

The challenge of monitoring PPP projects: Proposal of a conceptual 5-dimension KPI's model

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Abstract

Public-private partnerships (PPPs) have been used worldwide in infrastructure and public service provision as an alternative procurement model to traditional public work contracts. There are several benefits arising from the use of PPPs such as greater efficiency and value for money, but there is a pitfall that has significantly affected its performance: the lack of adequate monitoring by public authorities. This led to excessive renegotiations and problems of information asymmetry. Contract management remains as one of the main challenges in the PPP domain, if not the most relevant. This paper intends to minimize this gap, proposing a framework for key performance indicators (KPIs) categories that should be integrated with these contracts, enabling the grantor to effectively monitor the performance of the projects thus reducing information asymmetry problems. The KPIs category model proposed in this article congregates five groups of KPIs: operational indicators, financial indicators, relational indicators, environmental indicators, and social indicators.

Keywords: Concessions; Contract Management; Public-Private Partnerships; Key Performance Indicators.

Introduction

Despite the lack of a single and universal accepted definition of Public-Private Partnerships (PPPs), there are four characteristics that typically prevail in this type of procurement model: (i) long-term contract between a public entity and a private entity, (ii) design, construction, financing and operation of public infrastructure by the private sector, (iii) payments to the private partner by the public sector or by users of the infrastructure throughout the contractual period of the PPP, and (iv) the infrastructure reverts to the public sector at the end of the contractual period of the PPP (Yescombe, 2007; Cruz and Marques, 2013). Although the contract management is the longest phase of the project, it has not received the proper attention, both from the point of view of the professional practice as well as academic research (Cruz and Marques, 2012). The PPP contract management comprises the process of managing and administrating the PPP contract since the first stage of the procurement process until the end of the operational period (4ps, 2007). Includes all actions that allow monitoring the course of the partnership, including all necessary procedures for the contract renegotiation (Cruz and Marques, 2012). Considering a large number of projects that have been implemented with this public procurement model, it is important to understand the key factors that enable the success of PPPs (Carpintero and Petersen, 2014). These factors should be used to define key performance indicators (KPIs) that will allow the public partner (grantor) to effectively monitor the concession. These KPIs depend on the objectives of each project, and are the basis of incentives and penalties, especially during the operation phase, since they allow comparing actual performance with the estimated targets in terms of effectiveness, efficiency, and quality of service. The KPIs are useful tools for performance management since they can identify strengths and weaknesses, and thus support the establishment of appropriate decisions to improve the efficiency, effectiveness, and economy, which, in turn, improve the social welfare (Yuan et al., 2012; Yuan et al., 2009). In most cases, the KPIs used are formulas for calculating metrics or a grading scale that serves to determine whether the performance goals are achieved (FHWA, 2009). Therefore, it is important to design a set of KPIs in order to ensure adequate and effective contract management (Cruz and Marques, 2013). It is also crucial that all parties recognize that the contract performance is the key measure of the best value for money (VfM) and that should, therefore, be the basis on which the partnership is built. The best VfM does not correspond to the lower starting price but instead the best combination of cost and quality, overlooking to meet the requirements imposed by the grantor and, consequently, ensuring the satisfaction of the user's needs (NAO, 2008). Usually, the VfM is associated with the three "Es": economy, efficiency, and effectiveness (Shaoul, 2003).

The poor monitoring of PPPs led to greater information asymmetry, with a potentially large negative impact when the contracts are renegotiated, thus increasing value for money. The private sector holds more information about the business determinants of the PPP and, therefore, is in a stronger position during bilateral negotiations, without suffering from competitive pressure. The main objective of this paper is to establish a framework of potential KPIs categories that enable the public entities to monitor the performance of PPP contracts. This is an area that has been neglected in the literature. The methodology used consists, fundamentally, on an extensive literature review about KPIs to monitor PPPs, PPPs main characteristics also supported by the knowledge of international case studies. After this initial introduction, we present a literature review followed by the analysis of case studies in different sectors (road, health, and railway). We also present a model of KPIs for monitoring PPP projects and finally the conclusions and policy implications.

Literature review

There are several authors who argue that the performance measurement and management is an effective method that, integrated at the organizations, can increase their profits (Luu et al., 2008), increase the quality of their services and reduce the risks and their overheads (Yu et al., 2007). The main purpose of the performance measurement and management is to identify, measure and manage the appropriate KPIs (Yuan et al., 2012), which, in turn, are used as metrics to evaluate the factors critical to the success of the PPP project (Yuan et al., 2009). The performance measurement and management in addition to serving as a support for the development of new PPP projects also provide a set of methodologies aimed at helping both partners of PPP decision-making and partnership management (Pavlov, 2010).

