovic G. And Queiroz C., 2014) improved the toolkit in order to assess the financial feasibility of Availability Payment (or Annuity) PPP Projects in any infrastructure subsector (e.g., roads, rails, airports, metrorails, water, sanitation).

Since then, many agencies have used this toolkit to assess value for money, comparing the annual payment that should be necessary to attract a private partner with the amount that would be invested by the public sector. In a simple way, if we assume that the initial traffic volume is expected to be 20,000 vehicles per day and the construction cost USD 4 million/km, the minimum toll rate to attract private investors would be USD 0.09/veh-km, following some basic assumptions.

In a very comprehensive and dynamic way, the Availability Payment financial model comprises five worksheets:



- 1) Data Sheet: summarizes the main characteristics (assumptions) of the PPP project.
- 2) Cash Flow Graph: represents all concession company cash flows during the concession period.
- 3) Debt Graph: represents, during the concession period, the annual payment of principal and interest during the debt servicing period, and also the two main bank ratios over the repayment period (ADSCR – Annual Debt Service Coverage Ratio; LLCR – Loan Life Coverage Ratio).
- 4) Dividend Graph: displays, during the concession period, the equity mobilized by company shareholders during the construction period and dividends received by them during the operation period; and also the two main investment ratios over the concession (Project IRR – the financial Internal Rate of Return of the project; and the Equity IRR).
- 5) Summary of Assumptions and Results: all the assumptions and results of the project financial assessment are listed and summarized.

Therefore, as the present toolkit is available and has already proved to be an important support for policy makers, this model was selected to analyse the upcoming metrorail project in the city of Porto Alegre.

## 6.2. ASSUMPTIONS

The financial model requires several data inputs to calculate the annual payment that a potential private partner would require to build, operate and maintain, at a specified

performance level, the intended project. The main assumptions may be referred into six categories:

- 1) Funding Structure: the total cost and the percentage for each type of source (equity, subsidies and loans) used in the project. In addition, the nominal interest rate, the period of time to pay off the debt (called as debt maturity), the period of time to start paying (grace period), and the type of capitalization.
- 2) Construction costs: how long will the project take to be fully built and the percentage of delivery each year. It also includes the total costs over the years of construction period.
- 3) Operation Costs: it refers to all annual operating and maintenance costs incurred during the operation period (from completion of the construction period until the end of the concession period).
- 4) Revenue: for the first and the following years, not including those collected by tickets or toll.
- 5) Economic: inflation and tax rates must be included to calculate the real rates of financial indicators.
- 6) Project: information about the distance and the traffic are also important to evaluate the toll/ticket that should be charged from the users to be attractive.

## 7. PORTO ALEGRE METRO

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### 7.1. OVERVIEW

Porto Alegre, capital of Rio Grande do Sul State, located in south region of Brazil, with 1.4 million of inhabitants<sup>39</sup> and an area of 496 km<sup>2</sup>, is provided by a public transportation that comprises tram system in interurban areas, urban buses, and also an upcoming BRT system.

During the last decade, even though the city has not been growing on population, the “Grande Porto Alegre” (metropolitan area), which covers 34 cities, has been suffering of conurbation effect<sup>40</sup>, a common problem of big cities.

Moreover, in June 2013, a student-led protest movement emerged to fight against the increasing of bus and subway fares. It was led by the Free Fare Movement (Movimento Passe Livre)<sup>41</sup> and emerged what became known as “Manifestações dos 20 centavos”.

The project of Metrorail in Porto Alegre,<sup>42</sup> that has been discussed for decades. Finally, a bidding process has begun as one of the biggest hopes to boost the public transportation in the metropolitan area. In addition, the project involves financial resources not only from federal and state, but also local governments. Furthermore, the

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<sup>39</sup> IBGE, 2010. Cidades. <http://cod.ibge.gov.br/232N9>

<sup>40</sup> The term ‘conurbation’ applies to urban settlements that have grown together to form a large built-up cluster of urban sprawl, a network of merged urban communities possibly dominating a region that has arisen due to population growth and spatial expansion. [13]. Here, the term is understood as an aggregation or continuous network of urban communities often using common supply services.

<sup>41</sup> Movimento Passe Livre, 2015. <http://www.mpl.org.br/>

<sup>42</sup> Prefeitura de Porto Alegre, 2013. “Propostas de Manifestação de Interesse – Metrô de Porto Alegre”, accessed March 27, 2015. [http://www2.portoalegre.rs.gov.br/portal\\_pmpa\\_novo/default.php?p\\_secao=95](http://www2.portoalegre.rs.gov.br/portal_pmpa_novo/default.php?p_secao=95)

recent history demonstrates that the population claims not only for high quality public goods and services, but also fair fares. Therefore, this study realized that it would be a good opportunity to analyze if it provides value for money.

The procurement is to expected to take 30 years. The first phase, which will take about five years, refers to construction, which is divided into two sub-phases. The other 25 years are dedicated for operation and maintenance.

Phase 1 comprises 11 metro stations, 10 underground and one at street level, all of which encompass 11.7 km of distance. Phase 2 consists of 10 metro stations in 10.5 km of distance. At this moment, since the information gathered comprehends only phase 1, the scope will be limited to this phase.

