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LESSONS LEARNED IN OUTPUT AND PERFORMANCE-BASED ROAD MAINTENANCE CONTRACTS

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By delivering efficient, cost-effective and innovative maintenance services, well-designed output and performance-based road maintenance contracts can help maintain road assets and achieve value-for-money. Output-based contracts can also help governments build experience in undertaking Public-Private Partnerships (PPPs).

Several factors need to be considered when designing and implementing these contracts to achieve their full benefits. This issue brief discusses five key lessons learned from PPIAF and the World Bank Group's experiences in using output-based road maintenance contracts.

OVERVIEW OF OUTPUT AND PERFORMANCE-BASED MAINTENANCE CONTRACTS

The contractor in an output or performance-based road maintenance contract is paid on an output basis (maintaining the road at a specified service standard) rather than on an input basis as occurring under traditional maintenance contracts. This difference can be illustrated by a simple example. Under a traditional input-based contract the private contractor gets paid for each repaired pothole, whereas under an output-based contract the contractor gets paid for each length of road it maintains at the required condition. In return for achieving this standard, the government will periodically pay a fixed amount to the contractor or allow the firm to collect user fees (e.g., toll fees).

Output-based maintenance contracts have several benefits over traditional input-based contracts. By paying contractors based on the level of service they deliver, output-based contracts provide a clear financial incentive for contractors to meet performance standards. Private contractors are also incentivized to improve their efficiency and minimize waste because they are paid at a set level for performance, not based on the value of the inputs used. Output-based contracts

therefore encourage contractors to develop innovative solutions to realize the output standards while minimizing the inputs.

Output-based maintenance contracts are usually longer than traditional maintenance contracts, which incentivize private contractors to take measures that improve the road conditions for the duration of the contract rather than ad hoc repairs. Longer maintenance contracts also commit governments to fund maintenance for several years, reducing the risk of delaying maintenance for budget reasons. This encourages predictable and regular maintenance works, resulting in improved asset quality and reduced long-term costs from lower rehabilitation and reconstruction costs. Output-based contracts can also have positive demonstration effects such as in Brazil, where the success of output-based contracts encouraged the Ministry of Transport to introduce a large-scale road maintenance and rehabilitation program.

In addition, output-based maintenance contracts can help governments build their capacity to implement PPPs. Output-based maintenance contracts can serve as an introduction to PPPs and the resulting change in the public sector's role from a purchaser of goods or inputs to a purchaser of services. This shift requires different capacities and

implementing output-based contracts is one way for governments to build experience in PPPs. Output-based maintenance contracts usually do not involve large upfront capital investments and are often simpler to implement than other types of PPPs. These types of contracts can therefore be a starting point for governments interested in PPPs and can help governments build a track record of monitoring PPP contracts.

Several factors need to be considered when designing output-based contracts in order to achieve value-for-money and efficiencies over traditional contracts. These factors include:

- *Affordability*: is the government able to meet its long-term financial liabilities?
- *Incentive structure*: Does the contract have standards that encourage private operators to be efficient, innovative, transparent, responsible and reliant?
- *Risk allocation*: Are risks allocated to the public and private parties who are most able to bear them, in order to optimize the efficiency of the contract?
- *Contract scope*: Does the scope of the contract allow for economies of scale to be achieved? Is the scope of the contract manageable for the relevant public agency? Does the scope allow for synergies to be achieved or innovative approaches to be used?
- *Length*: Is the contract period long enough to transfer life-cycle risks to private operators? Is it sufficiently long for private investors to earn a return on any investment?

Although well-designed output-based contracts have several benefits over traditional maintenance contracts, it can be challenging for governments to implement these contracts for the first time. This issue brief addresses five key lessons learned in designing and implementing output and performance-based road maintenance contracts. While these lessons apply broadly to most contexts, the local context should be considered before applying the points discussed below.