The general goal of performance measurement and management is to promote accountability (FHWA, 2011). To successfully achieve this purpose, the system must be a cyclical process and include the following four elements (Simeone et al. (2005) cited by (FHWA, 2011)): strategy, community, budget, and evaluation.

With reference to the management process of the American Association of State Highway and Transportation Officials (AASHTO), the FHWA (2011) presents five phases of performance management of a PPP project. The first involves the selection of performance measures that are most suitable to evaluate the concessionaire in key areas of the program and service. It follows the monitoring and reporting of performance results. The third phase consists of analyzing performance results, identifying the main factors that influence the performance, as well as

opportunities for improvement. Subsequently, resources should be distributed to the performance measurement system in a manner that drives better results. Finally, the results of obtaining progress should continue to be monitored and reported.

The KPIs used for performance monitoring of PPP project has unique characteristics and are distinct from KPIs used for project monitoring undertaken by traditional procurement. According to Ismail (2009), there are ten qualities that characterize the KPIs of PPP projects. The first quality is that KPIs for PPP projects reflect and quantify the intentional value drivers that represent activities that are carried based on the planned strategy or direction to achieve the desired end product (service or infrastructure). The second quality is that the value drivers are also defined by the citizens, and therefore are not defined solely by the concessionaire and the grantor. Examples of these value drivers can be «high standards of quality of public infrastructure» for the public partner, «revenue satisfactory» for the private partner, and « high user satisfaction» for the citizens. As stakeholders are aware of the KPIs selected and how they are measured, the effort expended to achieve the agreed objectives is motivated. Another quality concerns the progress that the KPIs are targeted throughout the concession period, from the planning, designing, constructing, commissioning, and operating and maintaining. They are modeled by the top-level of the organization (both partners). The fourth quality is that the stakeholders involved in PPP projects must establish corporate standard measurements, which enables uniform definitions commonly used in KPIs and eliminate political obstacles with the unregulated definition. The fifth quality is that KPIs for PPP project must be based on valid data, where the data metric calculation must be accurate to provide valid and reliable results. The value drivers at an early stage are too many because they are proposed by all stakeholders, including citizens. The value drivers at an early stage are too many because they are proposed by all stakeholders, including citizens. The sixth quality is that the KPIs must be easy to understand by all parties involved in the PPP project. The number of established KPIs for PPP project must not be too many as this will overload the third party examiner to peruse and carry out the necessary action. The seventh quality is that the KPIs for monitoring of PPP project should be achievable and relevant to the execution of public infrastructure. The workability and applicability of the KPIs can be achieved through a periodic evaluation that may also prevent unwanted KPIs. Since the metrics show a number that reflects the activities and their performance, the KPIs for PPP project place that activities in context in which these KPIs evaluate activities based on expected objectives. This eighth quality is presented either via limits of acceptable performance (upper and lower), through targets (e.g. 10% of new patients per year), benchmarks, among others. The ninth quality of KPIs for PPP projects is that these

KPIs are linked to a system of incentives and penalties. This system aims to motivate perform concessionaires their responsibilities more efficiently. Finally, KPIs for PPP projects should serve as a guide for the development of the project into improved performance.

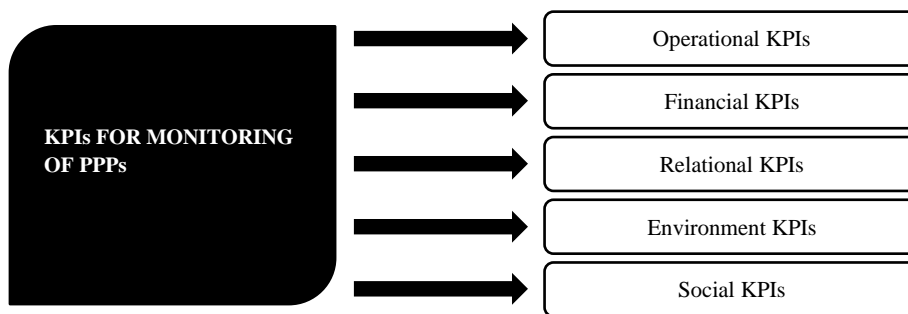
Based on a literature review and in the responses obtained by various stakeholders (academics, public sector and private sector) from various countries and regions to a survey questionnaire, the authors Yuan et al. (2009) conceived a conceptual model that comprises three modules: *Module 1: project inputs* - these KPIs generally do not change throughout the lifecycle of the project, but have a very significant impact on the decision process of the selection of the concessionaire; *Module 2: Requirements of stakeholders, including finance and marketing, innovation and learning* – it is composed by marketing and financial KPIs (e.g. sustainable profitability, increased marketing, financial ability of shareholders); *Module 3: Implementation of the project* – it is composed by process KPIs and includes factors that may affect the process of construction, operation, maintenance, transfer and post-transfer (e.g. quality control, environmental protection, contract management). Ismail (2009) developed a questionnaire survey that submitted to answer various stakeholders of Malaysia (academic sector, public sector, private sector, and the general public). With this study, the author Ismail (2009) conceived a model that comprises of following three groups of KPIs: *Operational KPIs* - are intended to monitor the performance of the project during the operation phase; *Functional KPIs* - serve to monitor the performance of the PPP, and should be classified to the economic component (monitor the effects of PPP for the monetary element), social (monitor the effects of PPP in the society) and environmental (monitor the effects of PPP in the environment, biodiversity, and habitat); *Professional KPIs* - are intended to monitor the performance of the professionals involved in project (e.g. engineers, architects, surveyors, contractors, and suppliers). In order to present a set of KPIs for monitoring the PPPs in Nigeria, the authors Aje and Adeniyi (2012), based on a literature review, developed fifteen KPIs which subsequently evaluated based on surveys submitted to various entities (consulting firms, contractors, government, and concessionaires) involved in projects materialized with this contracting model.