Therefore, this section intends to assess the value for money for this particular project. Assuming some information gathered from official and non-official sources, shadow bid (SB) is calculated using the Toolkit for PPP developed by the World Bank, as mentioned previously. For this point, the study elaborates a set of likely scenarios to output different results that will be compared with those delivered by the public sector comparator (PSC).

## 7.2. DATA INPUT

Based on official information gathered from EPTC (Empresa Pública de Transporte e Circulação - agency responsible for the project in municipality of Porto Alegre), and also on non-official information from the news, TABLE 6 illustrates all the assumptions to test the model:

<b>SOURCE OF FUNDS</b>	
<b>Concession Term</b>	30 years 5 years for project and construction; 25 years for operation and maintenance.
<b>Equity</b>	24% Actually, the exact percentage is 24.54% but it was rounded for easy purposes. This amount represents the amount invested by the Private Partner (R\$ 1.303). Amount converted to Dollar: USD 0.434 billion.
<b>Loans</b>	67% Actually, the exact percentage is 66.67%, but it was rounded for easy purposes. This amount represents R\$ 3.540 million (Federal Government: R\$ 1.770; State of Rio Grande do Sul: R\$ 1.080 billions; Municipality of Porto Alegre: R\$ 0.690 billion) Amount converted to Dollar: USD 1.180 billion.
<b>Subsidy</b>	9% Actually, the exact percentage is 8.80%, but it was rounded for easy purposes. It represents R\$ 0.466 billions of Reais. Amount converted to Dollar: USD 0.155 billion.
<b>Nominal Interest Rate</b>	8% (according to STN – National Treasury Secretary -, the desired nominal interest rate for PPP projects must range from 6.5% to 8.5%. Therefore, the public agency estimated as 8%)
<b>Debit Maturity</b>	20 years
<b>Grace Period</b>	5 years (2016 to 2021)
<b>Capitalization</b>	P+I
<b>Repayment of Loan</b>	Assumed to be 15 years
<b>CONSTRUCTION COSTS (VAT excuded, indexed on inflation)</b>	
<b>Duration of Construction (years)</b>	5 years (2016 to 2021)
Year 1	20%
Year 2	30%
Year 3	30%
Year 4	10%
Year 5	10%
<b>OPERATION COSTS (indexed on inflation)</b>	
<b>Amount in opening year</b>	Assumed to be 5% of construction cost
<b>REVENUE (ticket not included)</b>	
<b>First year revenue</b>	R\$ 0.327 billions of Reais fof revenues with fares Amount converted to Dollar: USD 0.109 billion.
<b>Revenue Growth</b>	5% each year
<b>ECONOMIC</b>	

<b>Inflation Rate</b>	5.5% per year
<b>Tax Rate</b>	0% - taking into account competitive neutrality (VAT and Corporate taxes)
<b>PROJECT</b>	
<b>Distance</b>	11.7 km (10.3km for delivery and 1.4km for maintenance)
<b>Traffic estimated</b>	325,000 users per day <sup>43</sup>
<b>Estimated Fare</b>	USD 0.94 (R\$ 2,80)
<b>Expropriation</b>	R\$ 0.195 billions of Reais – this amount was not included, because it should be paid anyway in the project, either traditional procurement or PPP.
<b>Depreciation</b>	Not included in the comparison due the fact both (SB and PSC) will incur in.

TABLE 6: DATA INPUT - METRORAIL PORTO ALEGRE

As the model's standard currency is dollar, all the values originally in Real (R\$) were converted to Dollar (USD) using an exchange rate of 1 USD to 3 R\$.

Generally, some key performance indicators include targets and constraints. Specifically, another key performance indicator, within the model, is the project financial internal rate of return. For this purpose, this study will assume a national reference to provide the main indicators for the project.

BNDES, which is Brazil's development bank, has been used by Brazilian government as the main vehicle for implementing its infrastructure policies. Therefore, in the sense that the indicators must fit the current rates for Brazilian spread costs, the following BNDES Project Finance's parameters were considered:

- Project Financial Internal Rate of Return<sup>44</sup>:  $FIRR \geq 8\%$ <sup>45</sup>.

<sup>43</sup> Prefeitura de Porto Alegre, 2013. "Propostas de Manifestação de Interesse – Metrô de Porto Alegre", accessed March 27, 2015. [http://www2.portoalegre.rs.gov.br/portal\\_pmpa\\_novo/default.php?p\\_secao=95](http://www2.portoalegre.rs.gov.br/portal_pmpa_novo/default.php?p_secao=95)

<sup>44</sup> Refers to the internal rate of return indicator resulting from a financial analysis of a PPP project, whereby all monetary values reflect market costs such as taxes.

<sup>45</sup> [http://www.bndes.gov.br/SiteBNDES/bndes/bndes\\_pt/Institucional/Apoio\\_Financeiro/Produtos/Project\\_Finance/](http://www.bndes.gov.br/SiteBNDES/bndes/bndes_pt/Institucional/Apoio_Financeiro/Produtos/Project_Finance/)

- Equity Internal Rate of Return (or Return on Equity)<sup>46</sup>:  $ROE \geq 8.5\%$ <sup>47</sup>.
- Annual Debt Service Cover Ratio<sup>48</sup>:  $ADSCR \geq 1.3$ .

