Ensuring Value for Money in Infrastructure in Africa

REPORT

3

Managing the Implementation of Infrastructure Projects

November 2010

CABRI

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About CABRI

The Collaborative Africa Budget Reform Initiative (CABRI) is a professional network of senior budget officials in African Ministries of Finance and/or Planning. CABRI was officially launched on 14 May 2008 in Maputo, Mozambique. On 3 December 2009, CABRI became a legal and independent membership-based organisation.

CABRI's main objective is to promote efficient and effective management of public finances, which fosters economic growth and enhances service delivery for the improvement of living standards of African people. Specifically, the network seeks to:

- support senior budget officials in the management of public finance systems by developing appropriate approaches, procedures and practices;
- advance the development of member states by building capacity and promoting training and research in the field of public finance management, in particular from a practitioner's perspective; and
- develop and promote common African positions on budget-related issues of interest to Africa.

About the infrastructure dialogue

The three-day CABRI dialogue on financing and managing infrastructure projects brought together senior officials from the budget office and ministries of infrastructure from 12 CABRI countries. The objective of the dialogue was for senior officials to find better ways to plan and evaluate public investments, to discuss alternative ways for governments to finance these projects and to establish ways to manage expenditure on these projects during implementation to achieve value for money.

The dialogue was articulated around six case studies that investigated key decision-points in large infrastructure projects:

- wastewater public-private partnership in Egypt;
- hospital public-private partnership in Lesotho;
- the Maputo Port Concession in Mozambique;
- hydroelectric project in Sierra Leone;
- urban sanitation project in Guinea; and
- the Songo Songo Gas Project in Tanzania.

The Dialogue used case studies as learning tools to apply the approaches, concepts, frameworks and tools presented in the main papers to real-life situations. Participants analysed these case studies and came up with recommendations with regard to a course of action to resolve the problem presented.

Those case studies were supported by keynote papers with a particular focus on the following areas:

- the pre-contracting phase with a focus on appraisal;
- the financing of infrastructure projects with a focus on the use of public-private partnerships; and
- managing the implementation of projects from the government's side through monitoring and review.

The infrastructure dialogue was the first in a series of three dialogues on the financing and management of expenditure in sectors.

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PART 2

Acknowledgements

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Part 1

Implementation and monitoring of infrastructure projects: A risk-management approach

Taz Chaponda and Tony Milanese

1. Introduction

Once infrastructure projects are appraised for construction, there is an ongoing commitment to achieving value for money throughout the project lifecycle. Large infrastructure projects often encounter cost and time overruns during construction. It is a fact that very few of the major projects procured internationally are completed within the project sponsors' originally estimated budget and time frame.

1.1 Even relatively small cost overruns can cause disruption when a project is part of a wider programme of expenditure. In extreme cases, where final costs turn out to be several times higher than originally estimated, the situation is unsustainable. Moreover, the responsible authority is faced with the problem of assessing the validity of additional financial claims.
1.2 There is recognition that infrastructure projects encompass a wide variety of works undertaken in the transport, water, energy and buildings sectors. By their nature, these can be complex undertakings involving a wide range of organisations, both national and international, as well as national agencies and private sector construction companies.
1.3 Unlike public-private partnerships (PPPs) where there is an effective transfer of risk to the private sector, most government-managed projects require a more systematic management of risk to avoid the cost and time overruns that are common in traditionally procured projects. In fact, the majority of publicly procured projects are not completed on time or within budget.
1.4 This paper looks at the key reasons behind such systemic project-management failures, which arise from an inability to manage risks adequately. The paper begins with considering a general risk-management framework and the main phases of the project cycle. Thereafter, it looks at two broad risk categories – macro-level risks and project-specific risks – and concludes with a discussion of risk-mitigation strategies.

2. Understanding the project-development process

In this paper, an infrastructure project refers to the development or improvement of land transport systems, public buildings, energy networks, and water supply and treatment works. Key social infrastructure (such as schools and hospitals) is also included in our definition. The basic aim of an infrastructure project is to implement an economically beneficial improvement, the objectives of which are determined in terms of technical performance, budget and time frame.

The development of infrastructure is a complex and resource-intensive process. It is possible, however, to analyse all projects in terms of a common lifecycle, which comprises a series of stages. These stages are illustrated in Figure 1, and brief explanations of each stage follow. Although the stages are depicted hierarchically, some of the stages can be undertaken simultaneously.

Project specification and feasibility

The first stage of the project cycle is the definition of user requirements and how they can be satisfied. This includes deciding on the size and quality of the facility that is required. Different options will be discussed at this stage and will be evaluated in terms of broad cost estimates, expected operational performance and economic benefit. Preliminary cost estimates may be attempted at this stage.

Cost-benefit analysis, whether formal or informal, will follow the initial specification of a project. The purpose of this is to test whether the project as specified will be economically viable or

whether it will generate good value for money. Leaving such feasibility studies until after a project has started may result in potential problems not being revealed in time to influence project planning. Although the economic and financial evaluations of the project are usually the most important elements of the feasibility stage, external factors can play a major role in determining whether a project will proceed. The project's political context, its relationship with the local community, the general economic environment, its location and the physical conditions in which it will be built are the most important external factors.

Outline design

Work will then be undertaken to develop the plans for the project. These plans will establish the general parameters of a scheme design and will include all the project's major components. The purpose of outline designs is to provide:

- the basis for the detailed design and accurate cost estimates of the scheme; and
- the necessary information for the planning and land-acquisition process.

Finance

Financing involves the arrangement of adequate funds to pay for the development of a clearly defined project. In some cases, it is also necessary to raise finance to cover maintenance and operating costs.

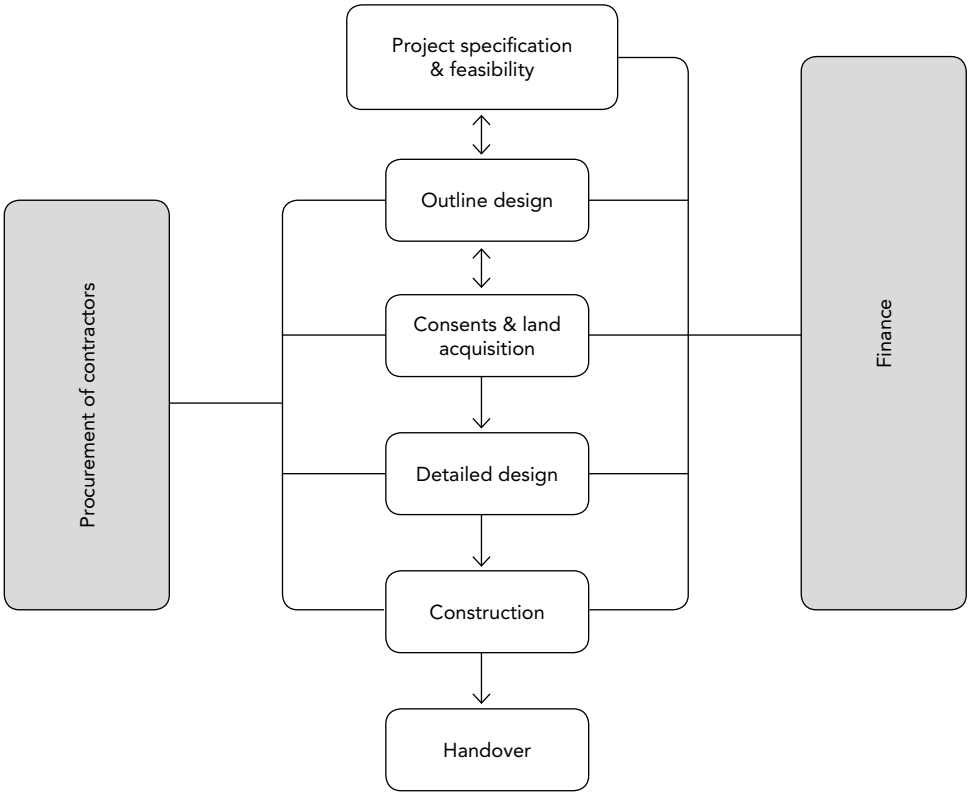
For most projects, the main elements of finance will be:

- *development finance*: to pay for the feasibility and initial design stages;
- *construction finance*: to pay for the capital expenditure;
- *operating-cost finance*: to pay for operating costs, including maintenance; and
- *contingency finance*: to allow for unexpected cost overruns and delays.

The structure and form of project financing will be influenced by the nature of the project. For some projects, the majority of funding will come from local or central government sources; in other cases, the project will be revenue-generating and this revenue will be used to repay loans and to cover maintenance and operating costs. Some projects may also involve a private sector contribution, in respect of which the private sector aims to own and control some or all of the assets.

The structure and timing of financial provision may impose certain constraints on the design and scheduling of the project. In the case of some projects that apply for external-aid funding, for example, very little detailed design work will have been undertaken prior to the award of the grant. This may be simply because all the funding for the project is not yet in place and/or the risk is too great to commit to even the design costs of a project that may not receive external funding.

Figure 1: The project cycle



Consents and land acquisition

Before construction work can start, the necessary consents and authorisations must be in place. The time taken to obtain these is probably the most unpredictable element of a large infrastructure project and can have a significant effect on the timetable and costs. In addition to institutional approval, consents may need to be obtained for health and safety, water, sewerage, waste disposal, fire certification, gas, electricity and highway rights.

Public consultation is a major element of the consents process and is becoming increasingly relevant for most African countries. Inadequate allowance for the required consultation may lead to unforeseen delays in project implementation. Environmental impact assessment (EIA) is now required for most large projects before consent is achieved. This also may take more time than anticipated.

A project cannot proceed if the project sponsor does not own or have development rights for the land in question. With projects implemented by local government authorities, the expropriation of land can be undertaken, but the existing owners have to be compensated and they can usually appeal against the sum offered. Appeals can be very time consuming, although in some circumstances a project may go ahead while the appeal is being heard.

Detailed design

The detailed design of a project is used to assess the quantities of materials required and the actual construction work involved in implementing the project. Drawings and lists of quantities are then used to produce detailed project costs and to establish an implementation timetable.

Procurement of contractors

Project procurement involves selecting a contractor to undertake the construction of the infrastructure. The conventional approach to procurement of public sector projects involves advertising for firms to tender for the work. These invitations may be open to all companies or restricted to a shortlist of preferred bidders. All invitations for major projects in the public sector should be gazetted and widely advertised in the media in accordance with the National Public Procurement Directives.

A contractor submits a tender that sets out the skills and experience of the company in undertaking similar projects, its proposed approach to the construction task, and its estimate of the cost of undertaking the work.

Many projects nowadays involve the procurement of contractors on a 'design-and-build' basis, where the contractor submits a design and tender on the basis of given specifications. Some projects may also involve the contractor providing all or part of the finance for building the project and for operating it after completion. Various terms are used to describe these contracts, the most common being DBFO (design, build, finance and operate). The construction contract, itself, is discussed in Appendix B.