KEY LESSONS LEARNED IN IMPLEMENTING OUTPUT AND PERFORMANCE-BASED ROAD MAINTENANCE CONTRACTS

1. Successful output-based contracts require sufficient dedicated fiscal resources and realistic performance expectations

Public officials often have high expectations on what output-based maintenance contracts can achieve and therefore under-estimate the level of fiscal resources required under these contracts. Output-based contracts are instruments that can generate various benefits, but they do not solve the underlying need for governments and/

or road-users (e.g. through tolls) to continue to provide sufficient funding for road maintenance. This is particularly salient when the existing road infrastructure is in a poor state. In these situations, this will require substantial regular contract payments in order to rehabilitate and keep the road at a much higher quality standard. These payments, in some cases, might be significantly higher and more frequent than current maintenance expenditure on the same network. On that basis, the contracting agency needs to make a realistic estimation of the required public funds, and the Ministry of Finance can assess whether this estimate fits the fiscal budget and the government's priorities. Likewise, private sector bidders will be anxious to see evidence that the contracting authority can afford and is committed to these same payment obligations so that the risk of payment default by the government is minimized. Educating public officials on the use of output-based contracts and what benefits can be achieved by using them can improve the implementation and monitoring of these contracts and sustain private sector appetite.

2. Private operators may need training and capacity building to bid for and implement output-based contracts

In many countries private operators are not used to the fundamental element of output-based contracts i.e., pre-financing outputs before being reimbursed by government payments. This need to provide working-capital financing can make private parties reluctant to participate in bidding or to make investments that minimize maintenance costs in the longer term. Additionally, private contractors that are awarded contracts may be unable to meet the performance standards if they are not familiar with the requirements of output-based contracts. Both of these challenges can limit the success of output-based contracts.

Market sounding and capacity building with local private sector firms can help address these challenges. In countries where private operators have limited capacity and hold misperceptions about output-based contracts, the government could carry out market soundings, which will enable it to refine contracts in a way that a sufficient number of private operators can participate in bidding. In countries where domestic players lack financial resources or expertise to bid as head contractor, international firms could be encouraged to partner with domestic firms to build local capacity. Training and capacity building sessions that improve private contractors' understanding of the structure of output-based contracts can improve contractor performance and increase the number of firms able to bid for these contracts.

3. Clear baseline data is needed to establish and monitor performance indicators and standards

Limited baseline data makes it hard to define the right performance indicators and set performance standards for output-based maintenance contracts. This issue is further compounded by latent defect risk, which is a major risk for road maintenance. Latent defect risk is the risk that public and private parties do not fully understand the road's condition before the contract is signed and therefore cannot accurately price the works required to achieve the desired standards. If the road is in worse condition than anticipated, the private contractor may not be able to finance all of the repairs needed or on the agreed-upon schedule. This can cause the contractor to miss the performance targets established in the contract and jeopardize the implementation of the contract. Additionally, the payment for successful performance may not be sufficient to cover the cost of the works if the road is in worse condition than anticipated. This removes the financial incentive to hit performance targets and cause the contract to fail.

Having a clear set of baseline data before designing the contracts will make the needs clearer and allow the contracting authority to tailor the design of the contract to the situation. If the road is in much worse condition than expected, for example, the government could rehabilitate the road before procuring an output-based maintenance contract. Collecting baseline data may require a comprehensive action plan to improve the management of road data, taking into account the stakeholder environment and budgetary constraints. PPIAF has funded multiple road asset management strategies to support governments to design these action plans, including support to the Government of Vietnam which is discussed in the case study below.

4. Simple performance indicators and user monitoring can improve contract performance

Output-based contracts require government resources to monitor the performance of contractors against the performance indicators established in the contract. This often represents a shift in the contracting authority's role, from paying on a per-input basis (e.g., number of potholes filled) to monitoring against a set of indicators. Additionally, it can be efficient to create output-based contracts with a large geographical or asset scope in order to benefit from economies of scale. However, for many countries it is practically and financially challenging to regularly monitor large areas on multiple performance indicators used in output-based contracts.

Simple and unambiguous performance indicators reduce the resources needed to monitor output-based contracts. In addition, complicated indicators can lead to differing interpretations among practitioners. Contracting agencies often measure these indicators in an unstructured way and measurement methods and assessed indicators may differ from one area to another. Likewise, contractors may have a different interpretation than the authority, which can lead to disputes over payment and performance. These issues can be prevented in part by having a set of simple performance indicators and clarifying how the indicators will be measured up-front.

In addition to the indicators, all parties should understand the roles and responsibilities of monitoring the contract. The contractor can conduct self-monitoring and periodically report on indicators to the public contracting agency. At the same time, the contracting agency (or an appointed agency or independent engineer) can verify these reports through periodic inspections. This verification can include random tests and does not need to encompass the whole road network. Finally, the contracting agency and the private operator should take advantage of road users in their monitoring efforts. For example, roadside billboards can be used to instruct motorists to call a hotline if road conditions do not meet performance requirements. In Liberia, a similar system is set up in which road users can send text messages to report road damages.