### 7.3. SHADOW BID

In order to simulate the SB, all the assumptions can be summarized as follows in

TABLE 7.

ASSUMPTIONS – SHADOW BID	
Concession Term	30 years
Construction Cost	125 million dollars/km
Operation Cost	6.2 million dollars (5% of construction cost)
Investment/Subsidies	0% (competitive neutrality)
Equity	30%
Loans	70%
Debt Maturity	20 years
Interest Rate	8%
Grace Period	5 years
Inflation Rate	5.5% per year
Corporate Rate	0% (competitive neutrality)
VAT Rate	0% (competitive neutrality)

TABLE 7: ASSUMPTIONS - SB MODEL

<sup>46</sup> ROE refers to the indicator resulting from the investor's cash flow, whereby all monetary values reflect market costs including project costs, taxes, subsidies, etc.

<sup>47</sup> [http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes\\_en/Galerias/Download/AF\\_DEPCO\\_english.pdf](http://www.bndes.gov.br/SiteBNDES/export/sites/default/bndes_en/Galerias/Download/AF_DEPCO_english.pdf)

<sup>48</sup> Means the ratio of cash flow to debt service obligations and calculated for each year of operation. This shows whether the net income of the project can support or cover, with a margin of comfort, the annual debt service obligations. Usually, the DSCR for each year of operation should be a minimum of 1.2 and often as much as 1.4, i.e. the minimum cash flow amount should be 1.2 or 1.4 times the amount of the debt service. If the DSCR is less than one, it means that the project will have to dip into reserves or other financial resources to cover debt payments and there is no surplus to provide a return to equity holders.

The next step is to figure out, using the financial model developed by Mladenovic and Queiroz, the Minimum Annual Payment (MAP) to attract investors in order to undertake the project.

A set of scenarios was tested in the model to provide different outputs to compare all the choices and find out those options for which value for money is positive, i.e.,  $PSC > SB$ .

While the indicator ADSCR is maintained in at least 1.3, FIRR and ROE are adjusted to calculate the Minimum Annual Payment<sup>49</sup> for the expectations desired.

### **Scenario 1**

Minimum required for the critical indicators for the project are assumed to be: FIRR=8%; ROE=8.5%; ADSCR=1.3.

In this case, the model shows that the Minimum Annual Payment for investors would be USD 20.4 million per year (in the first year of operation; payments in subsequent years would be adjusted according to inflation). Using the Cash Flow Graph (FIGURE 7-1), it is possible to obtain the Minimum Annual Payment by trial and error, by varying the MAP ("Initial Revenue" in the model) so that the financial indicators calculated by the model are equal to or greater than the required value for the three indicators considered critical for the project.

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<sup>49</sup> MAP refers to the minimum annual payment by the public sector to the concessionaire.





FIGURE 7-1: CASH FLOW GRAPHICAL MODEL INTERFACE

**Additional Scenarios:** Adjustments to FIRR and ROE were performed to evaluate the new Minimum Annual Payments required, which comprised a set of combinations shown in TABLE 8. ADSCR was maintained in at least 1.3.

		Return on Equity (ROE)				
		8.5%	10%	15%	20%	25%
Project Financial Internal Rate of Return (FIRR)	8%	20.4	20.4	20.4	27.1	32.2
	9%	22.0	22.0	22.0	27.1	32.2
	10%	23.7	23.7	23.7	27.1	32.2
	12%	27.3	27.3	27.3	27.3	32.2
	14%	31.4	31.4	31.4	31.4	32.2
	16%	36.0	36.0	36.0	36.0	36.0

TABLE 8: MINIMUM INITIAL ANNUAL REVENUE (USD MILLION) REQUIRED BY THE BIDDER

## 7.4. PUBLIC SECTOR COMPARATOR

Carrying out a PSC is one of the challenges for a PPP Project. Usually, public agencies do not have the appropriate knowledge or expertise to scrutinize all the costs involved in such huge projects. It is not uncommon to hire an external consulting firm for helping the government on the feasibility study, mainly because it demands multiple skills.

In this section, it is not desirable to identify and measure, in a precise way, each cost involved in the process. Actually, the main purpose is to make some assumptions, as have already been done in the last sections, to undertake a detailed quantitative comparison between the SB and the PSC.

The related literature approaches the overall costs to construct similar Metrorail Projects. TABLE 9 shows the estimated cost for similar PPP Metrorail Projects.