Project handover

A date for the handover of a project by the contractor to the project sponsor is usually included as an element of the contract. For many reasons, however, the handover date may vary from that originally agreed to in the contract. Typical reasons for such extensions are discussed below. Many projects include financial penalties (or rewards) for late (early) completion of a project. A percentage of the total project costs may also be retained until the project sponsor is satisfied that the project has been completed to specification.

Another major consideration is the key players that are involved in the infrastructure development process. These key players are outlined in Appendix A.

3. The project risk-management approach

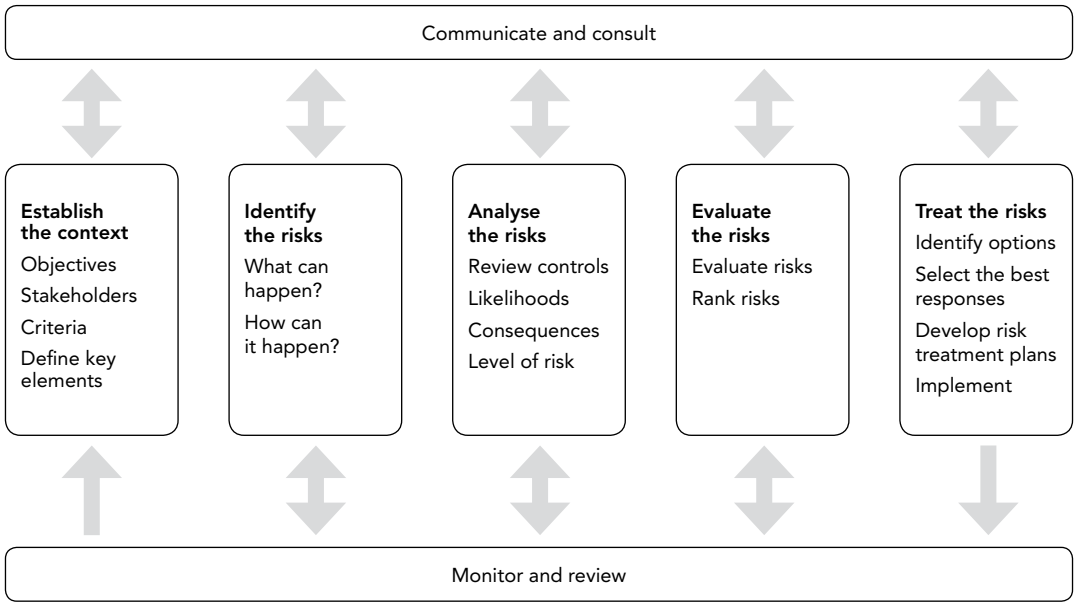
The objective of risk management is to identify and manage significant risks that could derail project execution.[1] There are several key phases, including feedback through a monitoring and review process. Risk management usually overlaps with other management processes and procedures, as many of the steps are undertaken as part of normal project management. This allows the project manager to integrate risk-management and project-management activities. The approach to project risk management depicted in Figure 2, which shows important questions for project managers, is consistent with international best practice.

There are broadly five steps involved in the risk-management process: establishing the context, identifying the risks, analysing the risks, evaluating the risks and, finally, treating the risks. These steps are quite intuitive and the real challenge is to apply them consistently and rigorously at key stages of the project. Right from the outset, the project planner must begin to identify and weigh the possible risks that are associated with large, complex projects. Some

1 The project risk-management approach is elaborated in greater detail in Cooper et al. (2004).

of these, such as design and construction risks, are explicit and obvious. Others, such as political risks, are subtle and indirect. All risks should be clearly identified and quantified, and a decision should be made as to what level of effort is required to keep them in check.

Figure 2: The project risk-management process



Source: Cooper et al. (2004)

Risk management is a discipline in its own right. It is important to approach the process as a full-time job, not as an add-on to the main project-management function. In fact, risk management is integral to project management and should be practised consciously at every stage of the project from project planning to monitoring and evaluation.

4. Macro risk factors

This section begins to look at macro risk factors that can have an impact on the course of a project. These factors are 'macro' in the sense that they are broad issues related to the context in which the project is planned and executed. They relate to the overall operating, economic and political environment, which impacts on project-specific issues that are dealt with later in the paper.

Both the macro and project-level risks must be assessed as part of the project-preparation stage, typically within the feasibility study. It is important to note that the sponsoring agency or line ministry has the primary responsibility for the risk assessment process. At the outset, the finance ministry may engage with the line ministry to raise major prioritisation or sequencing issues, but it is the line ministry that must convince key stakeholders of the project's merit. Once the feasibility study has been finalised, the finance ministry reviews it independently and can begin to challenge underlying assumptions, projected estimates and so on. However, when the risks relate to financing issues, such as whether or not to give guarantees to the private sector, the finance ministry gets directly involved and assumes responsibility for that risk factor.

Macroeconomic factors

The two most common macroeconomic variables that have an impact on project financing are inflation and exchange rate fluctuations. Levels of inflation vary significantly across African states, making this a serious risk factor on the cost side. The longer the expected construction period, the more account will need to be taken of expected inflationary price increases. This is particularly important where a public authority's expenditure programme is involved. Initial cost estimates must allow for the value that will have to be paid at the time the project actually goes ahead.

Inflation can act to increase the original estimates of construction costs. If the rate of inflation rises above the predicted level during the construction period, then the original cost estimate will be exceeded. Obviously, any other factor that delays a project will expose the project to the risk of further inflationary cost increases.

Political or technological factors may also affect one or more elements of cost. For example, increased labour mobility between different African countries and, say, China could lower the future labour cost element of construction projects. Indeed, Chinese construction companies are increasingly active across Africa.

The exchange rate is particularly relevant if contracting services or other elements of the project are to be purchased from other countries or regions. If exchange rates change beyond the level predicted by the project sponsor and the companies providing the services, then the cost of the project can increase. Of course, it could operate in the opposite direction, with the project sponsor taking advantage of a strengthening in the sponsor's currency.

Institutional arrangements

Every project must have a project team to manage the execution stage. The project team might also be involved in resource mobilisation. It follows that the project team will have an institutional affiliation, often with the line ministry that is responsible for the delivery of the project. Within the line ministry, the project team can be set up as a special unit under a broader division; however, the project team can also be based within the line ministry but be established as a special unit reporting directly to the permanent secretary. This would occur if the project were of a very high profile.

These different institutional arrangements have a bearing on how quickly project decisions are made and on whether additional resources can be secured. Where the project is embedded within a lethargic bureaucratic structure, the risk of project delays and budget problems is increased. In other words, project execution will be constrained by the government's current systems, notably the procurement system.

To avoid this constraint, governments often have created a special project-management unit (PMU). The PMU is given additional technical and financial resources together with a narrow mandate to get the project going as efficiently as possible. While this can bypass onerous bureaucratic systems, it introduces new problems. For instance, the staff of the PMU is often on a higher salary structure than their peers in the line ministry, which breeds discontent amongst the regular ministry staff. Development partners have been criticised frequently for favouring the PMU approach, in which they even have introduced their own procurement systems that are distinct from public sector systems. Critics have argued that this undermines existing public sector systems.

A hybrid approach exists in which the project team within the line ministry hires technical consultants to assist in the implementation of the project. In this scenario, the line ministry remains responsible for overall implementation but outsources specific technical tasks. If the ministry is well run, and the consultants are capable, such an arrangement can work effectively.

Recognising the structure and location of the project team can help to unblock project delays. If the structure is wholly unsuited for the magnitude and type of project, it may be necessary to propose changes. However, the ideal situation is where the project team is properly composed right from the outset to ensure efficient and rigorous decision-making that is based on facts and technical data from the project. The composition of the project team is also crucial for project governance. Sound governance can be promoted by ensuring a separation between the project-management team and the oversight committee (or board). Donors and other partners can sit on the board, but should not be involved in day-to-day decision-making.

Political interference

Most large infrastructure projects have strong political undertones because of the vast fiscal resources required and the amount of attention they draw from the public. If such a project is delivered according to expectations, the government of the day wins a lot of praise and possible re-election. Conversely, if the project fails to deliver, it stands as a constant reminder of failed political promises. For these reasons, politicians rightly take great interest in the delivery of large infrastructure projects. What becomes more difficult to determine is the appropriate level of involvement for a political principal in such a project.

There is a clear political role to be played at the initial stage of setting overall development priorities. Often, the priority-setting task is carried out by political principals, in the form of either the Cabinet or a Cabinet-appointed committee. Typically, once a project has received backing at the executive level, the legislative branch of the government will be called upon to give its views on the suitability of embarking on such an investment, especially if it pertains to a national-level priority project. Although the legislature is the ultimate authority on passing spending bills, it is the executive that will hold sway in most of these matters, certainly on the African continent.

Until this point, there is no real issue with political involvement. In fact, political oversight remains an important requirement throughout project execution to ensure that the funds allocated to the project are properly spent by the appointed authority. Political risk emerges where politicians begin to take a direct interest in the management aspects of project execution, including procurement, staffing and project design. The risks are very real and must be guarded against, particularly within the procurement process, which offers ample scope for corrupt practices. If potential bidders suspect that political interference will be a major factor during procurement, many are likely to withhold their participation, thereby reducing the level of competition. Once competition falls away, there is a greater likelihood that the remaining bidder(s) will not offer genuine value for money to the procuring institution.

Apart from the governance issues raised above, another risk arises where politicians begin to impose their views on the design aspects of a large project. For instance, a feasibility study might show that the appropriate size for a new airport is one million passengers per annum. Yet, due to 'national pride', political leaders could demand that the airport be double that size. Indeed, there are often tensions between what is technically desirable and what is politically expedient. It is quite common for the political preferences to override what is economically and financially prudent, which is why the 'white elephant' phenomenon is so widespread. Once started, a high-profile infrastructure project is often politically problematic to stop. So,

when the true costs do become apparent, it is difficult for authorities to refuse the additional funding required to complete the project.

Mitigating political risk is difficult because it is not always apparent that there are vested interests involved, and even when there are, technocrats operating at the project level do not have the leverage to act. One possible approach is to ensure that there is a regular flow of information from the project to other stakeholders, including other government departments, civil society and the legislature. A high level of transparency keeps political interests in check through questions raised by Parliament and civil society. However, this approach is constrained by the need to keep secret certain commercial aspects of large projects. For the finance ministry, publishing anticipated and actual project budgets contributes towards raising the level of transparency.

Community participation

As noted earlier, large infrastructure projects inevitably draw public attention because of the demand on fiscal resources and the existence of competing priorities. For instance, if the public transport department is planning to build a new highway, and to finance this through a tolling system, there are likely to be many questions from the public, such as what route the new road will take and whether existing houses in its path will be affected. There would also be concerns about the impact of the toll on commuters who might have no alternative to the new route. These are major social issues that need to be considered during the early planning phases of the project.

Indeed, any project that relates to the delivery of critical social and economic infrastructure will draw public interest. A case in point is water services, because large investments in this sector are likely to have an impact on water tariffs. However, due to widespread subsidisation by the government, prevailing water tariffs are often below the level required for full cost recovery. Yet, the inadequate tariffs directly contribute to degradation of the infrastructure assets and the resulting poor service delivery. Project sponsors in sectors such as water and energy need to gauge public sector sentiment and to consult widely, especially with civil society organs, to ensure that there will be no major outcry when the project begins or when the pricing structure has to change to sustain the new level of service delivery.

