

# DEVELOPING APPROPRIATE MANAGEMENT AND PROCUREMENT APPROACHES FOR ROAD MAINTENANCE

by

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## ABSTRACT

*This paper reviews experience of using the private sector for undertaking road maintenance in developing countries. It identifies the various organisational options for the client and supplier roles, key factors in establishing a competitive environment and building contract maintenance capacity, and the potential cost savings therefrom. It includes the following key messages:*

- *The private sector can effectively contribute in a variety of roles, most notably as a contractor, but also in the role of road manager.*
- *Stable funding and a conducive, enabling environment are prerequisites for privatisation and contract maintenance.*
- *Competition, linked to clear specified standards and activity definitions, is more important than privatisation.*
- *The size and scope of contracts will affect the extent of competition, and care and appropriate regulation is required to allow effective development of small-scale contractors.*
- *Apportioning risk must take due account of the capability of the contracting industry to accept risk, and is best allocated to the party most suited to cope.*
- *The management of change and increased competition require clear aims and objectives, and are best introduced in a phased manner.*
- *The development of sound business practices and capabilities within client and supplier organisations is essential.*

## 1. INTRODUCTION

The importance of addressing road maintenance properly is now well understood and is illustrated by the consequence of neglect. For example, the World Bank (Harral and Faiz, 1988) has estimated that of the 85 countries receiving their assistance for roads, the cost of reconstruction has been between three and four times the cost of the preventative maintenance that should have been undertaken earlier. The effect on road users is also significant, with vehicle operating costs increasing by similar or greater amounts. The effectiveness and efficiency of road maintenance can be improved through increased competition, clear separation of client and supplier roles, and the adoption of specific standards and activity definitions. As a result, significant economic benefits can accrue.

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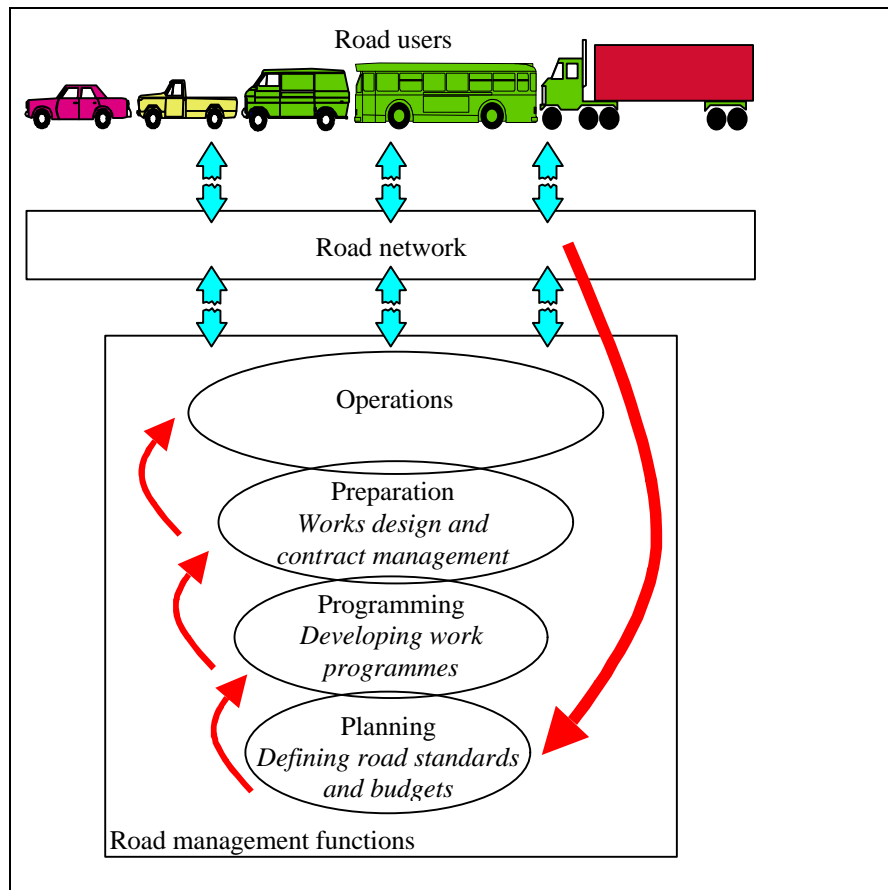
The Road Management Committee of PIARC (Montreal Congress, 1995) have already shown that the majority of periodic maintenance work is undertaken by private contractors and the majority of routine maintenance is carried out by direct labour organisations (DLOs). There is a general perception that DLOs are inefficient whereas private contractors are efficient, and this has created a pressure to make more use of private contractors for maintenance works.