PROJECT	DISTANCE (km)	PASSENGERS/DAY (thousands)	TOTAL COST (billion)	UNIT COST/KM (billion)
SÃO PAULO METRO LINE 4 – PHASE 1 <sup>50</sup> - construction began in 2004 - first phase opened in 2010 - completion expected in 2015	12.8	704	USD 1.86 R\$ 5.6	USD 0.145 R\$ 0.437
SALVADOR METRO	7.3	21	USD 1.3 R\$ 3.9	USD 0.178 R\$ 0.534
VANCOUVER EVERGREEN LINE - construction began in 2013 - completion expected in 2016 - only 18% (2 km) of the system, is underground.	11	N/A	USD 1.43 <sup>51</sup>	USD 0.103

<sup>50</sup> <http://www.metro.sp.gov.br/metro/institucional/pdf/rel-administracao.pdf>

Sao Paulo Metro Line 4 was elected one of the Top 40 PPPs in Emerging Markets (<http://www.ppiaf.org/sites/ppiaf.org/files/publication/emerging-partnerships.pdf>)

<sup>51</sup> [http://www.th.gov.bc.ca/evergreen\\_line/faq.htm](http://www.th.gov.bc.ca/evergreen_line/faq.htm)

THESSALONIKI METROPOLITAN RAILWAY (GREECE) - construction began in 2006 - completion expected in 2018 - fully underground	9.6	N/A	USD 0.998	USD 0.104
SOFIA METRO LINE 2 (BULGARIA) - construction began in 2008 - completion in 2012 - fully underground	17	N/A	USD 2.516	USD 0.148

TABLE 9: SIMILAR PPP METRORAIL PROJECTS

The information above indicates a range of USD 103 million/km to USD 178 million/km. Based on informal discussions with experts, it was decided to use a capital cost of \$ 125 million/km in this study.

Traditionally, when it comes to public procurement, even though the bidding process is usually based on Bill of Quantities (BoQ)<sup>52</sup> methodology, which requires a formal document that specifies the quantity and unit prices for the works, it has often been observed that variations<sup>53</sup> occur in projects using traditional procurement. Such variations are usually agreed between closed doors between the government and the contractor, during the project implementation.

In the last years, to host the World Cup 2014, Brazil made a heavy investment on infrastructure, such as airports, stadiums, arenas, general transportation, safety and telecommunications. Just to give an example, 12 new state-of-the-art stadiums have been built and all of them had their prices increased by at least 75% over the original estimates.

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<sup>52</sup> A Bill of Quantities is a document that describes and quantifies, in accordance with a standard method of measurement (amended where necessary to suit public works contracts), the work to be undertaken in the carrying out of a particular project. The Bill of Quantities provides work descriptions and quantities to tenderers to enable them to submit a lump-sum fixed-price tender.

<sup>53</sup> Variation is an alteration to the scope of Works in construction contract in form of an addition, substitution or omission from the original scope of works

Therefore, supposing that it is reasonable to expect an increasing in costs for public procurement, this study considers a range of estimated capital costs, as shown in TABLE 10. The first line (no increase) means that the overall cost is no-risk adjusted (other risks are not included). All the others, due to the fact that the overall cost may increase during implementation, they are risk-adjusted in a range of 20% to 100%.

<b>INCREASE (COST OVERRUN)</b>	<b>CAPITAL COST (USD MILLION/KM)</b>	<b>RISK</b>
0%	125	No-risk adjusted
20%	150	Risk-adjusted
40%	175	Risk-adjusted
60%	200	Risk-adjusted
80%	225	Risk-adjusted
100%	250	Risk-adjusted

TABLE 10: CAPITAL COST FOR DIFFERENT RISK ADJUSTMENTS (COST OVERRUNS)

## 7.5. VALUE FOR MONEY ASSESSMENT

### 7.5.1. Discount Rate

The key determining factor in deciding whether to develop any specific project as PPP is value for money, whether in general or in comparison to public procurement. So, if the project does not offer VFM, it should not be undertaken on a PPP basis, considering only the quantitative assessment perspective.

One of the most important decisions in a VFM assessment is the selection of the discount rate. It is a percentage by which a cash flow element in the future (i.e. project costs and revenues) is reduced for each year that cash flow is expected to occur. There are

different forms to estimate the discount rate to be used in a economic-financial analysis. The basic conception behind it is the opportunity cost of capital.

A discounted cash flow (DCF) analysis allows the public agency to discern the Present Value (PV) for revenues and costs that are not expected to occur until far into the future. In this manner, with discounted cash flow, the public agency can create a single overall cost estimate for each scenario even though their financial profiles are very different.

The discount cash flow (EQUATION 4) can be calculated as the nominal (i.e., inflation-adjusted) cash flow amount (C) divided by the discount rate (R) plus one (1) raised to the power of the number of years (n) into the future. In mathematical terms:

$$DCF = \frac{C}{(1 + r)^N}$$

EQUATION 4: DISCOUNTED CASH FLOW

Therefore, considering the values N equals to 30 years and r equals to 10% (a value often used in Brazil), the PSC and the SB can now be calculated for each scenario presented in the previous sections.

### 7.5.2. PSC Calculation

In the PSC calculations, the capital costs presented in TABLE 11 were used to discern the Present Value (PV) for every scenario (from “no increase” to “increase of 100%”). Besides, the construction period is 5 years, the total distance is 11.7 km and the project evolves as: Year 1 = 20%; Year 2 = 30%; Year 3 = 30%; Year 4 = 10%; Year 5 = 10%). As result, **Error! Reference source not found.** was developed.