In some countries, failure to properly consult with communities affected by a new development could lead to a legal challenge. These communities are entitled under the law to protect their interests and could demand financial compensation or even an amendment of project parameters to avoid being inconvenienced. Either action would have a negative impact on overall project costs.

Environmental issues

The environmental impact of project development has become a central concern in project planning. About two decades ago, environmental impact was not taken very seriously in African countries, and environmental concerns would certainly not have been the cause of project delays and cancellations. This has changed as international and local project financiers usually insist on an EIA, which is now also a standard feature of the detailed feasibility study that is required before project approval can be secured. The EIA seeks to ensure that any environmental impact is contained within the permissible legislative standards (e.g. for pollution levels) and, where there is risk of a large negative impact on the environment, that adequate risk-mitigation measures are put in place.

For project managers and planners, sufficient time should be set aside for this planning requirement. On large capital projects, the EIA can take up to a year to complete and is, therefore, a potential source of delay. Moreover, civil society groups are quick to protest if a project proceeds without proper clearance from the authority that is responsible for enforcing environmental protection legislation. The main message for project planners is to identify the main environmental issues very early on in the project cycle and to initiate an EIA process well in advance of the project start date, to ensure that unwarranted delays or cost increases do not arise.

Examples of project delays arising from EIAs abound. In South Africa, the state-owned transport corporation, Transnet, found one of its major port-extension projects delayed because the EIA had identified a rare species of frog in a wetland near the Cape Town harbour. Significant time delays were incurred while deciding what to do about the frogs.

5. Project-specific risk factors

This section first focuses on the factors that determine initial project costs and then examines some of the more important determinants of cost changes over time. No two infrastructure projects cost the same amount of money, no matter how similar they are. Apart from basic technical factors, the wide range of economic and institutional conditions in different countries always leads to variations. Nevertheless, the fundamental project costs are based on the actual cost of the land, materials, equipment and labour in the region where the project is procured. These basic costs vary depending on a number of factors, which are discussed below.

Factors that determine initial project costs

The project specification

The specification defines the physical attributes of a project. With a road, for example, forecasted levels of traffic will lead to specification of the required length, depth and width of the road, the material to be used for surfacing it, the number of lanes, bridges, junctions, and so on. For buildings, the required function and expected occupancy rate will lead to specification of the total floor space and floor plate size, height, internal and external appearance, floor loadings, heating and lighting requirements, and so on. Generally, the more detailed the specification and the larger the project, the more expensive it will be.

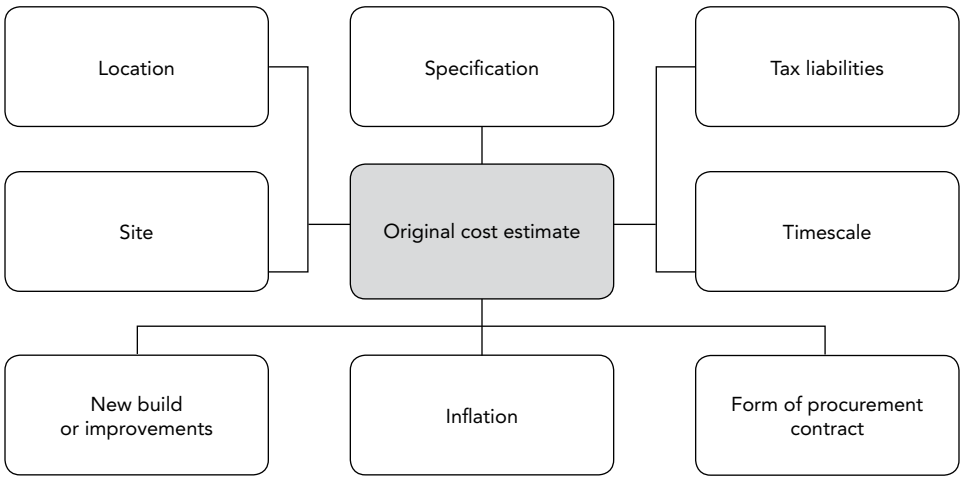
The key issues concerning the project's specification and feasibility relate to whether there is a need for the project and whether a budget cost (the maximum cost a sponsor would wish to pay for the project) has been identified by the sponsor. It would also be appropriate at this stage to check if a cost-benefit analysis has been undertaken and a project manager with proven experience appointed.

Even at this stage, it is necessary to check the design and architect's technical specifications to see that they are within budget and do not hide additional costs. There is the further risk that the architect may not be impartial and may favour a scheme that suits a particular manufacturer or supplier of equipment or materials. The architect's reports need to be scrutinised carefully. Examples abound of construction being influenced by an architect's choice of material and equipment.

The project description should not be technically complex. The project's objectives should be clear, consistent throughout the submission, and achievable. Simple questions should be asked, such as:

- Where is the project being undertaken?
- What exactly does the project comprise?
- Why is the project being undertaken – what is the demand?
- What previous phases have been undertaken and what phases are not included in the application (including costs)?
- Is this project directly dependent on any other projects?
- Who is undertaking the project and over what time period?

Figure 3: Key determinants of cost



Location

Location affects project costing by virtue of institutional factors and geographical realities. Institutional factors can affect initial project cost estimates in a several ways. Consent procedures, in particular, may be more arduous in some countries than in others, affecting the time it will take to implement a project successfully. Allowance for the costs involved in sustaining a long public consultation exercise is an example. Where a major project is likely to be strongly opposed on environmental grounds, increased costs may have to be allowed for environmental mitigation measures.

In geographical terms, construction and material costs, land costs and design standards differ widely across African countries, because of the varying distances from suppliers, climate and weather, and general market conditions. Even within a country, variations exist depending on whether a project is to be implemented in a peripheral or central area, or in an urban or rural context.

Generally, the more remote a project is, the more expensive it will be because of the cost of transporting construction materials and equipment to the site. In an urban location, land costs are usually much higher.

Form of procurement/contract

The form of procurement and contract used by the project sponsor can alter the estimated cost of a project. Cost savings may be made by means of lump-sum contracts, although these are usually marginal in relation to the total project costs. DBFO contracts, which seek to transfer most of the risk of cost overrun from project sponsor to contractor, may yield savings in some circumstances.

Site characteristics

A site can be affected by soil and drainage conditions and access restrictions, which can have an impact on the original cost estimates. The amount of excavation, piling and foundation activity required are particularly affected by poor ground conditions. Where there is uncertainty about ground conditions, accurate project costing cannot be achieved unless a soil survey is undertaken. This may require the sinking of boreholes to obtain soil samples at different levels beneath the surface.

An obvious situation affecting communities worldwide is the need to redesign and refurbish dams, because of the unanticipated consequences of poor ground conditions. In Cameroon, dams constructed on sinking land require substantial rebuilding at great expense.

New build or improvements

The construction of new infrastructure is very often more expensive than the improvement of existing infrastructure or the refurbishment of buildings. This is primarily because the 'non-building' costs, such as land purchase, foundations, service provision and so on, do not have to be included when existing structures are upgraded.

Tax liabilities

An organisation is generally liable to pay taxes on its purchases. However, some organisations and types of project are exempt from taxes, or else these can be reclaimed. Local government projects and infrastructure for public use are examples. Other public or quasi-public sector companies, voluntary and private sector organisations are liable, and tax costs can have a significant impact on gross construction costs.

Timescale

Generally, the longer a project takes, the greater the costs. Project timescales are dependent on the project's specifications. Usually, the larger the project, the longer it will take to implement. This is not always the case; if substantial additional resources are used, project implementation can be accelerated.

In some cases, work on a project may take a lot longer than expected, because its phasing is dependent upon other, linking projects or public finance programmes. A project that involves non-continuous phases is usually more expensive than one undertaken without interruption, because of the additional costs involved in re-mobilising plant and contractors.

Factors that change costs over time

Once implementation begins, a project's costs rarely remain static. As further information becomes available, the costs may be further defined. Yet, even when a cost has become firmly fixed, there are numerous factors that can lead to its increase.

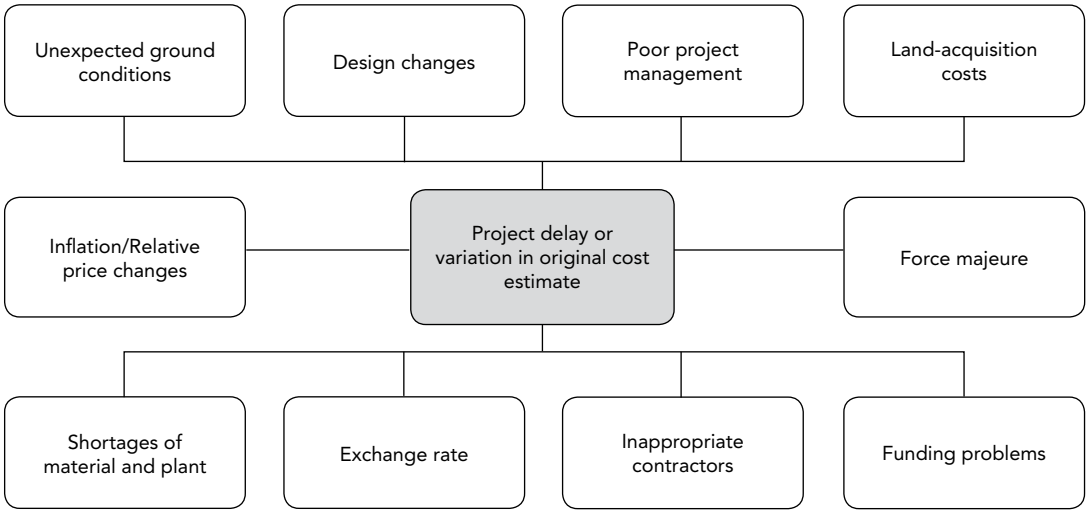
Delays are a major factor. Whatever the reason, a delay almost invariably increases budget costs. Many events – both foreseen and unforeseen – may have contributed to the delay. In the context of specific programme funding, time and cost overruns have obvious implications for the number of projects that can be funded within a programme period, and for the scale of the outputs and impacts generated.

Research has indicated that many aid-funded projects experience a range of problems in both the pre-construction and implementation stages. These lead to projects overrunning either in time or costs. A key consideration in the context of aid funding is the time at which an application for funding is actually made. Applications can be made at three main points:

- very early in the project cycle, when broad cost estimates only are available;
- on the basis of tender prices for the work to be undertaken; and
- retrospectively, where the project has been completed but a grant is still required.

The level of certainty about the final or outturn costs varies for each of these three scenarios. Obviously, if an application comes forward very early in the project development cycle, then there is a much greater chance that the project will experience time and cost overruns. Figure 4 illustrates some of the factors that result in projects being delayed or costing more than originally planned.

Figure 4: Cost-changing factors



Poor project management

The role of the project manager or project-management team is probably the most important element in containing the costs of a project. It is often true that a poor project with a good project manager will be completed satisfactorily; but even a good project, if combined with poor project management, almost always will face serious difficulties.