This paper is based on a study funded by the UK's Department for International Development (DFID) to identify the different contract-based approaches adopted worldwide for increasing the use of the private sector for road maintenance, and to identify the necessary steps to successful commercialisation of operations. The study aimed to provide a critical review that would be useful to those countries currently considering such initiatives, and complements DFID's overall aims to increase productive capacity and economic efficiency by creating a competitive environment and employment opportunities for wider sections of the community. The methodology used was to review published information and to supplement this with case studies from the UK, Ghana and Colombia. The review of published information is contained in a paper presented to the XXIst World Road Congress (Madelin and Parkman, 1999). This paper summarises the overall findings and describes the country specific case studies.

## **2. ORGANISATIONAL ROLES**

### **2.1 Different Functions of Road Management**

The management of road maintenance activities can be viewed in terms of four main functions: strategic planning, programming, preparation and operations (Robinson and others 1998). The relationship between functions is illustrated in Figure 1.



**Figure 1 Road management functions in relation to the road network and users**

Maintenance at the operational level is optimised through maximising the efficient and appropriate use of the resources of labour, materials and equipment. Depending on the relative costs of labour and equipment, the use either of labour-intensive or equipment-intensive operations might be appropriate. This will have an impact on the way that operations are undertaken. An implication of Figure 1 is that, if road maintenance at the point of delivery is to be ‘optimised’, then there is also a need to ‘optimise’ the higher level functions of planning, programming and preparation. But the higher level functions will need to reflect the needs of the road user on the network. An important conclusion is, therefore, that any successful change to improve operations should be driven from the needs and requirement of users and the network (‘bottom-up’), and considerations concerning the potential of the contracting industry. This study focuses principally on the operations function.

## 2.2 Organisational Roles

Road network management is carried out by organisations that perform a number of different roles. Different terms are applied in different countries, but the following are used in this paper.

### *Owner*

The role, or organisation, responsible for funding, establishing road policy and the legal and regulatory framework for management of the road network. Typically, this will be

a ministry of transport or works acting as the de facto owner of the network on behalf of the state.

*Administrator*

The role, or organisation, responsible for implementing policy and ensuring that the performance of the road network meets the overall political and economic aims of the owner. In many countries, this is referred to as the road authority or agency.

*Manager*

The role, or organisation, responsible for specifying activities to be carried out, supervising, controlling and monitoring activities. In most situations, the manager role is combined with that of the administrator, but increasingly worldwide there is a move to appoint managers under contract (typically, engineering consultants).

*Contractor*

The role, or organisation, responsible for delivery of operations by executing or undertaking works for the road administrator.

Within the various types of organisations, functions may be performed or work undertaken under contractual or other types of relationship where the roles of the ‘client’ (or ‘customer’) and ‘supplier’ (or ‘provider’) are identified formally. For example, the owner may be the client for an administrator who is supplying road management and works execution services; the manager may be the client within the administrator’s organisation responsible for procuring works execution services from an in-house works unit or external contractor. Thus a chain of client-supplier relationships may exist within the road network management system.