		Cost per km (USD Million)													
		Year	%	125		150		175		200		225		250	
				NV <sup>54</sup>	PV <sup>55</sup>	NV	PV	NV	PV	NV	PV	NV	PV	NV	PV
Construction	1	20%	26.38	23.98	31.65	28.77	36.93	33.57	42.2	38.36	47.48	43.16	52.75	47.95	
	2	30%	41.74	34.49	50.09	41.39	58.43	48.29	66.78	55.19	75.13	62.09	83.48	68.99	
	3	30%	44.03	33.08	52.84	39.7	61.65	46.32	70.45	52.93	79.26	59.55	88.07	66.17	
	4	10%	15.49	10.58	18.58	12.69	21.68	14.81	24.78	16.92	27.87	19.04	30.97	21.15	
	5	10%	16.34	10.14	19.6	12.17	22.87	14.2	26.14	16.23	29.41	18.26	32.67	20.29	
Operation	6		8.62	4.86	10.34	5.84	12.06	6.81	13.79	7.78	15.51	8.76	17.24	9.73	
	7		9.09	4.67	10.91	5.60	12.73	6.53	14.55	7.46	16.37	8.40	18.18	9.33	
	8		9.59	4.47	11.51	5.37	13.43	6.26	15.35	7.16	17.27	8.05	19.18	8.95	
	9		10.12	4.29	12.14	5.15	14.17	6.01	16.19	6.87	18.21	7.72	20.24	8.58	
	10		10.68	4.12	12.81	4.94	14.95	5.76	17.08	6.59	19.22	7.41	21.35	8.23	
	11		11.26	3.95	13.52	4.74	15.77	5.53	18.02	6.32	20.27	7.11	22.53	7.90	
	12		11.88	3.79	14.26	4.54	16.64	5.30	19.01	6.06	21.39	6.82	23.77	7.57	
	13		12.54	3.63	15.04	4.36	17.55	5.08	20.06	5.81	22.56	6.54	25.07	7.26	
	14		13.23	3.48	15.87	4.18	18.52	4.88	21.16	5.57	23.81	6.27	26.45	6.97	
	15		13.95	3.34	16.74	4.01	19.53	4.68	22.32	5.34	25.12	6.01	27.91	6.68	
	16		14.72	3.20	17.66	3.84	20.61	4.49	23.55	5.13	26.50	5.77	29.44	6.41	
	17		15.53	3.07	18.64	3.69	21.74	4.30	24.85	4.92	27.95	5.53	31.06	6.15	
	18		16.38	2.95	19.66	3.54	22.94	4.13	26.21	4.71	29.49	5.30	32.77	5.89	
	19		17.29	2.83	20.74	3.39	24.20	3.96	27.66	4.52	31.11	5.09	34.57	5.65	
	20		18.24	2.71	21.88	3.25	25.53	3.79	29.18	4.34	32.82	4.88	36.47	5.42	
	21		19.24	2.60	23.09	3.12	26.93	3.64	30.78	4.16	34.63	4.68	38.48	5.20	
	22		20.30	2.49	24.36	2.99	28.42	3.49	32.48	3.99	36.53	4.49	40.59	4.99	
	23		21.41	2.39	25.70	2.87	29.98	3.35	34.26	3.83	38.54	4.30	42.83	4.78	
	24		22.59	2.29	27.11	2.75	31.63	3.21	36.15	3.67	40.66	4.13	45.18	4.59	
	25		23.83	2.20	28.60	2.64	33.37	3.08	38.13	3.52	42.90	3.96	47.67	4.40	
	26		25.14	2.11	30.17	2.53	35.20	2.95	40.23	3.38	45.26	3.80	50.29	4.22	
	27		26.53	2.02	31.83	2.43	37.14	2.83	42.44	3.24	47.75	3.64	53.06	4.05	
	28		27.99	1.94	33.58	2.33	39.18	2.72	44.78	3.11	50.38	3.49	55.97	3.88	
	29		29.53	1.86	35.43	2.23	41.34	2.61	47.24	2.98	53.15	3.35	59.05	3.72	
	30		31.15	1.79	37.38	2.14	43.61	2.50	49.84	2.86	56.07	3.21	62.30	3.57	
			584.79	189.33	701.75	227.20	818.71	265.07	935.67	302.93	1,052.62	340.80	1,169.58	378.67	

TABLE 11: PSC CALCULATION - NOMINAL AND PRESENT VALUES

<sup>54</sup> NV = Nominal Value

<sup>55</sup> PV = Present Value



However, in order to narrow down the calculation for the Present Value, TABLE 12 presents only few combinations:

