

# PERFORMANCE BASED MANAGEMENT OF THE ROAD TRANSPORT SYSTEM IN SOUTH AFRICA

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## ABSTRACT

This paper gives an overview of the evolution of performance management in the South African National Road Agency Limited (SANRAL) – the roads authority at central government that manages the national road network in South Africa. Performance based contracting and management started with Routine Road Maintenance (RRM) some 15 years ago and has over the years progressively found wider application in other forms of contract and management regimes, such as periodic or preventative maintenance, toll road operations and maintenance, conventional construction contracts, the operations of multilane free flow tolling and a central clearing services, and Public Private Partnerships. Although the following of international best practice and the internal desire to iron out inefficiencies are indicated as some of the main drivers behind the development of performance management regimes, the paper also states that it is quite often the challenge to design unique applications for specific procurement and contracting situations in a given operating environment that provides the incentive for ongoing and sustainable development of performance management. The secret of successful performance management is to continuously monitor and assess the actual results of performance management applications with contemplated outcomes and industry benchmarks, and to ensure that the application is well aligned with the operating and contractual environment with regard to sustainability.

## 1. INTRODUCTION

The performance based management of construction, operations and maintenance of national roads under the jurisdiction of the South African National Road Agency Limited (SANRAL) has progressively developed since the mid 90's, and has become an entrenched feature of the growing demands within SANRAL for better management of the built environment of local transportation systems.

SANRAL is mandated to manage a national road network that has increased from 7200 to 16100 kilometers in the last 10 years, mainly by incorporating the more strategic and highly trafficked roads formerly owned by provincial governments into the national road network. The 16100 network comprises 13000 kilometers of non-toll roads and 3100 kilometers of toll roads, the latter of which is subdivided into roughly 1300 km of concessionary toll roads and 1800 km of State toll roads.

Government infrastructure, services and the built environment departments have, during the last 10 years, moved to more consistent and uniform procurement procedures that conform to public finance management regulations that are aimed at promoting sound procurement practices. Regulations set by the National Treasury concerning public private partnerships have also established a true benchmark amongst international manuals and guidelines for the application of PPPs in different infrastructural disciplines. This created

the opportunity for greater private sector participation in long term contractual relationships that are better aligned with long term performance requirements.

The drive to move towards more performance based contracting in construction, operations and maintenance was also triggered by a number of other reasons that have become quite common in the international arena:

- The traditional procurement of a consulting engineer to do the design and contract administration of competitive construction procurement, and also construction supervision is capacity intensive and expensive, and does not sufficiently mitigate the costs of, or reduce risk to the employer.
- There is little, or no incentive to contractors to produce more than the minimum specified for compliance, nor is there any encouragement of contractors, in conventional contracts, to provide better or longer lasting products by putting in a little more effort.
- Internationally, tendencies suggest that more risk should be transferred to the consultants and contractors, in the various forms of contract.
- Unit price based lowest bid procurement does not necessarily provide the best value for money, because the contractors/consultants do not take sufficient responsibility for the performance of the products delivered over their lifecycle.
- The benefits of achieving more consistent levels of service by means of imposing performance targets over a period of time.

The various types of infrastructure and services procured by SANRAL, in which performance-based management plays an integral role, covers the full spectrum of contracts procured by SANRAL, and includes:

- Routine Road Maintenance (RRM)
- Comprehensive Toll Road Operations and Maintenance Contracts (CTROM)
- Rehabilitation and periodic maintenance incorporating a short or medium term Product Performance Guarantee System (PPGS).
- Long term performance based contracts such as the design, construction, finance, operations and maintenance of a road under a concession contract.
- The operations of an interoperable open road electronic toll collection system and a national (central) clearing house

## **2. ROUTINE ROAD MAINTENANCE (RRM)**

Prior to the 90's, RRM of national roads was carried out on a force account basis. During the 90's all RRM's were procured by contract, and since 1995 performance based specifications were gradually introduced in a hybrid between method/ minimum threshold specifications and performance based criteria.

The primary reasons for adopting a hybrid contract are, firstly, to simplify and reduce the costs of supervision and measurement and, secondly, to improve the accountability and self-checking of the contractor with regard to the performance related part of the specifications, and to remain with method, or end-product specifications where there are no clear benefits of doing otherwise.