A poor project-management structure will have an impact at all stages of the construction process, leading to:

- a lack of planning and co-ordination;
- poor communication between members of the project team and the project sponsor;
- failure to identify problems and institute necessary design and programming changes; and
- a lack of control over time and cost inputs.

During the construction phase, there must be a project-management structure in place that allows frequent reporting of progress to be made between the contractor and the project sponsor. Most of the time and cost overrun factors that can occur, do so during the construction phase. Therefore, the appraiser must establish that the main risks taken into account in the contingency calculation are managed on site.

Design changes

A change in a project's design can arise for a number of reasons. It may be that the project sponsor wants additional elements to be included in the project, or changes to be made to existing ones. Usually, these design changes require additional time inputs from architects and engineers, as well as additional materials, and additional time and cost inputs from the contractor.

At the outline design stage, the key issues are whether the size of the project matches the identified needs, or whether it is over-designed. It is important to establish how much more design work will be required and what role the contractor will have in this process. If cost estimates are based on outline designs only, then the potential for costs to change is greater than if they had been finalised.

For large projects, it would also be appropriate for a risk-assessment study to have been undertaken by this stage. Such a study would show that the project sponsor was aware of specific risks that could affect project costs, and would form the basis for the calculation of the contingency budget. It should be possible for the appraiser to establish how the contingency was calculated and what risks it covered.

At the detailed design stage, the procurement of contractors to undertake the construction work can take place. In some cases, appointment of contractors may precede the detailed design stage. The form of contract and the respective roles of project sponsor and contractor in bearing risk for the ultimate project cost, are matters that monitors should inquire about, especially where there appears to be uncertainty in this area. It is also important to establish that procurement regulations have been followed and that the contractor has relevant expertise and experience.

Unexpected ground conditions

Desk officers should check whether ground investigations have been undertaken. If these have not been done, the risk of cost overrun increases and the contingency should reflect this.

Ground conditions can be assessed by a desk-based review of relevant published documentation and through the use of trial pits and borehole sampling on site. However, the actual site conditions for the full extent of a project are not usually determined until construction begins. It is possible for problematic conditions to have been overlooked by the initial review, or for conditions to have changed due to adverse weather, or for sub-soil conditions to have changed.

At times, unexpected sub-surface conditions can require the fundamental redesign of a project, at great expense. Changes in surface conditions can lead to problems in moving machinery and supplies around the site, and in undertaking excavations and laying foundations. This can also increase costs and add to the construction time required.

Shortages of material and plant

During periods of unusually high levels of development activity in a particular region, there may be shortages of construction materials, construction plant (machines and equipment used during construction) and service plant (equipment used in the operation of the infrastructure project). If this was not anticipated in the original cost estimate, delays may occur and/or the prices of these elements may increase.

Inappropriate contractors

Contractors are selected on the basis of price, experience in undertaking particular types of project and track record in producing high-quality work within budget and on time. Problems may arise where there is a high level of development activity in a particular region and the better contractors are not available to bid for the work at that time. Alternatively, the tender review process may not have been undertaken by the personnel with the best understanding of the services required.

As a consequence, firms that are relatively inexperienced in the particular field of activity are chosen, often with implications for the quality and cost of a project. Delays in project implementation and increases in costs can arise through the use of ineffective or inappropriate labour, or through errors in calculating how productive the labour will be. This can happen especially with the use of sub-contractors, the quality of whose work is not covered by the main project contract.

In most cases, there is a trade-off between price, experience and track record, but the desire to accept the lowest tender does not always lead to a project that is completed within time and budget.

There are cases of contractors and sub-contractors going into liquidation during the construction period. This can lead to significant delays and extra costs, as the project sponsor has to re-tender the remaining work. Identifying a new contractor to complete the first's work is difficult because of the possible liabilities that the new contractor would have to accept for another company's work.

Funding problems

Overall lack of finance to complete a project, or delays in payment for services, on the part of the project sponsor can lead to significant problems. If the costs of a project have increased significantly beyond the original estimate, then work on the project may have to stop or be delayed until additional funds are found.

Funding problems can also arise if funds allocated to one project are diverted to other projects within a programme of development. If the payment of invoices by a project sponsor is slow, the contractor may begin to commit fewer resources to a project, and may even cease work if cash flow becomes a problem.

In some cases, even when a project is expected to be entirely profitable, project sponsors may understate the availability of local funding simply in order to maximise the level of grant funding. This can happen with revenue-generating projects, in particular.

Force majeure

This term covers a range of events commonly referred to as 'acts of God', which include revolution, war, riot, extreme weather, earthquake, landslide, fire, and political and economic instability. Usually, the contractor is required to insure against such events happening. Where they do occur, they normally result in significant delays and, consequently, cost increases.

Land-acquisition costs

The land on which a project is to be developed is not always owned by the project sponsor. Where this is the case, local government authorities usually can appropriate the land in accordance with legislation. Such legislation generally requires that the land (and any structures on it) be valued and that compensation be paid to the owner on the basis of the valuations.

Although the right to purchase and develop the land can be agreed on relatively quickly, sometimes the amount of compensation to be paid cannot be settled before the project's completion, especially if the landowner appeals against the original valuation. The owner may have the right to appeal, and it is up to a court then to determine a fair price for the land. In many cases, this may be greater than originally forecast by the project sponsor. Inevitably, long, drawn-out compensation cases will delay a project.

The appraiser should be aware of what stage the project sponsor has reached with regard to consents and land acquisition. A project can experience considerable delay, which may affect costs, if the appropriate planning, environmental and other consent procedures have not been adhered to.

As regards land acquisition, it is important that the appraiser is aware of whether all claims have been settled or if there are any appeals over compensation. If appeals have not been settled, the originally anticipated land-acquisition costs will very probably be an underestimate.

Appendix C provides some idea as to major cost elements and their indicative share in a range of typical infrastructure projects.

6. Risk mitigation and monitoring

Methods of controlling costs

The purpose of this section is to review ways in which the cost and time management of projects can be improved by risk management and by more realistic estimation of contingency budgets. While this is ultimately the responsibility of project sponsors and their project managers, an understanding of the principles involved is of value to project monitors.

Uncertainty in project costing

The preparation of project cost estimates is a difficult task, because construction projects are subject to risks and uncertainties, particularly in the early stages when very limited information about the project is available. Yet, the early cost estimates are most important to the project sponsor, because they often form the basis of the bid for funds. As a project progresses, more information (regarding, for example, the on-site ground conditions or the specific types of plant or machinery required) becomes available, allowing costs to be calculated to a greater degree of accuracy. More reliable cost estimates are achievable after tenders have been received from contractors.

Nevertheless, many aspects remain uncertain, and normal costing practice includes an extra element to provide 'insurance' against cost overruns. The word 'contingency' is usually used to describe this additional cost element. As shown in Table C1 in Appendix C, different amounts are allowed for in different types of project.

Typically, the contingency sum is based on a 'rule-of-thumb' calculation – a certain percentage of the base-cost estimate, or a lump sum based on the experience of the estimator. A figure of 10% of gross costs is a common allowance. This risk allowance or contingency sum is often calculated only once and is not reviewed as the project progresses. The main weakness of this simple approach to contingency costing is that individual risks are not evaluated separately. As a result, a contingency is often set too high for low-risk projects, or too low for high-risk projects. In addition, it is not always appropriate to carry a specific contingency allowance for the duration of a project, since many of the risks can be eliminated as they become known.

Risk and contingency planning

By paying greater attention to which cost-determining factors are most likely to change, and why, project sponsors should be able to develop more accurate contingency estimates. This, in turn, should reduce the risk of cost overruns. Poorly managed, risk affects the ability of a project to be completed on time and within budget. On the other hand, the level of risk can be reduced if project sponsors take the time to identify, assess and manage the main factors leading to cost escalation.

Although a potentially complex subject, risk management basically involves three simple stages:

- *risk identification*: what could go wrong?
- *risk assessment*: is it possible to quantify or at least rank any of the risks?
- *risk management*: what steps can be taken to mitigate or manage these risks in order to prevent cost overruns?

Once the risks have been identified and assessed, they must be monitored continuously until the end of the project. Although careful risk assessment typically results in an increase in the initial cost estimate, it usually leads to a reduction in the contingency allowance. Risk-management measures are worthwhile, because they lead to a more certain final project cost.

Often, it is not clear what is actually contained within a project's contingency budget. As noted above, it could just be a general percentage estimate. In careful risk management, the contingency allowance for larger projects should cover three main types of contingency:

- *Special-risks contingency*: an allowance to cover the risks arising from higher land-acquisition costs, changes in external factors, such as the availability of funds, statutory requirements and force majeure. It can also cover the risk of a project sponsor altering the project specification (a fairly common occurrence).
- *Design contingency*: an allowance for use during the technical design process to provide for the risk of changes due to design development or data estimation.
- *Construction contingency*: an allowance for use during the construction process to provide for the risk of changes due to site conditions or as a result of different construction methods or poor performance by contractors or sub-contractors.

The above suggests the value of putting together a risk log/risk matrix at the beginning of the project, to be used by the project management unit and project manager as an aid in reporting and monitoring throughout the project. This mechanism is discussed in more detail in the section below, and Appendix D provides an example of a risk matrix.

The use of an accurately specified contingency allowance will be effective only if suitable procedures are in place to control all aspects of project performance. Project-control procedures should be organised and managed by the project manager. They should provide essential, coherent management information so that the project sponsor and project manager can react to changing circumstances.

Those responsible for the contingency funding should have a process in place for any release of funds that may be called upon. This should be project specific, so that the project manager can call upon the funds with a clear and coherent explanation and workings showing discrepancies in each particular area. Transparent reporting on the use of the funds also assists in ensuring good governance of project contingency funding.

Project management

Improved contingency planning can never be a substitute for good project management. The essential elements of good project management are:

- *Cost control*: managing the design and construction processes to achieve best value for money and to ensure that the final cost does not exceed the budget.
- *Time control*: managing the design and construction processes so that the project is completed on or before the agreed completion date.
- *Quality control*: ensuring that the quality and performance of the completed project meets the project sponsor's original objectives. This can be monitored and verified by an independent engineer.
- *Change control*: ensuring that any necessary changes are achieved within the approved budget, that they represent good value for money and that authorisation to proceed has been obtained from the project sponsor.