5. Vehicle overloading is a major challenge to implementing effective output-based maintenance contracts

Overloaded vehicles are a major cause of pavement deterioration in many countries. A vehicle overloaded by a factor of 2.5 can cause 50 times as much damage to a road as a vehicle under the weight limit. Overloaded vehicles can make it difficult to realize and maintain desired pavement conditions, thereby making it difficult to evaluate a contractor's performance under an output-based maintenance contract. The Government of Vietnam faced this issue when designing output-based maintenance contracts, which is discussed in the case study on page 4.

Clear vehicle weight regulations, along with strong enforcement protocols, are needed to overcome this challenge. The government will likely need to play a large role in communicating and enforcing the weight restrictions, as these roles may not be included under the scope of the maintenance contract. Additionally, stricter weight controls and enforcement may cause resistance among road users who are not used to these restrictions. Clear communication about the benefits of well-maintained roads and the damage caused by vehicle overloading can help to address these perceptions.

CASE STUDY: STRENGTHENING THE USE OF OUTPUT-BASED MAINTENANCE CONTRACTS IN VIETNAM

In 2012 the Government of Vietnam requested PPIAF's assistance to strengthen its implementation of output-based maintenance contracts by improving enabling environment and identifying international best practices. At the time the request was made, the government funded only half of the necessary road maintenance and the majority of road maintenance was performed by state-owned enterprises that lacked the capacity to perform efficiently.

A PPIAF-funded study proposed a roadmap for improvement, containing many of the lessons addressed in this issue brief. First, to build the necessary capacity for designing output-based contracts, the study recommended capacity building for the Ministry of Transport officials on how to do contractor prequalification, evaluate bids, estimate future costs, and structure contracts. Second, the study recognized that Vietnam faced particular challenges in engaging the private sector around joint ventures, as contractors did not take the international approach to joint ventures for maintenance works, in which a road management firm leads specialty contractors and service providers. This limited the potential benefits of the intended structure of output-based maintenance contracts. The study recommended training private operators on how to form a joint venture and meet the contracts' performance requirements.

In addition the PPIAF-funded study noted that existing data collection was insufficient to enforce the contracts. It recommended that the Ministry of Transport increase its collection of road data to establish performance baselines, determine contract standards and ensure private contractors were properly incentivized. The study also recommended that the Ministry simply use the performance indicators to improve contract management and create an effective bonus and penalty system.

Finally, the study identified vehicle overloading as a major cause for pavement deterioration in Vietnam. In order to fairly evaluate contractors' performance and ultimately gain the desired benefits from an output-based maintenance contract, the Ministry of Transport would need to address the overloading issue. The study proposed a five-pronged approach to control vehicle loads, with the following recommendations: i) improve law and protocols; ii) better communicate these new laws and protocols; iii) use better measurement equipment; iv) create a task-force to execute the monitoring; v) and target the heaviest vehicles for routine inspections.

With support from the World Bank, Vietnam implemented most of the recommendations from the PPIAF-funded study. These efforts have included capacity building efforts to strengthen contracting capabilities of the public authorities and the adoption of new legal and regulatory frameworks for output-based contracts. In addition, the Directorate for Roads in Vietnam has introduced new monitoring indicators and now collects more performance data when applying bonus and penalty clauses. As a result of these changes, the Ministry of Transport has increased its use of output-based contracts for road maintenance, including an allocation of \$60 million for three significant output-based maintenance contracts. The use of output-based contracts is expected to result in better maintenance of roads (especially in northern Vietnam), leading to lower vehicle operating costs, reduced travel time, and fewer road accidents.

CONCLUSION

Output-based maintenance contracts can help governments improve road maintenance programs and build experience implementing PPPs. Governments designing output-based contracts can learn valuable lessons from other countries' experience, including those described in this brief.

Setting realistic expectations and dedicating sufficient fiscal resources, training private operators, gathering clear baseline data, defining simple performance indicators, setting clear roles in monitoring and addressing vehicle overloading can help governments successfully use output-based maintenance contracts to improve the quality of their road assets.