Year	IRR=8% ROE=8.5%		IRR=9% ROE=10%		IRR=10% ROE=15%		IRR=12% ROE=15%		IRR=14% ROE=20%		IRR=16% ROE=25%	
	NV	PV	NV	PV	NV	PV	NV	PV	NV	PV	NV	PV
1	0		0		0		0		0		0	
2	0		0		0		0		0		0	
3	0		0		0		0		0		0	
4	0		0		0		0		0		0	
5	0		0		0		0		0		0	
6	20.4	11.5	22.0	12.4	23.7	13.4	27.3	15.4	31.4	17.7	36.0	20.3
7	21.5	11.0	23.2	11.9	25.0	12.8	28.8	14.8	33.1	17.0	38.0	19.5
8	22.7	10.6	24.5	11.4	26.4	12.3	30.4	14.2	34.9	16.3	40.1	18.7
9	24.0	10.2	25.8	11.0	27.8	11.8	32.1	13.6	36.9	15.6	42.3	17.9
10	25.3	9.7	27.3	10.5	29.4	11.3	33.8	13.0	38.9	15.0	44.6	17.2
11	26.7	9.3	28.8	10.1	31.0	10.9	35.7	12.5	41.0	14.4	47.1	16.5
12	28.1	9.0	30.3	9.7	32.7	10.4	37.6	12.0	43.3	13.8	49.6	15.8
13	29.7	8.6	32.0	9.3	34.5	10.0	39.7	11.5	45.7	13.2	52.4	15.2
14	31.3	8.2	33.8	8.9	36.4	9.6	41.9	11.0	48.2	12.7	55.2	14.5
15	33.0	7.9	35.6	8.5	38.4	9.2	44.2	10.6	50.8	12.2	58.3	14.0
16	34.8	7.6	37.6	8.2	40.5	8.8	46.6	10.1	53.6	11.7	61.5	13.4
17	36.8	7.3	39.6	7.8	42.7	8.4	49.2	9.7	56.6	11.2	64.9	12.8
18	38.8	7.0	41.8	7.5	45.1	8.1	51.9	9.3	59.7	10.7	68.4	12.3
19	40.9	6.7	44.1	7.2	47.5	7.8	54.8	9.0	63.0	10.3	72.2	11.8
20	43.2	6.4	46.6	6.9	50.2	7.5	57.8	8.6	66.4	9.9	76.2	11.3
21	45.5	6.2	49.1	6.6	52.9	7.1	60.9	8.2	70.1	9.5	80.4	10.9
22	48.0	5.9	51.8	6.4	55.8	6.9	64.3	7.9	74.0	9.1	84.8	10.4
23	50.7	5.7	54.7	6.1	58.9	6.6	67.8	7.6	78.0	8.7	89.5	10.0
24	53.5	5.4	57.7	5.9	62.1	6.3	71.6	7.3	82.3	8.4	94.4	9.6
25	56.4	5.2	60.8	5.6	65.5	6.0	75.5	7.0	86.8	8.0	99.6	9.2
26	59.5	5.0	64.2	5.4	69.2	5.8	79.7	6.7	91.6	7.7	105.0	8.8
27	62.8	4.8	67.7	5.2	73.0	5.6	84.0	6.4	96.7	7.4	110.8	8.5
28	66.2	4.6	71.4	5.0	77.0	5.3	88.7	6.1	102.0	7.1	116.9	8.1
29	69.9	4.4	75.4	4.8	81.2	5.1	93.5	5.9	107.6	6.8	123.3	7.8
30	73.7	4.2	79.5	4.6	85.7	4.9	98.7	5.7	113.5	6.5	130.1	7.5
<b>Total</b>	<b>1043.51</b>	<b>182.41</b>	<b>1125.36</b>	<b>196.72</b>	<b>1212.32</b>	<b>211.92</b>	<b>1396.47</b>	<b>244.11</b>	<b>1606.19</b>	<b>280.77</b>	<b>1841.49</b>	<b>321.91</b>

TABLE 12: SB CALCULATION – NOMINAL AND PRESENT VALUES



The complete Present Value for every combination is shown in TABLE 13.

		<b>Return on Equity (ROE)</b>				
		<b>8.5%</b>	<b>10%</b>	<b>15%</b>	<b>20%</b>	<b>25%</b>
<b>Project Financial Internal Rate of Return (FIRR)</b>	<b>8%</b>	182.41	182.41	182.41	242.32	287.93
	<b>9%</b>	196.72	196.72	196.72	242.32	287.93
	<b>10%</b>	211.92	211.92	211.92	242.32	287.93
	<b>12%</b>	244.11	244.11	244.11	244.11	287.93
	<b>14%</b>	280.77	280.77	280.77	280.77	287.93
	<b>16%</b>	321.91	321.91	321.91	321.91	321.91

TABLE 13: SB PRESENT VALUE (USD MILLION)

#### 7.5.4. VFM Analysis

Since the PSC and the SB are calculated, it is easy to decide the best option to the society. According to the EQUATION 3, where the VFM is analyzed comparing the Present Value in both cases, the option that results in the lowest cost should be chosen.

Therefore, the TABLE 14 shows the comparison between PSC (considering all the cases – from “no increase” to “an increase of 100%”) and SB (considering the variation on ROE and FIRR, maintaing constant ADSCR).