7. Contract management

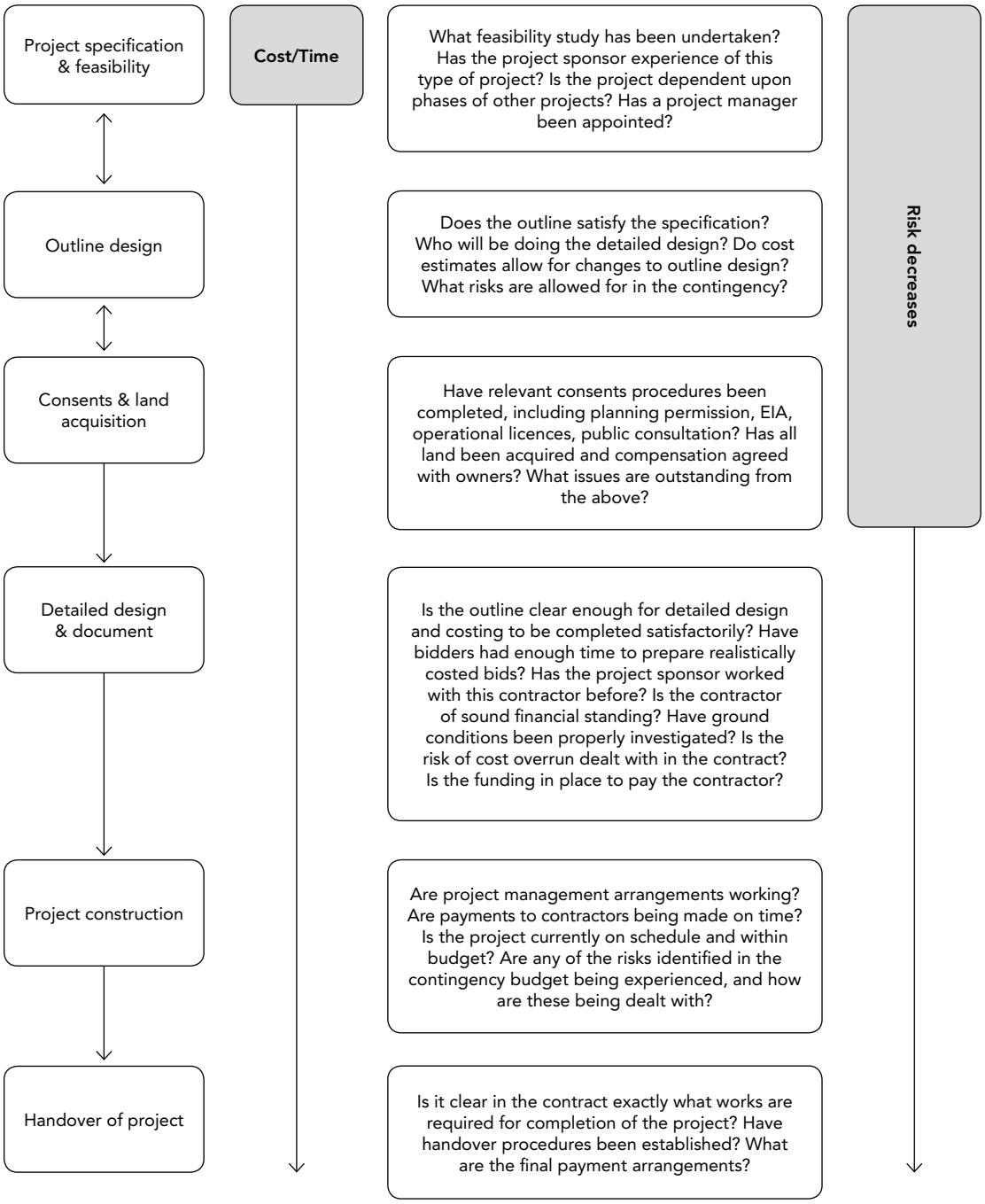
There are numerous systems and software packages for monitoring projects, particularly on the cost side. Common across these various systems are a number of basic principles, such as what to measure, how often to measure it, and how to inform key stakeholders if the project objectives are not being achieved or are at risk of not being achieved during the expected timeline.

The first step, even before turning to a computer programme, is to prepare a 'project-monitoring plan', also known as a 'contract-management plan'. This plan is linked directly to the risk matrix (see Appendix D). The contract-management plan lists all the possible project risks and, next to each risk, identifies the risk indicator, how this is to be measured and, importantly, the individual and/or institution responsible for monitoring and managing that particular risk. It is preferable to tie a specific person (or position) to each risk to ensure proper accountability. This way, if something goes wrong in a specific area, everyone knows who to approach.

Different types of indicator can be monitored during project implementation. There are fundamental performance indicators related to the technical and operational aspects of a project; there are 'early warning' indicators that serve to raise awareness before a particular risk translates into a project failure; and there are results indicators (also known as output indicators), which measure project dimensions including quantity, quality, cost and on-time completion of a particular stage.

Usually, the contract-management plan is developed as a tool to manage identified risks at the point when the contractor is about to begin project execution. In fact, the contract-management plan should form part of the project documents. However, risk mitigation should occur throughout the planning stages and not just after the contract is signed. Figure 5 divides the project development cycle into six stages. For each stage, parallel groups of project-interrogation questions are included. When interrogating a project, monitors should first establish the stage of development of the project and then ask the relevant questions. The figure shows graphically how risk (of cost and time overrun) decreases as a project progresses, provided the risk-management strategy is implemented progressively.

Figure 5: Risk through the project cycle



From the foregoing, it should be clear that a project-monitoring plan can become quite elaborate with dozens of indicators along many dimensions. This zealousness to capture every aspect of a project's progression can undermine the project-monitoring objective by generating an excessive amount of data that no one pays attention to. It is much better to carefully select a sensible number of indicators (say between 10 and 20), and then to collect data regularly to be analysed and reported on to key stakeholders. The way in which the data are presented to key decision-makers is particularly important. They should be given early signals when the project is running into trouble, together with recommendations for specific remedial action.

8. Conclusion

This paper has looked at project execution and monitoring through the lens of a 'project risk-management approach'. Our opening premise is that all large infrastructure projects are characterised by a myriad of complex risks at both the macro and project level. We further assert that public sector projects that are procured through the traditional manner often run into problems because of a failure to adequately identify, analyse and manage the various risks. As a result, time and cost overruns are encountered regularly on large projects.

Having highlighted the key risk factors and how they can impact on project costs, methods of controlling costs and systems for monitoring project costs were considered. While there are elaborate software programmes available for project management and monitoring, even a sensible, well-designed spreadsheet linked to the original project budget will suffice. The risk matrix should be in place as a first step after the project has been given the go ahead. Rather than trying to monitor too many overlapping indicators, we suggest a more selective approach that picks a dozen or so indicators and rigorously tracks and reports on them to key stakeholders, including project sponsors and political principals. By so doing, both micro and macro risk factors are managed right from the outset, even before the first brick has been laid.

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Appendix A: The key players

The key players in the infrastructure development process vary, depending on the institutional structures in different countries. The following roles are typically the most important:

- the project sponsor/programme manager;
- the project manager;
- the consents managers;
- the architect;
- the costing/quantity surveyor;
- the engineer; and
- the contractor.

The project sponsor. The project sponsor may be an individual, a private company or a public authority. The project sponsor (or programme manager in some cases) is ultimately responsible for defining the characteristics of the project that is being procured. It is very important for monitors to know exactly who the project sponsor is. If this cannot be clearly established, the risk of cost overruns and even project failure will be high. It is important also to understand whether the project sponsor has any construction expertise or has staff who can work closely with the other members of the project team. If an inexperienced project sponsor has major responsibility for costing, this may lead to poor project cost estimates. It is important from an evaluation point of view to understand exactly what role the project sponsor has in project development.

The project manager. The project manager is responsible to a project sponsor for the overall planning, control and co-ordination of a project, and for ensuring that the project is completed within time and budget, and that it satisfies the project sponsor's specifications. The project manager may also be responsible for assembling the project team, assessing the project's viability and securing the funds to implement the project. The project manager's role will vary from project to project, depending on the degree to which the project sponsor wants to be involved, as opposed to delegating the responsibility to the project manager.

Capable project managers should be aware of all factors that can threaten the successful implementation of the project. They ensure that adequate performance reporting is carried out at all stages, which allows for problems to be identified quickly and measures taken to mitigate them.

The consents managers. The consents managers include the local authority officials responsible for administering town- or regional-planning mechanisms, as well as other government agency officials with responsibility for licensing, safety aspects, environmental management and so on. They are responsible for ensuring that the project can be implemented legally in a particular location. At times, they may be involved in undertaking some of the feasibility work for a project and for assessing the potential environmental and economic impacts of the project.

The architect. The architect is responsible for designing buildings, public spaces and landscapes. In some countries, the architect undertakes certain consents duties. The architect may also act as the project manager.

The costing/quantity surveyor. The costing or quantity surveyor (QS) is responsible for calculating the costs of a project, preparing tender documentation and monitoring the value of the work undertaken during the construction phase. The QS (or equivalent) may also be responsible for monitoring the project's cash flow. Usually, the QS is appointed at the beginning

of a construction project to advise on costs and alternative forms and methods of construction that may be more cost effective. If a project sponsor wants a change in the project's design or specification during construction, the QS will cost these changes and assist in the decision-making on whether to implement the changes.

The engineer. Engineers are the main professionals involved in the technical design of projects. There are many different types of engineer, but the most commonly used are civil/structural, mechanical and electrical. Their responsibilities vary between states. Civil and structural engineers have expertise in the following types of work: roads, railways, bridges, ports, dams and buildings. Mechanical and electrical engineers are concerned with the design and integration of machinery and electrical systems within infrastructure projects. Engineers may be hired separately by a project sponsor as design consultants; alternatively, they may work with a contractor in both design and construction roles.

The contractor. The contractor is responsible for implementing – actually building – the project. With some forms of contract, however, the contractor can be responsible for designing the project as well. The contractor may be a single company but, in larger projects, two or more contractors may work together in a consortium. Most contractors usually employ smaller sub-contractors to undertake discrete and specialised work.

Appendix B: The construction contract

This involves the actual construction of the project. Contractors can be legally bound to undertake the work under a number of different contractual arrangements. Before a contract is concluded, a decision must be taken about the basis upon which the contractor will be paid.

The factors that may affect the decision on payment method include:

- the degree to which design information is available when contract documents are prepared;
- the institutional rules of the public sector funding parties;
- the nature and size of the project;
- the general economic context;
- the time period available to produce tender documentation; and
- the time available to undertake the work.

The following are some of the different methods of paying the contractor for the construction work:

- fixed lump sum, with payment usually on completion;
- target lump sum (as above but with more flexibility);
- progressive payment according to tasks completed (based on agreed rates for specified tasks or quantities of materials used); and
- progressive payment according to human resources expended (based on an agreed schedule of hourly/daily rates).

If the project's scope and specification have been defined very clearly, or a standard type of project is to be constructed, then the fixed lump sum may be used. The risk is passed fully onto the contractor, and the project sponsor usually cannot intervene further in the project.

With the target lump sum approach, the contractor prepares an estimate based on a defined scope of work. Before the project sponsor accepts this sum, there will be an agreement on the respective liabilities of the project sponsor and contractor should the contract overrun on costs.

The 'tasks-completed' or 'materials-quantities' approach involves measuring construction work according to agreed methods. When the works are priced, their total plus an element for profit and overheads forms the contract price. This approach is flexible, can deal with change effectively and is used in valuing the work undertaken during the construction phase. For the estimate of quantities and contract value to be realistic, the detailed design of the project must have been completed prior to commencement of construction.

If the activities to be undertaken are known, but the detailed design information and the scope of the activities are not, then a schedule of rates may be used. The contractor is paid, therefore, on the basis of unit rates that have been included in the tender. Usually, this method yields a higher project cost than the tasks/quantities approach, because a higher contingency amount will need to be included to allow for the greater uncertainty involved.