RRM also proved to be a good training ground for small emerging contractors and small, medium and micro enterprises (SMMEs). In order to protect SMMEs from the fierce

competition of the established medium and large contractors, SANRAL's procurement policy for RRM compels tenderers to outsource a minimum of 80 percent (subject to the tender amount) of the scope of work to SMMEs. Performance based specifications are also simplified to ensure that emerging contractors/SMMEs are able to achieve what is expected.

A typical RRM performance specification is, for instance, the imposition of a set maximum response time to rectify a defect, and if not rectified within that time, the contractor pays a penalty.

### **3. COMPREHENSIVE TOLL ROAD OPERATIONS AND MAINTENANCE(CTROM)**

At plaza level, contractual fragmentation between the various engineering disciplines (such as electronic, mechanical, electrical and related operational functions) gave rise to the need to consolidate all functions/disciplines under a single line of responsibility contract – the so-called CTROM contract.

The tenderer/operator is required to tender a basic fee on a scope of work that is partly fixed, and partly variable depending on the variations in traffic. The fee is increased or reduced according to the operator's compliance with functional criteria, which may either be fixed thresholds, or performance based specifications. A typical example is the maximum queue length of vehicles in plaza lanes which needs to control two Level of Service (LOS) criteria, namely the manning levels in the plaza lanes, and secondly the total plaza thru put capacity. The first criterion may happen for instance more frequently and will attract smaller penalties to be deducted from the monthly payment to the operator. The second criterion will attract a much bigger penalty and will be linked to a specific remedy period which, if not be complied with within the remedy period, may constitute a breach of contract, etc..

In order to attract more operators to this very competitive market, the CTROM tender package is often combined with RRM to provide economies of scale.

### **4. REHABILITATION AND PERIODIC MAINTENANCE THROUGH A SHORT OR MEDIUM TERM PRODUCT PERFORMANCE GUARANTEE SYSTEM (PPGS)**

This procurement philosophy is applied to, mainly, periodic or preventative maintenance and is applicable to areas in which contractors are able to reasonably assume and control the risk of product performance. A good example of this is asphalt overlays. The PPGS system promotes the dedicated management of performance warranties and acceptance criteria, based on performance, rather than on method or end-product requirements.

The types of products dealt with using the PPGS system are not limited to the functional performance of pavements only, and it is also applicable to the functional performance and durability of products such as the coatings applied to steel structures, the reflectivity of sign board material, as well as the reflectivity and durability of road paint. The monitoring of the functional performance of any particular product is done by assessing functional performance parameters immediately after completion and, thereafter, on predetermined and specified assessment dates.

If all parameters meet the acceptance criteria for, say, assessments after 2, 4, and 6 years, the lump sum under the Performance Guarantee will typically be released in the ratio of 50%, 30% and 20%.

Where distress or failure has occurred in excess of the permissible or maximum specified limits relating to the performance of, say, pavement surfacing, the contractor shall at his own expense, rectify all parts of the work where such defects occur. Repair work is required to be undertaken during the entire guarantee period if so needed, but no less often than at the end of the periods when assessments are carried out. In the event of the contractor failing to undertake the required steps to rectify/reinstate the defects to conform to the specified requirements, the employer reserves the right to withhold payment, or to withhold the specified portion of the Performance Guarantee.

At the end of the guarantee period and when the final certificate has been issued, all responsibility for repair and maintenance reverts to the employer.

