

Outsourcing municipal systems: proposing a *Performance-Based Contract* for road maintenance

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Master's Thesis in Civil Engineering – Extended Abstract

ABSTRACT:

In the global context of generalized efforts to increase efficiency in both private and public sectors there is a trend towards outsourcing of services. This tendency has been increasing globally and today there are several international cases of road maintenance outsourcing, where the model that stands out is the application of performance-based contracts.

On a national level the road maintenance outsourcing that exists relates to highway concessions and public-private partnerships, so the pure application of performance-based contracts to road maintenance still doesn't exist. This being the case and considering the results of the international experiences it becomes crucial to test the model on a national level and also to revise the legislature in order to allow municipalities to use this model of contract on their roads.

This Master's thesis contributes to the application of this model in Portugal by analysing several international cases and by proposing the general lines of a performance-based contract to be used in a pilot project of road maintenance.

Keywords: outsourcing; road maintenance, performance indicators, contract.

1. Introduction

Given today's world's and Portugal's circumstances, optimizing public sector is crucial in order to reduce public expense and also the tax burden on workers. Public entities must decide the best way to optimize the systems they're responsible for, choosing which management model is best suited in each case to guarantee that the system runs at least with acceptable reliability while simultaneously minimizing the operation and management costs.

Public managers and administrators are confronted daily with having to make technical and financial decisions regarding which assets should be maintained, repaired or replaced. Besides

this, they have to decide when to do maintenance works in order to keep the system at an accepted level of performance. If a certain system is not properly maintained it can fail, resulting in possible severe consequences when it leads to financial and economic losses, when it affects human life or when it has environmental impacts. On the other hand if there is an excess of maintenance the probability of failure decreases or is completely eliminated, but the cost of such maintenance increases therefore reducing profits or resulting in financial or economic losses (Michele & Daniela, 2011). This work aims to prove that applying a Performance-Based Contracts (PBCs) is the best way to achieve the balance between cost and performance. In this type of outsourcing contract the performance is monitored through the use of Key Performance Indicators (KPIs) and with a scheme of incentives and penalties the provider of the service is very motivated to try to keep increasing performance while decreasing the costs. According to Blom-Hansen (2003) several empirical studies reveal that the use of outsourcing contracts cuts public costs significantly even on road maintenance sector.

2. Outsourcing

Campbell (1995) defines outsourcing as the concentration of an organization's resources in its main competences, delegating all tasks that are not central to its activity, or those for which it has no competence, on an external agent that has the capacity to execute such tasks in an efficient manner.

2.1. General Context

Recently, globalization lead to increased competition and market pressure and posed new challenges for all companies and their managers (Greblikaite & Krisciunas 2012). During periods of economic recession, cost reduction is a priority for businesses and managers and public opinion is that public companies are too large, inefficient and unable to react adequately to environmental and market changes (Gaspareniene & Vasauskaite, 2014).

In most organizations, maintenance is not part of the core or strategic activities, nor of their goals. It is rather a secondary activity (although necessary) and there is an increasing tendency to outsource the maintenance functions, delegating them to external agents. (Murthy & Kobbacy, 2008).

According to Gaspareniene & Vasauskaite (2014), the literature presents contrary opinions on the use of outsourcing. On one side the ones who oppose this option indicate that it cannot guarantee high quality and simultaneously reduce costs (Pollitt & Bouckaert, 2000). Also, indicates that the use of outsourcing leads to a dependency on the external agent, a loss of

knowledge on maintenance and the fact that the organization becomes linked to an exclusive provider of that service. On the advantages of outsourcing Murthy & Kobbacy (2008) indicates:

- Increased maintenance quality due to high level of specialization of service provider;
- Easy access to high specialized human resources always and only when necessary;
- Possibility of reduction of high cost risk by establishing a fixed cost contract;
- Better user satisfaction because service provider is more attentive to shifts in needs of users;
- Possibility of access to most recent maintenance technologies;
- Less need of investment by the client organization;
- Increased focus of human resources on core organization activities.

Several authors highlight the importance of competition as key factors for the efficiency of an outsourcing contract. (Gaspareniene & Vasauskaite, 2014; Abdul-Aziz & Ali, 2004; Elinder & Jordahl, 2013).