SHADOW BID (SB) USD Million/km			PUBLIC SECTOR COMPARATOR (PSC) - USD Million/km											
FIRR	ROE	PV	125	DECISION	150	DECISION	175	DECISION	200	DECISION	225	DECISION	250	DECISION
8%	8.5%	182.41	189.33	SB	227.20	SB	265.07	SB	302.93	SB	340.80	SB	378.67	SB
8%	10%	182.41		SB		SB		SB		SB		SB		
8%	15%	182.41		SB		SB		SB		SB		SB		
8%	20%	242.32		PSC		PSC		PSC		PSC		PSC		
8%	25%	287.93		PSC		PSC		PSC		PSC		PSC		
9%	8.5%	196.72	189.33	PSC	227.20	SB	265.07	SB	302.93	SB	340.80	SB	378.67	SB
9%	10%	196.72		PSC		SB		SB		SB		SB		
9%	15%	196.72		PSC		SB		SB		SB		SB		
9%	20%	242.32		PSC		PSC		PSC		PSC		PSC		
9%	25%	287.93		PSC		PSC		PSC		PSC		PSC		
10%	8.5%	211.92	189.33	PSC	227.20	SB	265.07	SB	302.93	SB	340.80	SB	378.67	SB
10%	10%	211.92		PSC		SB		SB		SB		SB		
10%	15%	211.92		PSC		SB		SB		SB		SB		
10%	20%	242.32		PSC		PSC		PSC		PSC		PSC		
10%	25%	287.93		PSC		PSC		PSC		PSC		PSC		
12%	8.5%	244.11	189.33	PSC	227.20	PSC	265.07	SB	302.93	SB	340.80	SB	378.67	SB
12%	10%	244.11		PSC		PSC		SB		SB		SB		
12%	15%	244.11		PSC		PSC		SB		SB		SB		
12%	20%	244.11		PSC		PSC		PSC		PSC		PSC		
12%	25%	287.93		PSC		PSC		PSC		PSC		PSC		
14%	8.5%	280.77	189.33	PSC	227.20	PSC	265.07	PSC	302.93	SB	340.80	SB	378.67	SB
14%	10%	280.77		PSC		PSC		PSC		PSC		PSC		
14%	15%	280.77		PSC		PSC		PSC		PSC		PSC		
14%	20%	280.77		PSC		PSC		PSC		PSC		PSC		
14%	25%	287.93		PSC		PSC		PSC		PSC		PSC		
16%	8.5%	321.91	189.33	PSC	227.20	PSC	265.07	PSC	302.93	PSC	340.80	SB	378.67	SB
16%	10%	321.91		PSC		PSC		PSC		PSC		PSC		
16%	15%	321.91		PSC		PSC		PSC		PSC		PSC		
16%	20%	321.91		PSC		PSC		PSC		PSC		PSC		
16%	25%	321.91		PSC		PSC		PSC		PSC		PSC		

TABLE 14: VFM DECISION MAP: HIGHLIGHTED CELLS INDICATE PPP PREFERENCE

The VFM analysis shows that the higher the capital cost overrun for the traditional procurement, the more the PPP becomes the best option. Even in the scenario where there is no increase (USD 125 million/km), the Shadow Bid is lower for some cases. On the opposite side, where the increase in the capital cost for the traditional procurement is by 100% (USD 250 million/km), the Shadow Bid is lower in all the cases.

Therefore, considering all the options presented in TABLE 14, it is possible to summarize the chances for the each option to be the best, as shown in

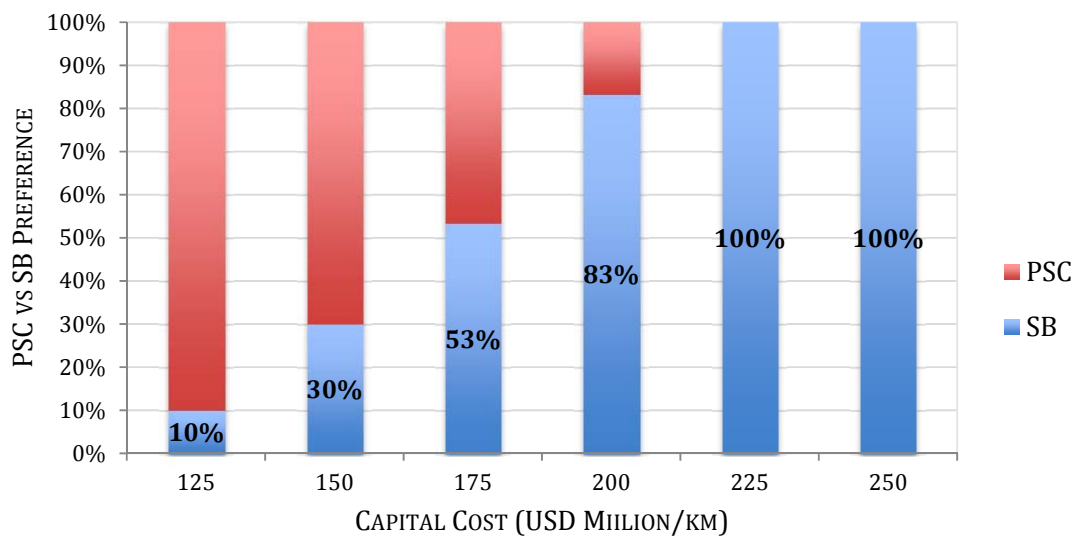


FIGURE 7-3.