### 2.3 Organisational Models

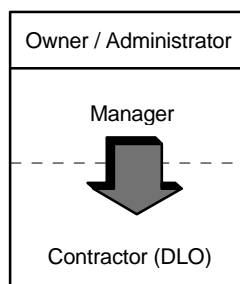
A number of organisational models exist for delivering road maintenance. The models differ in the way that the four roles mentioned above are set up and relate to each other. Different models will be adopted to reflect different political requirements for service delivery.

The following paragraphs set out the different models, in an order which represents, in general, the evolution of delivery of road maintenance for many road agencies worldwide.

The order represents an increasing transfer of risk and responsibility to the ‘supplier’ (see 4.4).

*In-house works unit (DLO) model*

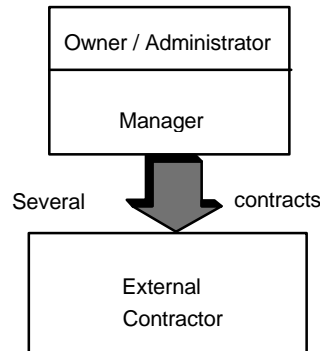
This is the traditional model for undertaking maintenance works (Figure 2). In this case, the administrator, manager and contractor are all part of the same organisation. In many cases, this will be the organisation of the owner, such as in a ministry of public works.



**Figure 2 In-house works unit (DLO) organisational model**

*Conventional contractor model*

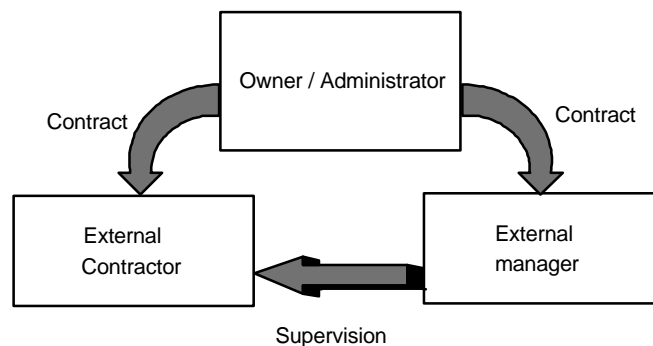
In this model, the road administrator, who lets conventional civil engineering contracts to an external contractor for carrying out the works (Figure 3), takes the manager role. The model has been widely used for carrying out development and periodic maintenance works. It is less widely used for carrying out routine and special maintenance works.



**Figure 3 Conventional contractor organisational model**

*Conventional contractor-consultant model*

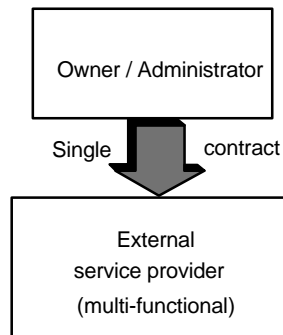
In this model, the road administrator lets contracts for both the manager and contractor roles. Consultants typically undertake the role of the manager and have the task of supervising the work undertaken by contractors (Figure 4). Examples also exist in the United Kingdom (Robinson and others 1998) where an in-house works unit has been awarded a contract after competition with the private sector, but with an external manager appointed under contract. The external manager then supervises the internal works unit.



**Figure 4 Conventional contractor-consultant organisational model**

*Total service provision model*

In this model, a single contract is let by the road administrator to the manager (Figure 5). The manager is then responsible for providing all services to the administrator. The manager organisation may choose whether to undertake the contractor roles itself, or engage contractors, either on a competitive or a negotiated basis. There are limited existing examples, although this type of arrangement is gaining favour. It represents the most significant transfer of risk to a private contractor and requires a mature contracting industry.



**Figure 5 The total service provision organisational model**

This study has reinforced the view that separating the ‘client’ and ‘supplier’ roles within organisations is the most important starting point in improving the delivery of road maintenance. In many cases, the client and supplier roles have been so mixed up that the prime task of maintaining the roads has become submerged beneath the more pressing problems of labour management, trade union pressure or political patronage. Formalising client-supplier relationships through contracts or agency agreements is helpful in clarifying roles and in increasing effectiveness since it increases the specificity of organisational functions (Israel 1987) and provides a greater focus for activities.

