

ENGINEERING PROJECT MANAGEMENT

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Chapter 15

Turnkey and BOOT Projects

The turnkey type of contract is widely used for the delivery of projects. The basic concept of this approach is for the organization requiring the project to contract with a single organization that would be responsible for design, procurement, engineering and commissioning. Literally all the promoter would have to do would be to 'turn a key in the door' and the project would be operational. This chapter first describes the procedures relating to the use of turnkey contracts in project management. In conclusion, a variation of the turnkey contract, the concession project, often referred to as BOOT project, is discussed. In this form of contract the contractor effectively becomes the promoter and, in addition to the role of turnkey contractor, also finances the project and operates and maintains the project over a period of time to generate sufficient income to provide a commercial return.

15.1 Comparison of turnkey contracts and BOOT projects

Concession projects, often referred to as BOOT projects, may be considered as contractor-financed turnkey contracts with the operation and maintenance element extended to generate sufficient revenue to service the debt on the financial investment and sufficient profit over that period before transferring the facility to the 'principal'.

As many turnkey contractors have been responsible for operating and maintaining facilities for a number of years after commissioning, this has resulted in many turnkey contractors gaining all the necessary expertise to take the role of promoter in concession projects.

Concession project strategies grew out of turnkey contracting, in which the supplier of complicated plant would remain in charge as an operator for a defined period of time to train personnel and prove that projects could meet warranted performance specification and capacities. Under the turnkey arrangement, operation elements evolved into longer

operational periods under which the supplier of plant and equipment realized a more substantial proportion of his reward from the actual operation and maintenance of the facility.

In conventional turnkey contracts, governments have attempted to shift the risk for the project construction to the private sector while still bearing the risk of financing and operating the project. In a concession project the major risks of finance and operation, however, are borne by the promoter.

In turnkey contracts feasibility studies are often carried out by the principal to determine the basic requirements of a facility. An invitation to tender often includes a *performance specification* on which the contractor will base his bid. In concession projects a promoter would be responsible for feasibility studies in a speculative bid and the principal for an invited bid. Commercialization of a turnkey contract is normally the responsibility of the principal, who will often pay the contractor a mobilization fee and monthly payments for the work carried out. In a typical concession project, however, commercialization will be carried out by the promoter.

Construction of a turnkey contract will be carried out by the contractor who will in most cases operate it for a period of up to two years after commissioning, the principal then taking over the operation for the life of the facility. In concession projects the promoter will often enter into a construction contract with a contractor and operate the facility over the concession period before finally transferring the facility to the principal.

A comparison of turnkey contracts and BOOT projects and the major risk allocation is illustrated in Table 15.1.

Table 15.1 Comparison of major risk allocation between turnkey contracts and BOOT projects.

Project phase	Project type	
	Turnkey	BOOT
Feasibility	Principal	Principal/promoter
Commercialize	Principal	Promoter
Construction	Contractor	Promoter
Operation	Principal	Promoter

15.2 Definition of turnkey contracts

A turnkey contract may be defined as follows.

Turnkey preparation of a facility means that a single contractor acquires and sets up all necessary premises, equipment, and supplies operating personnel to bring a project to a state of operational readiness. All the customer needs to do is turn the key to begin full effective usage of the new facility. Sometimes the contractor continues to operate the facility for the customer; in other cases the customer assumes operational control. Turnkey facilities are appropriate for customers who are unable to perform or wish to avoid their own subcontracting for ordering and testing components acquired from several vendors. Recruiting, screening and training is a highly specialized task. A turnkey contractor is compensated either through surcharges on each item or service procured for the facility or by a commitment in advance to a fixed price.

15.3 Performance specification

A turnkey performance specification forms the basis of the contract between a promoter and a contractor. This specification indicates the required performance of a facility, often producing a defined offtake for a specific period of time. This specification will often form the basis of a contractor's design, construction and commissioning methods and operation and maintenance of a facility to meet a promoter's requirements. Many turnkey contractors will often only require a performance specification, standards and conditions of contract from a promoter's organization to prepare a turnkey tender.