Appendix C: Typical analysis of project costs

As well as understanding the process by which cost estimates are calculated and how they may vary during construction, it is worthwhile having some understanding of how important the different cost elements are, and how sensitive they may be to a range of cost-varying factors.

Tables C1 and C2 provide a general representation of the typical proportion of total project costs accounted for by major cost elements. The tables are not absolute benchmarks, but are designed to guide desk officers in their general understanding of the relative significance of different cost elements and cost-varying factors.

Table C1 provides estimates, for seven different types of infrastructure project, of the typical proportion of total project cost that is accounted for by specific categories of cost. A range is given to show how proportions may vary from project to project.

Table C2 gives an indication of the degree to which some of the cost categories may change in response to the influences of the main cost-changing factors identified. In this table, 'Site preparation' has been listed as a separate element of 'Building and construction' cost; this is because unexpected problems with ground conditions most frequently impact on the cost of site preparation works.

The ranges given in Table C1 for the different categories making up initial costs may enable desk officers to judge whether or not particular project submissions need to be interrogated. If, for example, a project indicates that land purchase costs for a sewage-treatment plant amount to 10% or more of total costs, a monitor should be alerted to ask questions. This is because land purchase costs do not exceed 1% of total costs in typical projects of this nature.

Again, if a project sponsor indicates that poor ground conditions were the reason for plant and machinery costs being higher than anticipated, the monitor would need to interrogate this, because (as shown in Table C2) unforeseen ground conditions are likely to significantly affect only site preparation costs (part of the construction costs). Plant and machinery costs are most unlikely to be affected by this factor.

Table C1: Major cost elements and indicative shares of total cost for seven infrastructure types

	Motorway dual (1 km) rural area	Motorway dual (1 km) urban area	Sewage-treatment plant 50 000 people	Water supply network[a] 50 000 people	Public building[b] 15 000 m²	Energy 1[c] CCGT power station	Energy 2[d] City gas distribution network
Planning design fees	3–5%	3–4%	3–5%	5–7.5%	10–15%	5–10%	5–10%
Land purchase	3–5%	20–30%	0–1%	1–2%	5–15%	0–10%	0–10%
Building & construction	75–80%	60–65%	40–41%	75–80%	25–38%	15–30%	20–35%
Plant and machinery	N/a	N/a	40–41%	N/a	10–18%	50–60%	40–50%
Contingencies	10%	10%	10%	10%	10–15%	10–20%	10–20%

Notes: *Because a percentage range is given for each cost element, the columns do not sum to 100%*
a. 10 km pipeline from existing reservoir with new treatment plant and new mains network
b. Eight-storey building in urban area with offices and function rooms
c. 60 MW station with 20 km of transmission lines feeding into main grid, sufficient for a settlement of 50 000
d. LPG storage plant with 500 km pipeline network (15% primary distribution, 85% secondary distribution), 250 000 population

Table C2: Effect of cost-changing events on key cost elements[a]

	Cost-changing factors					
Cost elements	Design changes	Land acquisition problems	Poor project management	Unexpected ground conditions	Inflation/ relative price rise	Difficulties with contractors
Planning design fees	●	•	●	•	●	•
Land purchase	●	●	●	•	●	•
Site preparation[b]	●	•	●	●	●	●
Building & construction	●	•	●	●	●	●
Plant and machinery	●	•	●	•	●	●

Notes:
a. Large dot denotes a major effect – potentially 20% change for affected cost elements; small dot denotes a minor effect – typically 5% change or less for each cost element affected
b. 'Site preparation' is identified as a separate element of 'Building & construction' costs because it is here that the main effect of unexpected ground conditions is experienced

Appendix D: Risk matrix

Table D1: A risk matrix

Risk category	Description	Consequence	Mitigation	Risk value (US$)	Allocation
Construction risk	Events occur during construction that prevent the facility being delivered in terms of time, budget or specification.	Cost and delay	Private sector bears primary responsibility but may pass risk to sub-contractor. The institution will not pay until the service is delivered.	10	Generally allocated to private party
Policy risk	Change in policy that could not be anticipated at contract signing.	Additional costs to the private party	Institution mitigates impact by excluding changes such as tax charges; also, mechanisms could be used to minimise and manage financial impact on government and (where appropriate) a regulatory regime could allow pass-through to end users.	5	Public sector (although the parties may share the financial consequences).
Technology risk	Technological improvements may render the technology inputs out of date (technology obsolescence risk).		The private party will be obligated to update the technology from time to time to meet the output specification.	5	Private party
Financial risk	Debt and/or equity required for the project may not be available when required or in sufficient amounts to complete the project.	Inadequate funds to complete construction	The institution requires all bids to have fully documented financial commitments with minimal and easily achievable conditionality.	4	Private party
Market, demand or volume risk	Risk of alternate suppliers competing for customers – primarily in a user-charged model.	Revenue shortfall	Private party to review likely competition for service and barriers to entry.	8	Generally allocated to the private party.

Source: National Treasury (2004)

Part 2

The Maputo Port Concession, Mozambique

Clara Picanyol[2]

2 The author wishes to express special gratitude to Mr Ronnie Holtshausen, General Manager, Grindrod, and his team for their efforts to provide information for the case study, as well as Sue Lund and Brenda Horne for facilitating the process. Please note that the case study heavily draws on material provided by the CFM, the MPDC (and Internet sources), since it was not possible to meet other shareholders during the mission.

The government of Mozambique entered into a partnership agreement with a private sector consortium that was granted a concession for 15 years to finance, rehabilitate, upgrade and operate the port of Maputo, with the option of continuing to manage the port for a further ten years. Some difficulties were experienced in the negotiation and implementation of the agreement.

Background

The transport sector in SADC countries[3]

The improvement of infrastructure in the transport sector, including ports, is of vital importance for economic development, facilitating growth and trade by connecting producers, suppliers and markets. It also creates employment and enhances efficiency in the allocation of resources, because it reduces costs. The connection of landlocked countries in the Southern African Development Community (SADC) region, such as Swaziland, Zambia and Zimbabwe, by roads and railways with the seaports of Mozambique and South Africa is crucial for the economic development of the region.

Ports in the SADC are linked to the interior by the Regional Trunk Road Network (RTRN) and the Inter-Regional Railway Network (IRRN). These networks should have the capacity to ensure cost-effective trans-shipments of goods onto road, rail and ships for exports and imports. The SADC region has embarked on a programme to rehabilitate, modernise and expand key infrastructure. In this regard, the port concession aims first to address the capacity constraints of the region and, then, progressively to increase the efficiency of port logistics to strengthen the region's competitiveness.

Other activities aimed at addressing the challenges in the transport sector include infrastructure development along major SADC corridors, rehabilitation and expansion of ports and improvement in transport safety.

The RTRN outlines the minimum in road developments required to facilitate operations and provide adequate overland transport linkages in the SADC region. For each member state, there is a national component for the proposed road network, with a view to developing road linkages from north to south and from the east coast to the west cost. This would give landlocked countries a choice of ports along the region's coastline.

Similarly, the IRRN aims to extend the railway network to provide alternatives to the use of road transport for the movement of bulk goods. Although the IRRN is the most integrated railway network in Africa, traffic has been shifting from rail to road over the last 15 years due to deferred maintenance and service inefficiencies. Rehabilitation and modernisation plans have been developed and are included in the NEPAD Short-Term Action Plan.

Recognising the regional interdependence of sectors, including transport, these networks were integrated into the concept of development corridors. The rehabilitation and enhancement of regional transport corridors became a priority focus area for SADC members in the early 1990s.

These trade corridors recognise the variances in the nature of traffic flows in the different parts of the region, which entails some railway lines and roads being integrated more closely than

3 This section draws heavily on the information provided by SADC Heads of State and Government, 'Action on Infrastructure'. Available at: http://databases.sardc.net/books/Infrastructure/view.php?bname=infrastructure&id=15

others.[4] The railways were categorised into corridor groups that formed routes conveying consistently similar flows of traffic.

In parallel, the Spatial Development Initiative (SDI) was conceived as an integrated planning tool aimed at promoting investment in regions that were underdeveloped but had potential for growth. Exhibit A shows the development corridors and SDIs in the region. The Maputo Development Corridor was the first SDI to be developed.

The Maputo Development Corridor

The Maputo Development Corridor (MDC) links the Port of Maputo with the landlocked South African provinces of Gauteng (the industrial heart of South Africa), Mpumalanga and Limpopo. It comprises road, rail, border posts, port and terminal facilities, and runs through the most highly industrialised and productive region of southern Africa (exhibit B).[5] It has been considered a success story and is used as a model for trade facilitation on development and transport corridors.

Various infrastructure projects associated with the MDC were identified – among others, the upgrading of the Port of Maputo and the railway line from Ressano Garcia to Maputo, the dredging of the harbour, the upgrading of the border post between South Africa and Mozambique at Ressano Garcia and the upgrading of telecommunication links between the two countries. The first phase of the corridor was the construction of the N4 toll-road, which was begun in 1998. The transport axis between Gauteng and Maputo offers the shortest link to an export port.[6]

One of the principles that underpin the approach of development corridors and SDIs in the SADC is that, as far as possible, private sector resources should be mobilised. If a commercial return is achievable, then the private sector should be brought in.[7] The economic growth potential and the high costs of infrastructure development for the governments of SADC countries have led to the invitation of the private sector to invest in some of the key projects identified for the development of the region.

In the MDC, over 200 projects were identified, which offered many opportunities for the private sector to invest in the provision of infrastructure for the agriculture, mining, energy, chemicals, tourism and manufacturing sectors. Private sector involvement in transport infrastructure was to speed up progress by providing new funds, skills and technology. Investment opportunities were open for the provision, maintenance, operation, management and ownership of infrastructure that had traditionally been the preserve of the public sector.

The Maputo Corridor Logistics Initiative (MCLI) was launched to promote and further develop the MDC as the region's primary logistics transportation route. The MCLI is a non-profit organisation engaging infrastructure investors, service providers and stakeholders, both public and private, from Mozambique, South Africa and Swaziland.

The legal framework for PPPs in Mozambique

Currently, there is no public-private partnership (PPP) law in Mozambique. However, the government is in the process of drafting a law for PPPs and large infrastructure projects. The law will aim to protect the maximisation of equity and distribution of benefits to all partners,

4 Southern Africa Railways Association, http://www.sararail.org/site/issues.html
5 Maputo Corridor Logistics Initiative, http://www.mcli.co.za/mcli-web/mdc/mdc.html
6 SouthAfrica.info, Spatial Development Initiatives, http://www.southafrica.info/doing_business/economy/development/sdi.htm.
7 World Bank, 'Development Corridors and SDIs in Africa', January 2009.

to prevent undue financial and fiscal risks for the government and to monitor project preparation, tendering and contracting. The law will also specify the requirements of economic, financial and legal advice to such projects.

In the existing law, there is nothing obliging the conceding authority or concessionaire to fulfil their commitments. While these obligations are covered in each concession agreement, there is no umbrella law applicable to all projects involving the private sector.