2.2. Evolution in Public and Private Sectors

According to Grossman & Helpman (2002) outsourcing has been increasing in private sector. The same happens in the public sector, where traditionally management and maintenance of public infrastructure was done by public entities, there is a trend today towards outsourcing. Maintenance activities are delegated on an external agent and the public agencies focus their resources on central responsibilities (Murthy & Kobbacy, 2008).

According to Lewis & Bajari (2010) the governments of OECD outsource on average 42% of costs of goods and services. In countries like the Netherlands, United Kingdom, Germany and Japan the amount of goods and services outsourced is between 50% and 60%. By contrast, Mexico and Greece only outsource between 20% and 30% of goods and services.

Scientific literature presents considerable evidence that outsourcing public services to private sector allows for a cost reduction (Alonso *et al*, 2013). Borcharding *et al* (1982) reviews 52 studies comparing the costs of public and private sectors in 19 economic sectors in 5 countries of OECD concluding that in 40 of those cases private sector is clearly more efficient. Only in 3 of the 52 cases was public sector cheaper. Bailey (2002) and Lundsgaard (2002) show with more recent data that the outsourcing of public services to private sector allow for reductions of operational costs of about 20%. Domberger & Jensen (1997) also show that saving of 20% are possible without compromising quality. Rajabzadeh *et al* (2008) alerts that this 20% cost reduction frequently stated in literature is too optimistic and can't be ambitioned in every area of public sector nor can it be presented as standard. Nevertheless, despite not accepting this 20% value the author accepts that there is a cost reduction and states that statistical evidence points to a value of between 6% and 12% cost reduction when outsourcing public services to private sector.

2.3. Performance-Based Contracts

According to World Bank TN-27 (2005) there have been traditionally used method-based contracts on road maintenance outsourcing. With these contracts the public agency specified techniques, technologies and materials that should be used, as well as the maintenance actions planning. Payment on these contracts is usually made in accordance with the amount and type of work that is done at a contracted price (Zietlow, 2005). The same World Bank document indicates that with *performance-based contracts* – PBCs – the client specifies the key performance indicators to be monitored as well as the standards of performance that should be met by the service provider.

Liinamaa *et al* (2016) defines PBC according to the Chartered Institute of Supply Procurement and The Institute for Public Procurement as a contract that is goal oriented, focused on quality by complying with determined measurable performance levels as a way of defining at least part of the payment.

According to McCullough *et al* (2009) the performance standards should be adequately defined and should be objectively measured. A PBC has variability on the assets that it covers, meaning that it can cover just some assets like traffic lights, public lighting, traffic horizontal markings, etc. or all the assets in a certain portion of road. There is also variability on what types of work are included such as cleaning, gardening, pain jobs, pot hole sealing, crack sealing and so on.

3. International Experiences

Zietlow (2005) says that the first application of PBC on road maintenance was done in 1988 with a pilot project in British Columbia that was then adopted in Ontario and Alberta. In Australia, the first use was in 1995 for the maintenance of roads in Sidney and in the USA these contracts were introduced in the State of Virginia in 1996. This contract included the maintenance of all assets, incident management, and ice and snow removal services on 402 km (four hundred and two kilometres) of state roads. The contract had an initial duration of five years and was renewed in June 2001 for another five years. This proves that the pilot project was successful and in fact, when compared to other traditional contracts at the same time in Virginia, the PBC continuously showed better results (Ozbek & De La Garza, 2011).

After the first project began in Virginia the use of PBCs then spread to Alaska, Florida, Oklahoma, Texas Minnesota and North Carolina. They also spread to Australia and Canada and to New Zealand in 1998. In the case of developing countries the first applications of road maintenance PBCs were done in Argentina in 1995 and Uruguay a little later. Soon followed projects in Brazil, Chile, Colombia, Ecuador, Guatemala, Mexico and Peru. De seguida outros países da região seguiram o exemplo, tal como o Brasil, Chile, Colômbia, Equador, Guatemala, México e Perú.