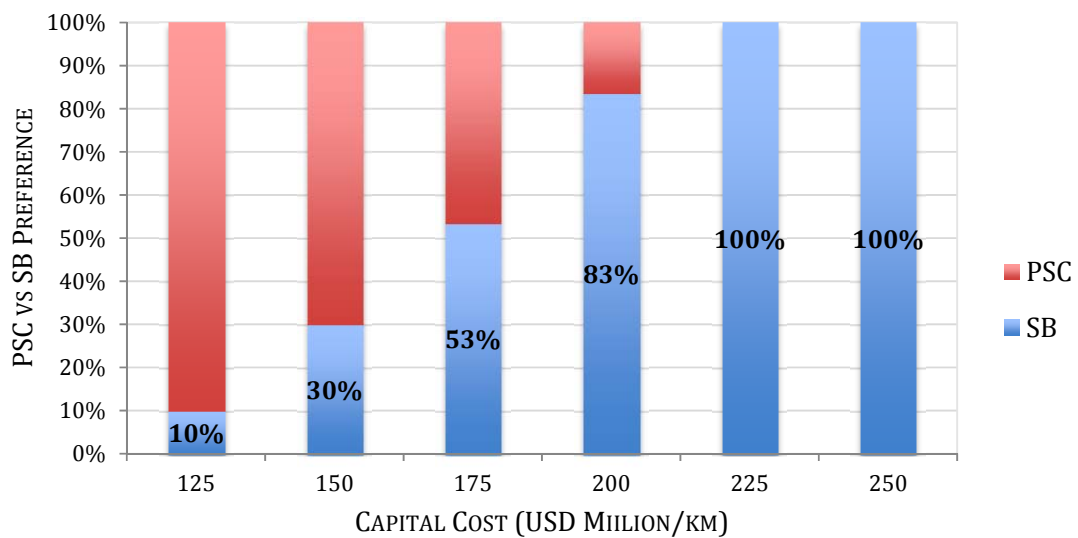


FIGURE 7-3: THE BEST OPTION VS INCREASE OF CAPITAL COST

Particularly to the case studied (it may not apply generically), the results indicate that the PPP is the best option when the capital cost is increased (cost overrun) by at least 40%. Actually, Even without any cost overrun (USD 125 Million/km), there is a 10% chance that the PPP option would be preferred, what really means to be pretty representative. Finally, this numbers shown do not demonstrate what naturally is provided by the private entities in the PPP option: efficiency, speedy and higher quality.

## 8. CONCLUSIONS AND RECOMMENDATIONS

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The recent global economic and financial crisis (2008/09) has generated challenges at all levels of economic policy decisions. As Governments in advanced countries and emerging markets have faced an urgent need to act concurrently on different fronts: systemically or politically sensitive economic sectors had to be bailed out; the general downfall in economic activity had to be counteracted; vulnerable population groups had to be protected from declining incomes. These costly actions were taken in a context of falling government revenues and shrinking domestic and foreign financing, with medium to long-term consequences for budgets and debt (Burger et al, 2009).

As a result, a growing number of developing country governments, including Brazil, have become interested in new ways to finance projects, build infrastructure and deliver services. In this way, Public-Private Partnerships have been considered an interesting option to pursue value for money, as seen in chapter 2, not only because it is a good way to overcome budget constraints and low public savings, but it also provides better quality, efficiency and speed to implement the project.

But, is PPP always the best option? For this question, this paper studied how Value for Money Analysis can assist public agencies to answer this simple, but difficult, question. Any project, whether it is a PPP or a traditionally procured project, should be undertaken only if it creates value for money. In order to clarify the issue and address some important aspects when evaluating the best option, chapter 3 points out the importance for assessing the project considering both qualitative and quantitative perspectives.

The use of a proven methodology to assess value for money was presented in chapter 6. The PPP toolkit developed by the World Bank Institute was used to make the quantitative assessment, which involves comparing the total cost of a proposed PPP or actual bids received (Shadow Bid) with a Public Sector Comparator (PSC).

In chapter 7 the Porto Alegre Metro (project that involves investments from federal, state and local levels) was selected to perform an analysis using different scenarios to create the “decision map”. It indicates which would provide the “best value for money” to the society. Porto Alegre Metro was considered because it can become the first PPP project in Rio Grande do Sul State.

Finally, some highlights from the World Bank Global Round Table (World Bank, 2013), there is much to be gained in strengthening VFM analysis going forward. Some interesting lessons from the debate included:

- 1) Governments need to strike the right balance between qualitative and quantitative approaches — particularly in new PPP programs, where there is very limited data available to inform assumptions for quantitative analysis; and in some cases a lack of capacity to implement complex risk analysis;

- 2) Governments should be realistic about the nature of quantitative VFM analysis. It means that VFM can assist as an important tool rather than be considered a “scientific proof” for the decision process;

- 3) VFM analysis is important in part because it requires thorough and systematic risk analysis;

4) Better data is needed on PPP and major infrastructure investment project outturns. So, VFM analysis could be improved by more systematic collection of data on actual PPP project outturns and;

5) VFM analysis should be integrated with overall public investment planning.

In the case of the State of Rio Grande do Sul, which currently faces strong fiscal constraints, in order to allow investments in infrastructure, PPP can be the turning point. In this way, the Secretariat of Finance, which gathers a multi-disciplinary and high skilled team of public servants, could play a leading role. Therefore, the State Internal Control Agency (CAGE) and also the State Treasury bring together the main competences to assist the government and the decision makers.

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