However, the ability of role clarification to improve performance may be constrained by external factors. Constraints may include issues such as:

- Inadequate or unstable funding
- Lack of flexibility in the governmental budget process, which fails to account for all costs, and prevents costs being assigned to specific activities
- Approval processes that are beyond the control of the client
- Recruitment and personnel policies restricted unduly by legislation
- Inflexible national procurement processes

### **3. ESTABLISHING A COMPETITIVE ENVIRONMENT**

#### **3.1 Benefits of Competition**

Whereas increasing specificity has been identified as the first requirement for improving organisational effectiveness and efficiency, the second requirement is to subject organisations to competition (Israel 1987). This study reinforced this finding. It confirmed that competition rather than privatisation is a major driver of improved efficiency. Competition creates a climate that can reduce cost while maintaining quality through:

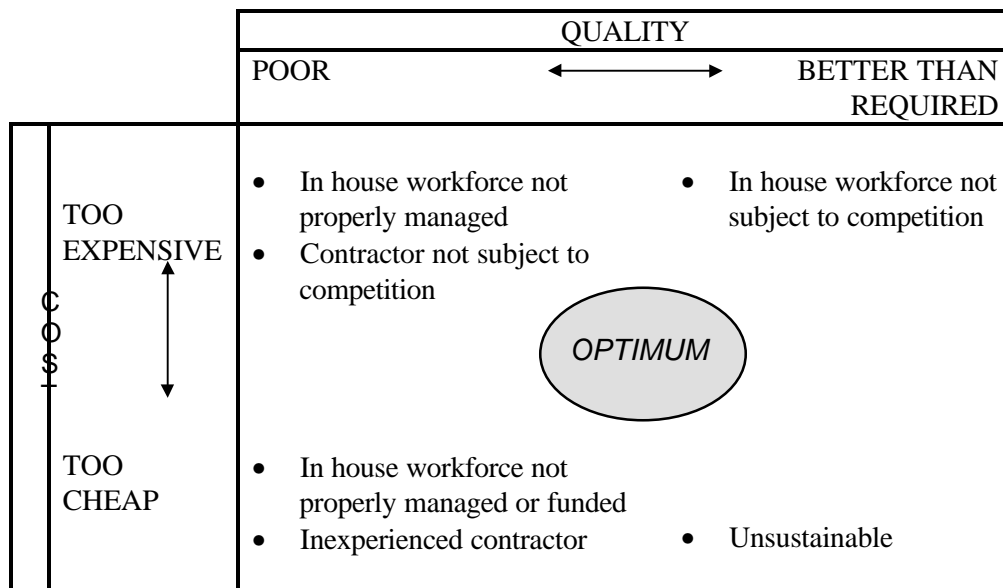
- Challenging people to rethink ways of working
- Encouraging innovation, learning and the adoption of new ideas
- Balancing risk with reward
- Making better use of information
- Identifying and filling gaps in knowledge

However, the introduction of competition, and business-oriented objectives, into a public organisation requires a change in culture, and the implications can be threatening to existing civil or public servants. The traditional pattern of centralised control, supported

by a defined and regulated bureaucracy, need to be changed into a form of organisation where responsibility is delegated internally, and externally through contractual relationships.

### 3.2 Environment for Competition

Competition can be based on price, quality, performance, or a mixture of all three. The aim of competition should be to gain work of sufficient quality at the most economic price. The relationship between quality and price, and the consequences of competition, is illustrated in Figure 6.