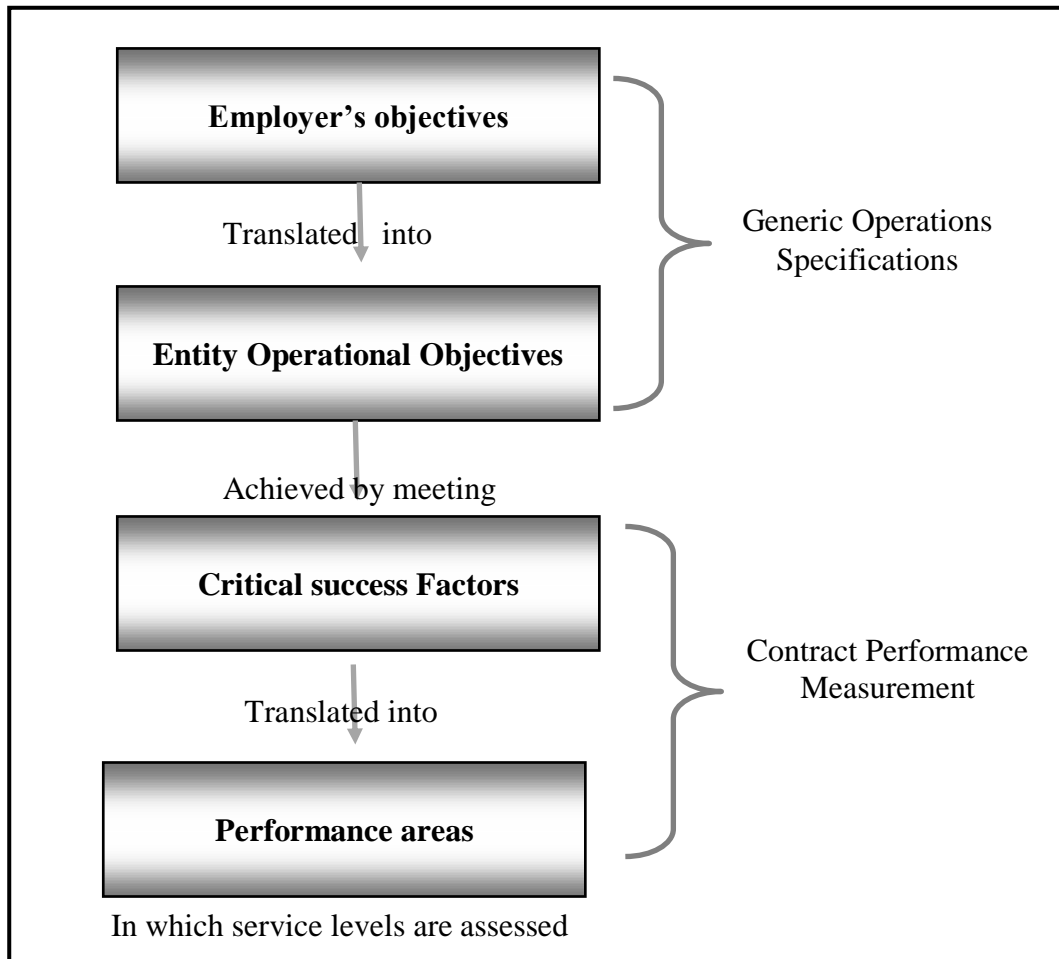
## **5. THE OPERATION OF AN INTEROPERABLE OPEN ROAD ELECTRONIC TOLL COLLECTION(ETC) SYSTEM AND A NATIONAL (CENTRAL) CLEARING HOUSE**

SANRAL has embarked on the first phase of a large network wide (560 km) interoperable open road tolling (ORT) project that includes the operation of the tolling system (44 tolling points/gantries), the establishment and operation of a national transaction clearing house (TCH) and the establishment of a violation processing centre (VPC).

The overall objective is to deliver an integrated ORT solution for the Gauteng metropolitan area, and a centralised clearing facility to all toll agencies (State toll operators and concessionaires), whilst delivering a consistently high level of ETC-related customer service nationally. Three stand alone entities are procured to achieve this objective, namely, the ORT Operator that establishes the tolling points and related infrastructure to capture and process toll transactions before sending them to the TCH, the TCH Operator that undertakes national transaction clearing, account management and customer relations services in respect of all ETC service providers, and the VPC operator who provides a processing service for unpaid toll fees and a support service for law enforcement and prosecution.

Although closely integrated and managed by one contractor, each of these entities is treated separately for the purposes of performance assessment. The objective of the approach to performance measurement is to incentivise the contractors by utilizing performance related adjustments to their payment certificates that ensure that the level of performance of each entity is of a consistent high quality. In order to achieve this, it was necessary to identify critical success factors, performance areas, key performance indicators, appropriate minimum service levels and target service levels that are desired to be achieved by the contractor. From the latter, a performance score, weighted according to the relative contribution to meeting the employer's objectives, is calculated.

The relationship between the Employer's objectives, entity operational objectives, critical success factors and performance areas is shown in the figure below.



In general, the total score achieved by the contractor is the sum of the scores applicable to each critical success factor. The maximum attainable score in relation to each critical success factor is derived solely from the maximum attainable scores derived from its constituent KPIs.