The results of this investigation show that the entities interviewed attach significant importance and similar to fifteen KPIs. However, there are three KPIs that stand out: cost; innovation, learning and development; and sustainability. Therefore, Aje and Adeniyi (2012) conclude that these three types of KPIs (qualitative and quantitative) are best suited to measure the performance of PPP projects. However, the authors stress that all fifteen KPIs should be applied in PPP projects.

Proposed for a model of KPIs for monitoring of PPP projects

It is crucial for the establishment of a clear and simplified model of KPIs with the aim to inform and monitor the performance of PPP projects. These KPIs should be selected judiciously to allow effective and efficient monitoring of the PPP contracts. Based on the literature review conducted and in the analysis of the case studies, we propose five groups of performance KPIs (presented in Figure 1). Some examples of KPIs are presented for the road sector and for the health sectors, although the KPIs groups could be adopted for all PPP, regardless of the sector, with the necessary adaptations. With this model, the aim is to understand the types of KPIs that could be implemented in a PPP project.

Figure 1 – Proposed for a model of KPIs for monitoring of PPPs



Operational KPIs

The operation and maintenance activities are those that are performed along the period of operation of a concession and, therefore, must consist of a large group of KPIs, designated to monitor the performance of activities of operation and maintenance (see Table 1 for examples). This KPIs group is divided into two sub-groups: infrastructure KPIs and service KPIs. With the definition and subsequent implementation of infrastructure KPIs in a PPP project, it is intended that, in a given period of the concession, the grantor can assess the quality levels of the various types of physical assets. On the other hand, the service KPIs should be established to allow the grantor to check the quality levels of service provided to users.

Table 1 – Examples of operational KPIs

Road sector		
Infrastructure KPIs	<ul style="list-style-type: none"> ▪ Pavements ▪ Road markings ▪ Vertical signalization ▪ Guardrail ▪ Elements of the drainage network ▪ Illumination ▪ Tunnels 	<ul style="list-style-type: none"> ▪ Viaducts ▪ Rest stop areas ▪ Toll plazas ▪ Retaining walls ▪ Trees and plants ▪ Telematics ▪ Telecommunications

Service KPIs	<ul style="list-style-type: none"> ▪ Bridges ▪ Traffic lane availability ▪ Response to accidents/incidents ▪ The response of maintenance activities ▪ Rest stop areas 	<ul style="list-style-type: none"> ▪ Toll plaza ▪ Information to motorists about incidents ▪ Information to motorists about traffic detours
Health sector		
Infrastructure KPIs	<ul style="list-style-type: none"> ▪ Electrical installations ▪ Data and voice structured network ▪ Equipment of signaling and intercommunication ▪ System and diffusion sound equipment, TV and video ▪ Time information system ▪ System looking for people ▪ Networks of monitoring ▪ Internal TV networks ▪ Radiocommunications infrastructures ▪ Lifting devices 	<ul style="list-style-type: none"> ▪ Kitchen equipment and cafeterias ▪ Equipment for the laundry service and laundry treatment ▪ Network and equipment of medical gases and of suction ▪ Detection equipment and alarm and extinguishing fires ▪ Surveillance equipment and intruder alarm ▪ Systems for hot and cold water ▪ Sewage and drainage systems ▪ Heating, ventilation and air conditioning
Service KPIs	<ul style="list-style-type: none"> ▪ Maintenance service ▪ Clinical service ▪ Pest control service ▪ Medical gases service ▪ Laundry service ▪ Roads, grounds and landscape maintenance services 	<ul style="list-style-type: none"> ▪ Catering service ▪ Security service ▪ Cleaning service ▪ Helpdesk service ▪ Car parking service ▪ Mechanical service

Financial KPIs

As with any project, independently of its nature, the financial assessment is always an aspect of utmost importance. Simplistically there are three main drivers to monitor: costs, revenues (commercial and/or subsidies) and debt levels. Thus, we propose a group of financial KPIs that should be monitored by the grantor to assess the financial performance of the project (see Table 2 for example).