Later the trend spread to other developed countries and in some cases like Finland, Serbia and Montenegro and South Africa PBCs were not applied on a pure definition, having simultaneously characteristics of PBs and MBCs and being called “hibrid” PBCs.

3.1. Advantages of PBCs

According to Tamin et al (2011) when using PBC it is expected an improvement in quality and competition of road maintenance services through sustainable management and maintenance. Coordination and bureaucracy problems are also expected to be resolved. Liautaud (2004) concluded that this type of contract allows a more sustained management and maintenance throughout the road’s life cycle, in such a way that in the long term, the result is the significant reduction of costs for the State. World Bank Transportation Note No. 27 states that PBC contracts have the potential to reduce costs by encouraging the private sector to innovate and increase productivity, through the reduction of administrative expenses and other fixed costs due to better formulation of contracts, with less need for personnel to administer and supervise contracts and through a greater flexibility in private sector to reward and penalize performance. However, the benefits are not limited to cost reductions, and the World Bank says that the option for PBCs by road agencies from several countries over more traditional alternatives also has the possibility of managing the public body with less human resources, it has increased user satisfaction with road conditions and one of the most significant advantages is that it provides stable financing for maintenance for several years. Queiroz (1999) and Wirahadikusumah et al (2015) identify further reasons for road agencies to adopt PBCs: reduced effort to measure the amount of work produced; avoidance of frequent complaints and attempts to change the contract in order to increase the amount of work to be paid to the service provider; increased effort to satisfy users through KPIs relating to the quality of the provided service; the increased risk for service providers stimulates innovation in the industry; increased efficiency in the use of public funds is likely.

The Virginia pilot project allowed Ozbek & De La Garza (2011) to identify some important aspects to take into account in future uses of PBCs in road maintenance, such as tying the payments directly to KPIs in order to compensate the service provider according to its performance, creating a detailed plan with the conditions of the assets at the beginning of the project, use performance goals that increase continuously in time, do several inspections per year, develop an evaluation system for all the assets and develop clearly defined, quantifiable and easily measurable performance goals.

3.2. Key Performance Indicators

The definition of clear and adequate KPIs is one of the main difficulties when designing a PBC. The definition of KPIs should satisfy a set of goals such as leading to cost reduction, including 6

long term maintenance costs as well as the costs, comfort and safety for users. The difficulty is not only the definition of KPIs but also of its standard values.

This thesis studied the use of PBCs in several countries, mainly United Kingdom, Argentina, Australia, New Zealand and Peru. These cases were selected on a bases of the available information. In the case of Argentina, Australia and Peru, the States allow municipalities to use an available draft contract when launching PBCs for road maintenance. In some cases the draft contract comes with several other documents with regulations and technical specifications, so the municipalities have guidelines to follow.

The international research showed that there was not a single case where all the contract and all the contract documents were freely available or easily accessible. Nevertheless, taking into account that for each case the available information covered different aspects, summing all the cases, all aspects of a PBC are covered from a research stand point and thus it is possible to draft the general guidelines of a contract based on the international research to use in Portugal. It is important to realize that in all countries that use PBCs there is proper legislation for their use. The legislation and the existence of a draft contract helps municipalities to use this model of contracting and standardizes the model throughout each country.

4. Portuguese context and proposed contract

There are some uses of performance measures on road maintenance contracts in Portugal but these examples are tied to road concessions and public private partnerships. So, there isn't a single example of pure PBC applied to municipal road maintenance. The roads and highways that are not part of concessions are under the responsibility of a public company - Infraestruturas de Portugal, S.A. – and this company outsources maintenance actions in some cases, but being a public company the State is never free of risk and responsibility.

The main obstacle to the use of PBCs for the maintenance of Portuguese roads is the fact that this contract model is not legislated. There are laws in Portugal for public contracting such as the CCP – *Código dos contratos Públicos* – and there is legislature regarding public-private partnerships and they both apply to PBCs but the fact is that they are very limited for example when it comes to contract duration and when it comes to the need to specify the techniques and technologies to be used, so it is very clear that there is no adequate legislature for PBCs.