The performance specification for a particular project may be determined by a promoter organization, by a consultant advising the promoter, or by a promoter and contractor, depending on the type of contract preferred.

A turnkey contract is often adopted on the basis of the findings of a feasibility study carried out by or on behalf of a promoter organization. A promoter's choice of plant and type of contract and the clarity of the performance specification adopted will be paramount in achieving an efficient plant. The contractor's design obligation, irrespective of the specification adopted, will form part of his general obligation to supply a facility that meets the required performance specification and guarantees. In turnkey contracts it is normal to provide only proven technology to meet the requirements of the performance specification.

The content of information issued to a contractor may be dependent on the results of a feasibility study and a number of possible design methods proposed by the promoter or his representative. Drawings and site investigation reports may be provided to the contractor, but in many turnkey contracts the contractor will be responsible for ensuring that ground conditions are sufficient and for the preparation of working contract drawings. A promoter may require either a schedule of rates or values to be used to assess interim payments and projected budget figures and manufacturers' drawings for stage payments on design and manufacture of plant and machinery. The most common types of turnkey contract are usually related to specialized or patented process plant supply contractors with the advantage of obviating split responsibility and interface problems.

Various standard forms of conditions of contract have been obtainable in the UK for many years to cover civil engineering, mechanical and electrical works. The type of contract adopted would be determined by the promoter as best suited to meet his needs, with a number of different contract procedures currently available. A project may be considered as a single contract, in which case a main contractor will sign a contract with the promoter and accept full responsibility for the proper execution of the works. The main contractor may be a large civil engineering contractor who will employ specialist subcontractors but purchase plant from a plant manufacturer. If the main contractor is a process plant contractor he may engage a subcontractor for the civil engineering works and for the electrical installations.

Many traditional forms of contract strategy necessitate the production of detailed specifications, formal contract documents, bills of quantities and detailed working drawings, which will be very time-consuming but will ensure that bids can be evaluated on a similar information base. Promoters pursuing this traditional form of contract may also nominate subcontractors or suppliers, who will need to be coordinated by the promoter. Should the promoter prefer a turnkey contract strategy then he may require the contractor to design, construct, inspect, test, commission and hand over a completed facility ready for operation. Such contracts will usually be entered into for projects that involve some specialist process, often proprietary equipment, in which only a few large, integrated organizations are truly competent.

15.4 Economic choice

The choice of a turnkey contract is often determined on the basis of funds available to a promoter as well as technical reasons. Export

financing has tended to favour the turnkey contract, and many developing countries have been eager to adopt a turnkey contract as a means of financing a project. The lump sum price offered in a turnkey contract is often considered an advantage by promoters who have a limited budget and are not in a position to incur additional costs, as the price is determined at an early stage in the evaluation process.

When promoters are providing their own finance for a project then technical expertise and speed of construction are often the main reasons for the choice of a turnkey contract. A promoter needs to identify the economic reasons for the choice of a turnkey contract compared with other traditional forms of contract. The promoter costs associated with planning, designing, supervising and coordinating a contract are often significant, and often a managing contractor would be best employed on major high-technology contracts where a turnkey contract would not be in a promoter's best interest. The need to carry out capital cost estimates, equipment selection and economic criteria in regard of a number of proposals is of prime importance to a promoter organization.

A promoter will need to investigate a project's cash flow, operation and maintenance methods, and the payment method during the contract period. The fact that a turnkey contract is considered to have a shorter overall duration from conception to commissioning may be a major criterion in a promoter's choice. The cash flow often based on the contractor's proposed payment schedule may also affect the choice of a turnkey contract. Many turnkey contracts are agreed on a lump sum basis and contain a list of unit prices for certain sections of the works. These prices often serve for the valuation of variations and interim payments.

In a turnkey contract the promoter may consider that the best terms of payment are on a schedule of values and not on the basis of monthly measurement of quantities. The method of payment based on agreed schedules may also be linked to the construction programme, which will allow the promoter to identify each interim payment by simply monitoring progress.