**Figure 6 Quality, cost and competition**

Examples of different types of competition include:

- Open competition
  - private sector bodies bidding against each other
  - public and private sector bodies bidding against each other
- Closed competition – bidding between pre-selected parties
- Direct appointment – single tender
- Benchmarking – public and private sector performance compared with best practice benchmark values

Without genuine competition, the existence of monopolies can put effectiveness and efficiency at risk. Experience from countries such as Sweden warns of the tendency of mergers and take-overs in the industry to create a supply monopoly. This can be countered by ensuring contracts are of a small enough size to maintain competition, but this strategy does require more client management. Conversely, larger longer-term contracts will be required where there is a need to invest in specialist equipment. Only large contractors will be in a position to undertake such work (Madelin 1994, Lantran and Morse 1995).

A supporting contracting environment is crucial to the success of competition involving the private sector. In addition, the competitive environment should seek to balance the benefits and risks. Typical aims should relate to:

- Customer care - recognising the need for service delivery to please the customer
- Asset management - maintaining the value of the asset
- Efficiency - improving productivity and reducing costs
- Effectiveness - the right task at the right time
- Quality - appropriate speed of response and quality for the activity and budget
- Flexibility - ensuring that the client has real options for service delivery
- Public/private - whether any minimum public sector capability is to be retained

### **3.3 Constraints**

Typical constraints, which limit the gains to be made, from competition for lower income countries and small local contractors include the following (Larcher and Miles 2000).

*Financial:*

- Difficulty of obtaining bonds and loans from banks who perceive contracting to be high risk
- Clients being slow to pay and requiring unrealistically high bonds and guarantees

*Contractual:*

- Overly complex contract documents biased against small contractors
- Contractors inexperienced in producing tenders
- Tender systems awarding contracts to unrealistic lowest bidder, who is often incompetent and unable to carry out work at bid price
- Contract documents biased against labour-based techniques

*Technical:*

- Specifications often vague or ambiguous
- Lack of engineering skills and inadequate site supervision

*Materials:*

- High variability of quality and cost

*Business:*

- Lack of work continuity and availability

Workshops and meetings can be held to increase knowledge of these constraints, and to advise on possible means of addressing them. These can often be undertaken as part of a wider dissemination exercise for improved government policy for management of the road network. For example, Honduras instigated a national campaign to disseminate how it was planning to increase use of the private sector (Gyamfi and Ruan 1996). A similar approach was adopted in Colombia. In industrial countries, where competent contractors already exist, there may also be a need to involve firms in a dialogue to facilitate the introduction of contract maintenance. For example, Berkshire County Council, which was one of the first local authorities in the United Kingdom to make use of the private sector, held a series of meetings with contractors and performed a 'market testing' exercise. This involved issuing a draft bill of quantities and inviting three interested contractors to submit informal offers. Once this approach had become more established, other authorities merely invited contractors to submit expressions of interest to pre-qualify.



The introduction of competition will require a clear set of rules, which must be seen to be fair if those competing are to be encouraged to give of their best. Particular care appears to be needed when introducing competition in environments where there are possibilities for corruption and mismanagement. Competition (or the lack of it) is not the only difference between the public and private sectors, and other factors can affect the apparent competitiveness of an organisation. Competition rules between public and private sectors should take account of issues such as the following:

- Defining the type of work that is considered appropriate to undertake without competition, eg routine maintenance
- Defining the type of work for which the private sector will normally be invited to bid, eg periodic maintenance
- Establishing accounting procedures for in-house units to enable full costing to be undertaken, so that cost comparisons can be made with private contractors
- Establishing a system of independent audit to check on the process of competition
- Benchmarking the performance of in-house units and, if information is available, private contractors
- Defining the extent and form of competition, eg which activities should be subject to competition and whether competition between in-house units and private contractors is to be allowed
- Defining performance criteria, including penalties which could apply to poor quality work and performance, and a bonus system to provide incentives

There are many examples of successful transfers of personnel to the private sector. However, all have been introduced only after extensive consultations with those staff that will be most involved, and therefore affected by change.