Table 2 – Examples of financial KPIs

<ul style="list-style-type: none"> ▪ Costs ▪ Incomes ▪ Value for money ▪ Net present value (NPV); ▪ International rate of return (IRR) 	<ul style="list-style-type: none"> ▪ Debt service coverage ratio (DSCR) ▪ Loan life coverage ratio (LLCR) ▪ Solvency ratio ▪ Financial autonomy ratio
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Relational KPIs

In all PPPs is important to conceive communication strategies by means of meetings, reports or other actions, which aim to narrow the communication gap. For this purpose, the concession contracts should establish mechanisms to effectively accomplish this communication (e.g. elaboration of a communication plan). In all projects analyzed there is a contractual obligation on the part of the concessionaire to report periodically to the grantor the necessary information for monitoring of the contract execution. As examples of these reports, can be noted the reports which contains information on the activities of operation and maintenance that were executed, reports containing information on the performance of the concessionaire in respect to fulfillment of KPIs and the performance failures, reports of profit

and loss accounts and annual accounts balance, together with the legal certification of accounts and auditor's report. In addition to reports, there are also regular and extraordinary meetings between the concessionaire and the grantor. Thus, it is proposed a set of KPIs, designated by relational KPIs, which are intended to reflect the level of fulfillment of reporting obligations, meetings and communication plan (see table 3 for examples).

Table 3 – Examples of relational KPIs

<ul style="list-style-type: none"> ▪ Fulfillment of the periodicity of reporting obligations ▪ Content quality of reporting 	<ul style="list-style-type: none"> ▪ Communication plan between the entities involved in the project ▪ Fulfillment of scheduled meetings
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Environment KPIs

The importance of environmental sustainability and its accurate assessment is an unquestionable assumption. In this sense, we propose a set of environmental KPIs to monitor the effects of the PPP project on the environment, biodiversity, and habitat. The table 4 presented some examples of this group of KPIs.

Table 4 – Examples of environmental KPIs

<ul style="list-style-type: none"> ▪ Environmental impact ▪ The water quality ▪ Production of water ▪ Energy consumption ▪ Water consumption ▪ Impact throughout life 	<ul style="list-style-type: none"> ▪ Transport movement ▪ Water reduction ▪ Gases ▪ Habitat creation ▪ Habitat retention ▪ Impact on biodiversity
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Social KPIs

With the aim to realize the effects that a given PPP project has in the society, it is proposed a set of KPIs designated by social KPIs. On the one hand, these KPIs should reflect aspects such as the degree of satisfaction of the various stakeholders in the project, as well as the type of relationship that is maintained between them, and, on the other hand, aspects such as sensitization for health and safety, employee training, technological innovation, and the project impact in the region, should also be monitored. The Table 5 presents some examples of social KPIs.

Table 5 – Examples of social KPIs

<ul style="list-style-type: none"> ▪ Community's satisfaction with the infrastructure or service ▪ User's satisfaction with the infrastructure or service ▪ Employee's satisfaction with the employer ▪ Employer's satisfaction with the employee ▪ Employee's training 	<ul style="list-style-type: none"> ▪ Safety and hygiene awareness ▪ Relationship between the various stakeholders in the project ▪ Impact of infrastructure or service in the region ▪ Investment in research and development of new technologies
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Summary and Conclusions

The purpose of this paper was to present an overall framework for the establishment of KPIs for monitoring PPP projects, particularly, concession contracts. A first aspect that is clear is the importance of performance measurement of any project, particularly PPPs. Considering that PPP projects comprise a long-term contractual relationship, there are numerous factors that

can affect the partnerships, and, as such, it is crucial to implement a performance monitoring system that allows the public entities to assess the fulfillment of the contractual obligations of the concessionaire. Adequate contract management, evaluated based on the achievement of KPIs, is an aspect of great importance in a PPP project. The various KPIs types which must be an integral part of the concession contracts should reflect the features that best characterize the performance of the concessionaire, and therefore the success of the PPP. The analysis of several case studies allows concluding that all of the concession contracts establish a performance monitoring system. This system incorporates essentially all data records relating to the performance of the various services provided by the concessionaire, the PMS developed and implemented by the concessionaire (based on KPIs) and approved by the grantor, and a set of mechanisms to report compliance with the KPIs to grantor. Finally, it was possible to conceive the model comprising a varied set of KPIs categories, which requires the need for a diverse set of technical skills for its definition, and subsequently to ensure its fulfillment. Most KPIs categories would need to be further developed taking into account the specificities of each project (e.g. sector, country, etc.).

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