The institutional framework for port concessions[8]

With respect to the ports, government policy is stated as follows in the Council of Ministers Resolution 5/96:

> *to provide incentives to the participation of private capital in the creation of new port infrastructure, in the exploitation of ports and different port services and activities through management contracts, total or partial concession in joint venture with the State port operator.*[9]

The ports sector falls under the Maritime Directorate of the Ministry of Transport and Communications, and the responsibilities of the port authority lie with the state-owned entity, Portos e Caminhos de Ferro de Mocambique (CFM).

The ports and railways sectors undertook a major reform during the 1990s, in parallel with the restructuring of CFM. The new vision of CFM included the following specific reference to the private sector:

> *to promote and develop rail and port infrastructures and services, so that it will reveal a modern, competitive, efficient system, market oriented and financially viable in partnership with the private sector in transport and logistical operations in the region and worldwide.*

The institutional framework of CFM allows it to associate with national and international organisations with the authorisation of the Ministry of Transport and Communications.

With this is mind, CFM adopted a shareholder structure for port concessions that included CFM and the private sector along the lines of a joint-venture model. This means that the shareholders share the risks and costs of the enterprise, as well as the profits.

Port and railways concessions in Mozambique

Mozambique was a pioneer in private sector involvement in ports and railways. The Maputo Port Concession was the first port project in Africa based on a PPP model. Two factors are cited as the reasons leading to the consideration of a PPP in this case: balance-sheet pressure; and recommendations by the international community.

The ports in Mozambique – the Port of Maputo, in particular – are among the country's most strategic assets. Naturally, the government wanted to remain a shareholder and owner of the ports; through CFM, it is a shareholder (of between 33% and 49%) in all its concessions. This

8 This section heavily draws on Harding A (2009) 'Review of the Effectiveness of Port and Port Terminal Concessions', SADC Secretariat, January 2009, draft.
9 Cited in Harding A 'Review of the Effectiveness of the Port and Port Concessions', paper presented at the Regional Forum on Enhancing Competitiveness in Southern Africa: A Roadmap for Success, South Africa, February 2009.

allows the government to exercise control over its operations and to ensure that no information bypasses its oversight. Exhibit C lists the companies in which CFM has a shareholding and the size of the holding.

The current port concessions in Mozambique include Mozambique International Port Services (MIPS) and the Maputo Port Development Company (MPDC) at the Port of Maputo, the Port of Beira and the Port of Nacala. In 2008, 11.6 million tons were handled by the ports of Mozambique, out of which the three ports with concessions dealt with 98% (Maputo handling 7.6 million tons, Beira 3 million and Nacala 1 million. The Port of Quelimane, the Port of Pemba and the Port of Mocímboa da Praia accounted for the remaining 0.2 million tons.

The terminals under the management of concessionaires accounted for 65%, or 7.6 million tons, of the total cargo handled, out of which the ones under the MPDC accounted for 4.6 million.[10] According to CFM, the Port of Maputo has a cargo-handling capacity of 14 million tons.[11]

With regard to MIPS and the concession in the Port of Beira, the functions of the port authority are exercised by CFM. However, in the case of the MPDC and the Port of Nacala, these responsibilities are exercised under concession by the new enterprise. Furthermore, the railway concession in the North Development Corridor, which includes the port of Nacala, is integrated with the port concession under a single and fully integrated private management and shareholding structure. In this case, the complementarities of the railway and port development are implicit in the benefits of the agreement.

The Maputo Port Concession

The partnership

The partnership agreement grants the concession to finance, rehabilitate, operate and upgrade the Ports of Maputo and Matola to a consortium for 15 years, with the option of continuing to manage the port for a further ten years. The capital value of the project was estimated at US$70 million.

The consortium formed the MPDC, 51% of which initially was owned by an international consortium of investors comprising Mersey Docks Group (United Kingdom), Skanska (Sweden) and Liscont (Portugal), with the remaining 49% owned by the Mozambique government (33% by CFM and 16% by the central government). The shareholding has changed, with the 51% of the European investors being owned since 2008 by Grindrod (South Africa), Dubai Ports World (DPW) and Mozambique Gestores, SARL. The MPDC is run now by Portus Indico, of which Grindrod and DPW each hold 48.5%, the balance of 3% being held by Mozambique Gestores, SARL.

The consortium aimed to rehabilitate and develop the port, including modernising quays and port equipment and supplying new tugs, as well as upgrading transport connections by road and rail to neighbouring countries.

The concessionaires took over the equipment (formerly operated directly by CFM) and the ports authority functions, including the setting of tariffs.

10 CFM, Resumo da Produção Ferro-Portuária (Janeiro–Dezembro 2008), http://www.cfmnet.co.mz/estatisticaJDFP2008_2.html
11 CFM, Porto de Maputo, http://www.cfmnet.co.mz/porto_m.htm

The Maputo Port Concession includes the Port of Matola, since they were both managed under a single administration. The principal bulk terminals (petroleum, coal, aluminium and grain) are located at Matola, and the container terminal, general cargo berths and certain specialist terminals are located at Maputo. The grain, aluminium and fuels terminals remained under CFM direct management. The required investments were agreed during the contract negotiations, although these do not explicitly form part of the contract.

Project initiation and negotiation

The transaction was prepared by Paribas and, following the usual international bidding procedures, the government invited bids in 1997.

The bidders for the concession submitted their proposals in December 1997, and the preferred one was announced in 1998. Three consortiums passed the technical threshold and, consequently, could be considered as potential concessionaires. However, the consortium led by the Merseyside Docks and Harbour Company obtained the highest technical score, and negotiations began with them. The Ministry of Finance participated in the negotiations. The port concession agreement was signed in 2000, and financial closure was reached in 2003, with operations under the MPDC beginning in April 2003. From the outset, the consortium faced challenges in achieving the agreement, which were reported to be resolved through basic negotiations and guidance by the World Bank and other stakeholders.

The performance of the concession of the Port of Maputo depended largely on the development of the roads and railways that link the port with other parts of Maputo and the rest of southern Africa. The full economic and financial value of the port could be realised only with the development of complementary infrastructure, such as the N4 Platinum Toll Road and the Resano-Garcia railway, which linked the port with South Africa. Inefficiency in the operation of the railway was named as one of the reasons that made negotiations difficult, with the winning bidder being reluctant to sign until efficiency in the railway increased.

Slow progress in completion of the railway refurbishment (see below) also led to the MPDC not being able to pay rental fees and failing to declare dividends. The concession agreement allowed for the postponement of 'fixed fees' under certain conditions. The 'variable fee' element was always paid, but fixed fee payment was postponed for a period. These outstanding fees are being paid progressively.

The concession agreement set certain conditions that needed to be met at set dates, which ensured that all parties met their obligations during implementation. Limited rules and procedures were put in place by the Concession Authority to define the structure and application of port tariffs. The concession agreement allowed the concessionaire leeway to formulate the port tariffs on the basis of the market, investment needs and future port developments. If tariffs were too high, traffic would decrease as a result of the charges; if they were too low, port costs would not be covered.

The current shareholders, however, were not party to the original agreement concluded between the government and the original concessionaires. Negotiations with the current shareholders started in December 2007, and the transition period lasted three months. Management continued as before. The negotiations involved only the previous and new shareholders.

Originally, the shares were offered to all port companies and large institutions. The existing shareholder agreement, however, contained pre-emptive rights, which Grindrod exercised. In turn, Grindrod facilitated the entrance of Dubai Ports World, given its interest in ports and skills in operating terminals globally.

The different parties had not worked together before on large contracts. However, apart from its investment in the MPDC, Grindrod has the following investments in and around the port:

- Matola Coal Terminal is held 95% by Grindrod through a wholly owned subsidiary, Grindrod Mauritius. The terminal has the capacity to handle 4 million tons of coal/ magnetite exports per annum. An upgrade to expand capacity to 6 million tons and to increase the capacity of material-handling equipment was due to be completed by September 2010.
- Grindrod Mozambique Limitada is held 100% by Grindrod Mauritius, and owns and leases out a ferro slab in the Port of Maputo, which is operated by the MPDC. It also owns and operates a sized coal terminal on a sub-concession basis, with the MPDC handling approximately 600 000 tons of sized coal per annum.
- Maputo Car Terminal is held 70% by Grindrod Mauritius. The car terminal is a state-of-the-art terminal with a capacity of 54 000 vehicles per annum, expandable to 250 000 vehicles (7 500 ground slots). The terminal holds a 25-year concession from the MPDC, and services domestic, regional and Pretoria-based original equipment manufacturer (OEM) demand.
- Grindrod handy-size ships and container ships service the port regularly to discharge and uplift cargo. Grindrod has around 125 vessels calling per annum.
- Grindrod operates ship agency, clearing and forwarding and transport operations both in Maputo and the wider Mozambique region.

Railway development and the port concession

In 2006, the MPDC was making a loss. As with all ports, rail linkage from the hinterland is a key to success. The availability or lack of rail and road linkages is the determining factor of whether the port is a success or a failure. In the case of Maputo, the road to South Africa, via the N4 highway (redeveloped as a toll-road concession), allowed cargo to be transported by road while the CFM rail facilities were being upgraded.

Through CFM, the government agreed to invest in the upgrading of the railway line. Although the upgrade was incorporated in the concession agreement, it was never guaranteed. However, CFM had committed to aligning its investment with that of the port.

Exhibit D shows how cross-border rail traffic reduced dramatically from the 1970s until the 1990s, and how this has started to recover in recent years, increasing from 1.7 million tons in 1995 to 2.3 million in 2004, representing a 35% increase. Also note that while traffic with Swaziland and Zimbabwe does not appear to have increased, traffic with South Africa accounted for almost all the international traffic, increasing from less than 1 million tons to almost 2 million from 1995 to 2004 (exhibit D).

Depending on the effective operation of rail concessions in the SADC region, the demand for port traffic through Maputo could be very high, taking into account the plans for coal and other mining projects in Mozambique.

However, the lack of an effective rail linkage prior to 2006 certainly prevented large volumes of bulk cargo from reaching the Port of Maputo. The rehabilitation of the line to South African rail standards, and the introduction of operators that understood the local market and customer base, contributed to the success of the port after 2007, when the upgrade was completed.

Port redevelopment and management

The MPDC adopted a focused approach to efficiency and pricing that attracted hinterland customers to the port. Maputo is predominantly a bulk port, which makes price and productivity key success factors for exporters and shipping lines alike. The fact that the port was managed by private enterprise allowed for quick decision-making, particularly with regard to capital investment and matters relating to operational efficiencies.

In 2003, the MPDC launched the port's US$70-million development works programme designed to restore the basic essentials of a trading port. Immediate improvements included the restoration of the channels to their design depth of 9.4 metres and width of 100 metres, rigorous tightening of port security and refurbishing of port infrastructure such as roads, rail, quays and warehouses. Other significant improvements were effected in marine operations, towage, stevedoring, terminal and warehousing operations and port planning and development. Exciting highlights of the port's development include the following:

- the launch of the first phase of the Maputo Car Terminal in late 2007;
- the first tanker to discharge 5 000 tons of liquid vegetable oil at the new bulk-liquids storage terminal in February 2008;
- a US$12-million expansion programme for the Bulk Sugar Terminal;
- a new Bagged Sugar Terminal;
- the Ferrochrome Terminal handled in excess of 1 million tons in 2008;
- the Matola Coal Terminal implemented a US$35-million modernisation programme, which will more than double present capacity; and
- the Container Terminal invested US$18 million in infrastructure improvements and saw radical growth in throughput from 80 000 twenty-foot equivalent units (TEUS) in 2007 to 92 000 TEUS in 2008.