## **4. PROJECT CASE STUDIES**

### **4.1 Countries Studies**

Case studies were undertaken in Colombia, Ghana and the United Kingdom. The case studies were chosen to provide practical examples of a range of countries, conditions and experience, with particular reference to the needs of low-income situations. The UK study provided a base-line comparison with industrial country experience.

### **4.2 Pre-Qualification and Tendering**

Ghana has developed a system of contractor registration operated by the Ministry of Roads and Transport. This enables each administration reporting to the Ministry to avoid pre-qualification since, for any advertised work, the contract advertisement specifies which class of contractors is allowed to tender. Contractors are categorised as *Roads, airports and related structures* (Category A), *Bridges, culverts and other structures* (Category B), *Labour-based road works* (Category C) and *Steel bridges and structures* (Category S). A contractor can be placed in more than one category if they can demonstrate the relevant competence.

Within each category, contractors are classified within four classes. A contractor in a given class is not allowed to tender for any single contract, or have work on hand in excess

of a stated threshold value. For a contractor to be rated in a given class, requirements must be met in terms of employing a minimum number of staff, having minimum values of assets and annual turnover, having certain recent work experience, and with minimum qualifications for key staff. Contractors are required to pay an annual licence fee for classification, and resubmit for classification every 2 years (Class 3 and 4) or every 3 years (Class 1 and 2), and to attend various training programmes.

In Colombia, the selection of labour-based micro-enterprises (MA) for routine maintenance is made solely on their anticipated ability to carry out the work. The road administration fixes the rates to be paid, so there is no element of price competition. The basis for selection is similar to a pre-qualification procedure and considers:

- Registration of MA with the appropriate bodies (eg local chamber of commerce or government training agency)
- Training record of members of the MA
- Experience in contracts of a similar nature
- Ownership of required tools
- Local residency

A similar system of selection has been used in Ghana following pre-qualification. This focuses on aspects relevant to each specific project, such as local knowledge and experience. This appears to support worldwide experience of the development of sustainable contracting industries, in which price competition is seen as an eventual goal rather than an initial requirement. The phased introduction of price competition in tendering in Ghana aims to proceed through the following steps:

- i Bidders are first provided with bills of quantities and schedules of rates which indicate all costs of materials, labour, equipment, site administration and overheads; they are required to tender a percentage to cover profit and other risks - similar approaches are still used elsewhere in the developed world (Miquel and Condron 1991); then
- ii Bidders are provided with bills of quantities and expected productivity rates, and are then expected to price all costs of materials, labour, equipment, site administration and overheads, with mark-ups for profit and risk; and finally
- iii There is totally unrestrained price competition

The development of acceptable cost and productivity rates is an activity to which contractors associations can usefully contribute, to ensure full stakeholder participation and agreement with the adopted approach.

### **4.3 Client Supervision**

The importance of client staff development is often overlooked. Client training can help with developing the in-house staff to supervise works. Relevant staff in Ghana attended the same courses as those for contractors. Client staff then received further 'on-the-job' training as required, and the case study suggests that a major lesson has been the realisation by the client that high calibre staff are needed for this role. Other experience (Miles 1996) goes further by recommending that a distinct training programme is required for client staff.

The supervision and monitoring of contractors will be an intensive activity and often client administrations will have insufficient resources or time for this. Colombia experienced this problem, so developed a system of community-based micro-enterprises for carrying out road maintenance. This approach was originally used in the 1980s but, by the early 1990s, the system had become ineffective because reforms in other areas had not adequately addressed the client role. One initiative to remedy this situation was the introduction of private road managers (AMVs) to identify needs on the network and manage the implementation of works by the micro-enterprises. A separate technical assistance project was set up, which identified a programme for development of AMVs, by establishing their responsibilities and a timetable for their introduction. Considerable interest was shown by the private sector, and interested parties attended training and dissemination workshops.