The seven (7) critical success factors relating to this project are;

- public compliance;
- revenue optimisation;
- operational performance;
- system health;
- cooperative relationships with the employer , the customers, the road users, between entities and with third parties; and
- Broad Based Black Economic Empowerment (BBBEE) compliance.

A typical example of a KPI derived from critical success factors is the Tolling Point Performance Indicator. This KPI measures the accuracy of a tolling point in generating toll transactions. Failure to meet the required target service level affects two of the success factors.

- Revenue optimisation – every transaction that is lost at a tolling point, is a loss of revenue.
- System health – Lost transactions indicate system failure.

The measurement of this KPI is the percentage of transactions generated compared with the total number of vehicles travelling through a tolling point. This critical KPI is measured by auditing procedures, and the Target Service Level is 99.9%.

Due to the expected high number of transactions per day (3 million), it is crucial that the performance system is adequately populated with relevant KPIs. The three major challenges in designing the performance regime were to select the correct KPI's, to determine the methods of measuring the KPI's, and to define and grasp the relevance of each KPI to successful operations, i.e. why each KPI is important, what will be measured, and what the consequences of failure will be.

## **6. LONG TERM PERFORMANCE BASED CONTRACTS SUCH AS THE DESIGN, CONSTRUCTION, FINANCING, OPERATIONS AND MAINTENANCE OF A ROAD AS A CONCESSION CONTRACT**

SANRAL has developed 3 successful Public Private Partnerships (concession projects) in the past 13 years. The concession contracts include the design, construction, finance, operation and maintenance of the respective toll roads over 30 year concession periods. The Engineering Requirements of these Concession Contracts include minimum service level and performance requirements, and cover the areas of construction, operations, upgrading and maintenance. The extent of the performance requirements applied in this comprehensive form of contract is almost a culmination of the development of performance criteria in the preceding forms of contract.

The most cost sensitive performance criterion in this form of contract is the required capacity improvements required to be implemented over time, which are mainly traffic driven. The Concessionaire is allowed to follow a phased approach and has to increase the road width/capacity in line with the increase, over time, of the traffic. This is achieved by specifying that the actual level of service (LOS) may not fall below a particular level, or increase above a predetermined volume/capacity ratio.

Pavement performance requirements are comparable with international trends and cover parameters such as road roughness (riding quality), surface friction, rut depth, faulting and macro texture depth. Performance requirements regarding operations and routine road maintenance are similar to the discipline specific contract forms above.

A distinct advantage of this form of contract is that the longer life cycle of 30 years allows the Concessionaire more flexibility in managing its risks.

## **7. CHALLENGES**

The evolution of performance based management in SANRAL is not so much dependant on the significant lessons learned over time, but more on the continual discipline of observing, reviewing and refining of specifications in order to create sensible and sustainable performance specifications. We continually ask ourselves what is a realistic and achievable benchmark? How do we specify a performance requirement or target? How and what do we measure and what measure will be sustainable? How do we control, check and verify – and establish simple checking and an easily managed system.

Other challenges in this regard are:

- To identify the changes or adjustments necessary to change from method or end-product specifications to performance specifications.
- How to break the contractors' culture of providing the product at the lower end of the specification, with the least risk and responsibility?
- What is the ideal lifecycle for a product or combination of products for a contractor to sufficiently manage his risk and minimise his cost.
- How do we ensure optimal value for money in the design of performance specifications, i.e. under what circumstances will risk attract an undue premium and when is it more controllable and manageable.

## **8. CONCLUSION**

Our main challenge in the optimisation of management is to design and apply performance criteria that can act as a value added extensions to the various management roles and components in the Road Transport System. Simple principles such as:

- transferring of risk to party or parties who an best manage the risk,
- reasonable and practically achievable requirements,
- promotion of self checking mechanisms,
- creation of ownership through contractual mechanisms,
- using the best combination of incentives and disincentives to achieve desired outcomes, and
- sustainability of the performance application

should always be considered when designing and optimising performance management criteria. The secret of successful performance management is to continuously monitor and assess the actual results of performance management applications with contemplated outcomes and industry benchmarks, and to ensure that the application is well aligned with the operating and contractual environment with regard to sustainability.