This programme was followed in 2008 by the development of a 50-year ports' master plan by SOGREAH, an international ports consultancy based in Dubai. The plan indicated that regional demand for the port would exceed 40 million tons per annum by 2028. The plan envisaged a further US$300-million investment in the port's terminals.

In addition, the master plan included the following:

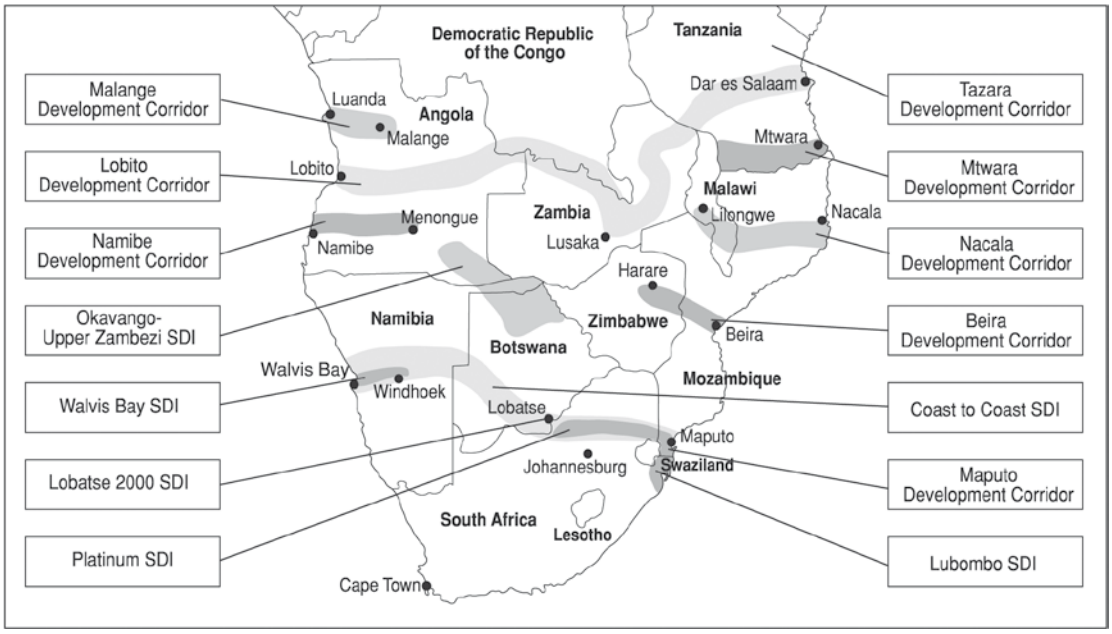
- a review of the business plan prepared by the MPDC (which tested the assumptions on forecast growth and throughput of different commodities);
- an assessment of the supporting transport networks (namely capacities and constraints in the road and rail freight systems);
- an assessment of existing and future shipping (including the assessment of the existing navigation conditions and restrictions, and proposals on the access channel);
- an assessment of the port's actual layout and the condition of assets; and
- an identification of port facilities required in the future.

This work, together with the railway development and the strategic advantage of the port's location relative to key markets in southern Africa, has resulted in an increase in volumes of trade through the port from 4.43 million tons in 2002 to 8.3 million tons in 2009.

Under the current concessionaire, management and staff are trained and skilled in meeting the growing demand for port services within Maputo. There is also training in the specific skills required to operate new equipment and in the handling of different types of cargo in the upgraded terminals. The concessionaires, through their international training centres, have

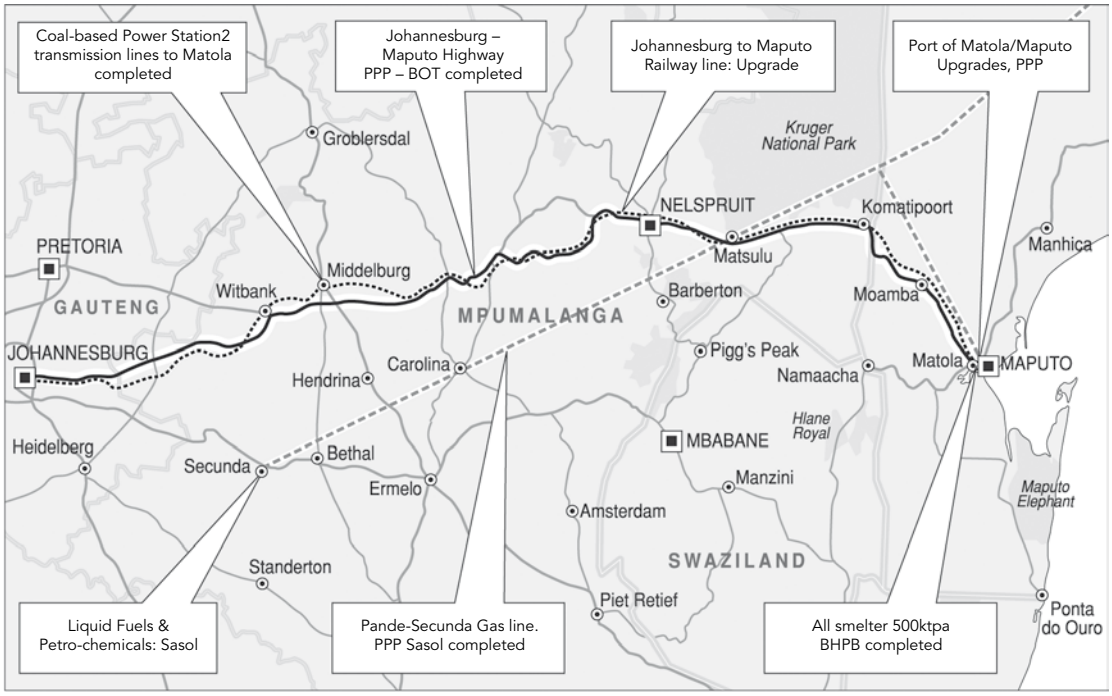
the necessary facilities to train existing and new employees in the latest management practices, systems and technology.

Exhibit A: Development corridors and SDIs in southern Africa



Source: Southern African Railways Association, http://www.sararail.org/site/issues.html

Exhibit B: The Maputo Development Corridor

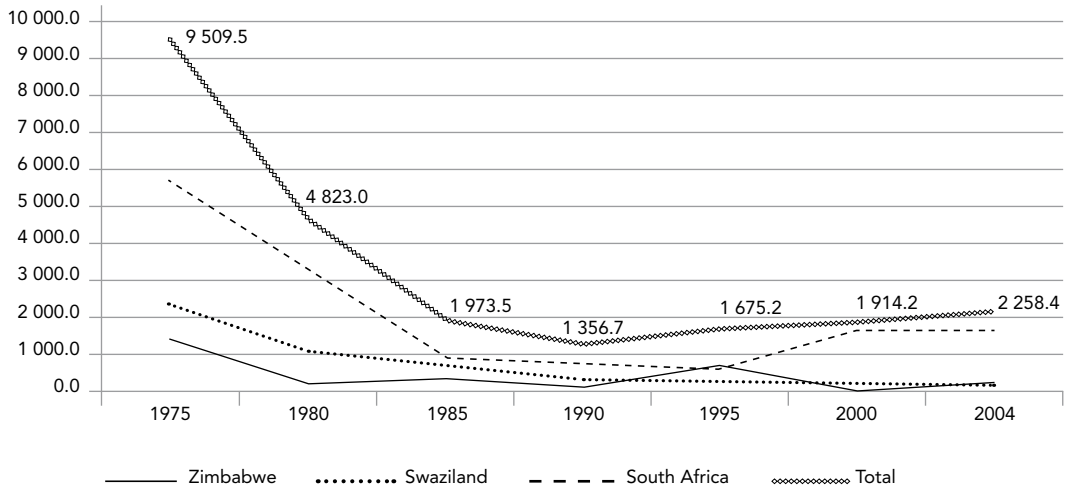


Source: The World Bank, Development Corridors and SDI in Africa, January 2009

Exhibit C: Companies with CFM shareholding

Company	Percentage
Cimentos de Moçambique, SARL	4
Cornelder de Quelimane, SARL	49
MIPS, SARL	33
SDCM – Soc. de Desenvolvimento do Corredor de Maputo	30
Cornelder de Moçambique, SARL	33
Central East African Railways	49
Airplus, SARL	18.4
Terminal de Cabotagem de Maputo	49
Bukusha, Lda	49
Xitimela Leasing Limited	67.5
CCFB – Companhia dos Caminhos de Ferro de Moçambique	49
STM – Soc. de Terminais de Moçambique	50
CDN – Corredor do Norte SARL	49
MPDC – Soc. de Desenvolvimento do Porto de Maputo	49
Intur – Soc. do Turismo do Índico	35
Terminal de Granito	50

Exhibit D: International rail traffic CFM–South (1975–2004)



Source: CFM Developments of Maputo Corridor, presentation by Dr Joachim Zucule, 2008

Example of case-study questions

It is now six years since the MDPC started operations. During this period, there was a change of private shareholders in the consortium after a difficult start. While the port concession is currently on track, the government of Mozambique is eager to learn from the project and avoid problems in the future.

You have just been appointed jointly by the Ministry of Finance and the Ministry of Transport and Communication to assess the implementation of the concession. The two ministries would like advice on how the problems encountered in the project could have been avoided and what the key issues are that should be monitored going forward. Some of the key questions you are asked to answer are as follows:

- What could the government have done to prevent the difficulties encountered in the negotiations towards the financial closure of the agreement?
- What part of the project cycle is to blame for the problems (project identification and development, appraisal, project financing and contracting) or were the problems inherently part of poor implementation arrangements? What are the implications for future concessions?
- Was the government's approach at the time correct in singling out one consortium for negotiation and closure? How else could this have been approached?
- In 2006, the MPDC was making a loss. Indicate some factors or measures that would have prevented poor financial performance? Have these factors been addressed, and what would you advise for the future to prevent similar circumstances arising?
- What are the main implementation risk factors and implications in the current management? How are they being mitigated? You need to identify the risks that apply and with whom they rest in the current arrangement. How can government's risks be mitigated?
- What implementation arrangements should the government (have) put in place to ensure the continued smooth operation of the port?
- What institutional arrangements (structures, processes and rules) should be in place to monitor this and other concessions?
- What reporting is required to ensure that the project remains on track and that problems are identified early?

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For information on the Collaborative Africa Budget Reform Initiative, or to obtain copies of this publication, please contact:
CABRI Secretariat
National Treasury
Private Bag X115
Pretoria 0001
South Africa
e-mail: info@cabri-sbo.org
www.cabri-sbo.org

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