An AMV is responsible for about 150km of the network, which usually means managing the activities of between two or three micro-enterprises. An AMV will usually have an inspector who manages site activities, an office-based secretary to deal with the public, a driver and a vehicle, plus other administrative support. The role has attracted interest from both local consultants and individuals. The key requirement for their selection is that they are technically competent. However, they are also required to be professional, and aware of the needs of both road users and micro-enterprises from a societal point of view. Their selection is competitive, and is based on a combination of factors and their proposed cost.

In addition to managing the activities of the micro-enterprises, the AMV's carry out broader road management duties for the road administration. These include keeping an up-to-date road inventory and information on the road, identifying user satisfaction with the road network, identifying and planning future maintenance work, etc. Their payment is based on performance indicators related to these activities, and is also linked to the performance of the micro-enterprises. Whilst such a system might seem to encourage collusion between the AMV and the micro-enterprises, the clear link of their activities to the satisfaction of the general road user should mitigate against this.

#### **4.4 Contractors Associations**

Contractors associations can provide a strong focus for communications between individual contractors and various client authorities. Particularly where the contracting industry is developing, they can assist with identifying and articulating key problems and constraints. The experience of Ghana is particularly relevant. The Road Contractors Association (RoCA) was formed in 1993 from a previous more general Association of Civil Engineering and Building Contractors. This was in response to a specific need for an association of contractors addressing issues and problems peculiar to the road sector. It has a constitution, with by-laws, a code of practice and ethics, for which there are disciplinary committees to ensure each member complies. In addition, sub committees sit for various reasons, such as reviewing rates for work and conditions of contract. RoCA provides a forum for discussion and social support, an opportunity for business collaboration (eg co-ordinated bulk procurement of equipment), and representation. Members pay an annual subscription based on the size of their firm.

The Chairman of RoCA is a member of the committee that is responsible for classification of contractors. A RoCA representative also sits on the Ministerial Advisory Committee on new development projects. Perhaps a key role is that of the representative who sits on the Road Fund Board, thus representing their interests as stakeholders in the network. In

addition, representatives of RoCA can bring matters of concern to the various agencies' attention. For example, requiring contractors to register on an annual basis proved to be too onerous, so RoCA requested that this to be revised. Also, where agreed national rates for activities were found to be unreasonable, RoCA requested that these be revised by the agency concerned.

The Labour Based Contractors Association (LaBCA) exists for similar reasons to RoCA. Labour-based contractors consider they have a specific interest that is represented better by a separate organisation, although discussions have been held to consider the possibility of a merger with the RoCA. LaBCA was recognised officially by government in 1989, and its role was important since the labour-based programme was innovative and all parties were new to the approach. Concerns and representation of LaBCA are similar to RoCA. Specific concerns currently include the issue of competitive tendering and the possibility of equipment-based contractors gaining a larger share of the market at the expense of labour-based contractors.

#### **4.5 Finance**

Adequate finance is key to the success of the sustainable development of contractors. The fundamental starting point to achieve this is for there to be reliable and timely payment mechanisms from clients to suppliers. The case is particularly important for labour-intensive contractors, whose major resource is the labour they employ – if payment is not timely, then they are unable to pay their staff and social problems will arise. Reliable payments also assist the cash flow of consultants and contractors, and facilitate the development of a stable industry. For example, the recent restructuring of the Road Fund in Ghana has improved the reliability of funding, and the banks are now more amenable to lending to contractors.