4.1. Proposed model

This work proposes a short length PBC to be used by municipalities in order to outsource road maintenance. The evidence in scientific literature that long PBCs offer significant advantages over

a short period ones is indisputable, but as we are talking about a pilot project it is suggested that it should be no longer than three years in order to minimize risk for both parties. Also, the amount and length of assets included in the trial should be very limited for the same reason.

The payments should be monthly and the actual amount payed is tied to performance incentives and penalties for non-compliance with standards. The international experiences showed that this is the best option.

For this proposal the performance standard is the inexistence of incidents for each KPI. An incident consists on the occurrence of a pathology or defect on the asset. So, when a defect is identified this constitutes an occurrence and the response time starts to count. If the service provided does not address the defect within the defined response time for the respective KPI, it is considered to be in default and penalties are applied. The first penalty is a 5% discount to the monthly payment if the situation is resolved within 5 days. Beyond the first 5 days the penalty increases to 10% and beyond 10 days the situation is considered a breach of contract and it might be cancelled. Cancelation can be avoided if the service provider addresses the situation and volunteers to pay a fine superior to the 10% penalty, pending assessment by the municipality. The KPIs, response times and penalties are clearly specified on table 18 of the thesis and can be consulted for more detailed information.

Besides the penalties, the monthly payment can also be affected by performance incentives. These aim at incentivizing the service provider to do maximize its will to improve on performance and to keep performance at optimal levels for long periods of time. There are two incentive schemes, one for the absence of occurrences and another for the absence of defaults as can be seen on the next table (table 21 of thesis).

Tabela 1 – Performance incentives scheme

Performance incentives scheme				
Time since last occurrence	2 months	4 months	6 months	8 months
Bonus	2%	3%	5%	6%
Time since last default	3 months	6 months	9 months	12 months
Bonus	2,5%	5%	7,5%	10%

The incentives schemes allows for an extra 2% in payment if there is no occurrence for at least 2 months. With increased time without record of occurrences the bonus increases until it is capped at 6% for 8 consecutive months of no occurrences. When there is an occurrence, the calendar starts again. According to this scheme, there is the possibility of an occurrence without resulting in default, so this makes it possible for the service provider to receive a bonus for not entering default despite the fact that there are occurrences. And if there are neither occurrences nor

defaults, the bonuses sum up. The default part of the scheme starts at a bonus of 2,5% for a period of 3 months in a row without defaults and the bonus increases with time, being limited at 10% for 10 months without defaults.

5. Concluding remarks

The socio-economic characteristics of a certain locality are very influenced by the quality of its infrastructure. In order to provide good quality maintenance to roads, the literature on international experiences show that Performance-Based Contracts provide better results altogether.

The use of PBCs on road maintenance should include KPIs as a way of measuring the performance of the service provider and the quality of the service provided. The KPIs should also be used as a way of adjusting the payments made to the service provider in a fair way in order to incentivize and compensate optimal performance and as a way of penalizing lack of quality and less than acceptable levels of performance. The literature is very unanimous when it comes to the importance of transparency and the importance of establishing a true strategic partnership in order to optimize the chances of successfully implementing a road maintenance PBC.

The best proof of the qualities of PBCs on road maintenance is the way its use has increase throughout the world. The evolution of these contracts through the several international experiences allowed for an incremental reduction in expenses because the increasing trust in the model allows for less supervision.

One of the most important aspects of PBCs is the possibility of establishing a stable availability of funds for maintenance as opposed to it being subjected to yearly budgets.

It can be concluded that in applying a pilot project for road maintenance PBC in Portugal it is expected to be needed the establishment of a dialogue between public and private sectors in order to evaluate the capacity of both parties to support a contract of this type.

As of today, the most important obstacle to the use of PBCs in road maintenance in Portugal is the absence of legislature guiding the model. The existence of a draft contract in some countries helps municipalities to speed up the process of contracting and legitimizes the model on a local level. Given that the use of PBCs is becoming generalized it is crucial that the law be revised in order to allow this model of contract.

Taking into account the international experiences it is the conclusion of this work that the technical skills and knowledge in both private and public sectors are adequate to make the use of this model possible. Therefore, it is possible to design a simple enough PBC to implement as a pilot

9 in Portuguese municipalities and the country has a lot to gain from such an experiment given the need and will to optimize public sector's use of funds.

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