Traditional construction projects require bonds and sureties to be presented by the contractor. However, for maintenance contracts, the need for such guarantees can be set for different sizes of contracts, such as (Bentall et al 1999):

- Major contracts: 10–12.5 per cent
- Minor contracts: 2.5–5 per cent
- Micro contracts: zero

The following measures can also reduce the burdens for developing contractors:

- Replace the bond requirement by appropriate pre-qualification procedures
- Governments can offer loan-guarantee schemes through commercial banks and in association with contractors associations, or through business credit agencies
- Reduction in retention money from the usual 10 to 5 per cent

#### **4.6 Equipment**

A major need for contractors to have access to finance is for the purchase of equipment and tools. Various approaches have been adopted to address this issue:

- The Colombian micro-enterprises are awarded a 20 per cent advance payment to help purchase tools and equipment; this is paid back over the term of the contract
- In Ghana, the Bank for Housing and Construction provides assistance to contractors in the form of bank guarantees and loans, as well as commercial banking services; in addition, it had set up a subsidiary plant pool company, which hired equipment funded by donor assistance to contractors

The plant pool in Ghana is no longer in operation. It appears that there is a culture within the country of ownership, rather than of hire, and contractors preference was to use only the pool as a last resort. With less than full utilisation, the rates for hire soon became uncompetitive, and some private firms offered equipment at better rates for those contractors who did wish to hire. In addition, the plant pool was based in Accra, which made it difficult for contractors based further afield, thus illustrating the importance of local factors.

#### **4.7 Performance-Based Contracts**

There has been a general move worldwide towards performance-based contracts in recent years. These require the maintenance contractor to take on responsibility for managing the road network, where payments are linked to maintaining a defined road standard. In many cases, this has been associated with reduced client supervision.

The Colombian system, described above, has now moved to performance-based contracts. This generally requires a mature client and contractor, and a flexible, partnership-type attitude to the work. A key to success is the definition of clear objective indicators to measure performance. The Colombian experience suggests that the road management process must be related clearly to the needs of road users and to the local community, to mitigate problems.

## **5. CONCLUSIONS**

### **5.1 Organisational Models**

There are a number of models for considering the involvement of the private sector. These models vary in the way the relationship is defined between the key roles of:

- Owner (eg Ministry of works or transport)
- Administrator (eg road administration or local authority)
- Manager (eg road administration, local authority or consultant)
- Contractor (eg in-house works unit or private sector contractor)

The private sector can undertake any of the last three roles, but not easily that of the owner.

### **5.2 Client-Supplier Split**

Organisational change involving client-supplier separation, with formal agreements between the parties, is required if performance is to be improved. This change, together with an improved process of procurement, can contribute significantly to efficiencies, regardless of who does the physical work.

### **5.3 Funding Mechanisms**

A stable funding mechanism is essential if privatisation or contract maintenance are to be considered. Unstable funding can also be a cause of inefficiency in an in-house unit and can result in a reluctance of private contractors to bid for work.

### **5.4 Competition is More Important than Privatisation**

Evidence confirming the importance of competition as a spur to efficiency is growing. Efficient public sector works units can compete with contractors given the chance to do so. Clearly specified and enforced maintenance standards and activities are the keys to greater cost-effectiveness.

### **5.5 Packaging of Contracts**

The size and scope of contracts will affect the extent of competition and the size of contractors bidding for work. The initial aim may be to encourage small contractors, but the trend is towards large contracts and large contractors. This reduces the cost of supervision and introduces benefits from economies of scale. However, for these contracts to be successful, a partnering approach involving collaboration between the parties is a pre-requisite.

### **5.6 Monopolies**

There might be a risk of private sector monopolies developing when undertaking long-term maintenance contracts. Maintaining an efficient in-house capability can guard against this by providing a price benchmark.

### **5.7 Management of Change**

The introduction of competition requires clear aims and objectives, careful planning and managing, and is best introduced in a phased or evolutionary way. In-house units can transfer successfully to the private sector, providing that the staff are fully consulted on the changes. Private contractors can play a greater role in road maintenance, but may require support and training.

### **5.8 Cost Savings**

The introduction of competition, particularly subjecting in-house units to competitive tendering, has resulted in significant cost savings of the order of 5 to 20 per cent. But there is evidence that the savings can reduce in subsequent tendering rounds if there is insufficient competition.

## **6. ACKNOWLEDGEMENTS**

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