15.5 Bidding turnkey contracts

Many promoter organizations with in-house engineering capabilities often consider a turnkey contract to be in the promoter's best interest for a particular project. If the need for a short tender and construction duration is paramount, the promoter may choose to adopt a turnkey contract in which tenderers are invited to submit an offer for the design

and construction of a particular project, which may include commissioning and hand-over and possibly operation and maintenance and training for a specified duration. A turnkey contract provides for all elements of the project up to and including the commissioning and hand-over of the plant as an operational unit. Process design, civil engineering and structural engineering design are all included.

Normally a contractor's offer will be in the form of a lump sum, with or without a price fluctuation clause, depending on the terms of contract, the type, location and size of the project, the duration of contract and many other factors. Consequently it is usually possible to obtain tenders fairly quickly, particularly when compared with the time required to prepare detailed designs and specifications and invite tenders in the more traditional manner.

As a bidding contractor is usually permitted a degree of freedom in selecting a process design, he can adopt a design suited to his own particular expertise, specialization and choice. If a promoter decides to approach a number of turnkey contractors indicating performance requirements, then the promoter will receive a number of different proposals and costs, allowing a number of options to be examined. The options would give the promoter far more flexibility over the traditional type of contract based on one design. In most cases turnkey contractors use past experience and feedback techniques to ensure that current designs are up to date and suitable to the promoter's requirements.

The turnkey lump sum also requires the most precise definition of the project objectives prior to a contract price, and introduces an adversarial relationship between the owner and the turnkey contractor, who must give consideration to economic survival as well as to the best interests of the promoter. A promoter's need for urgency may result in the choice of a turnkey contract. If urgency is a major criterion then the turnkey contract is considered most suitable as the turnkey contractor is well accustomed to the degree of urgency normally attached to such tenders. Also, the difficulties normally associated with subcontractors and project coordination and the burden on the promoter's resources are significantly reduced.

It is, however, extremely important that bidders are given a comprehensive brief, otherwise it will be extremely difficult, if not impossible, to compare accurately the bids received. The more comprehensive the brief, the more comparable will be the tenders. Many unsuccessful turnkey projects have often resulted from an inadequate definition of requirements at the tender stage. One method considered for turnkey tender submission is that the tender should be in two parts, one part (the technical package) containing the product specification documents

and the other (the financial package) containing the price documents.

The technical package contains components regarding the construction and operation of the facility, often determined by the performance specification, and the financial package and its components are determined by the financial requirements of the contract. A typical schedule of components that may be included in a turnkey contract is as follows.

Technical package: standards and specifications, quality of offtake operation and maintenance, plant, equipment and material schedules, construction and labour programmes, method statements, preliminary calculations, designs and drawings, performance guarantees and procurement schedules.

Financial package: selling price of the facility, schedule of values, mobilization fee, financial guarantees, bonding arrangements, projected drawdown of payments, payment milestones, insurances and ratio of host country and overseas currency expenditure.

The selling price is normally fixed and based on a schedule of values for construction, commissioning and operation and maintenance.

15.6 Projects realized utilizing turnkey contracts

The turnkey approach is quite frequently adopted for process/industrial type projects. The types of project carried out on a turnkey basis both in the UK and overseas are considerable. Plants have been and are still being constructed under turnkey contracts, examples of which include a crude oil supply line in Algeria, a power station for the Manx Electricity Authority and the Jing-Aw Hilton Hotel complex in Shanghai. These contracts have all required multidisciplinary involvement with short construction durations.

Turnkey contracts are often considered when a project requires a multidisciplinary involvement by promoter organizations who consider that type of contract best suited to their requirements or do not have the resources available to coordinate and supervise the project. Total responsibility and accountability for all aspects of the project in the hands of a single turnkey contractor often determines a promoter's choice in multidisciplinary projects. Some promoters, however, prefer to retain in-house project management teams when they consider a project too large and requiring resources not available to a turnkey contractor.

The location of a plant may well determine the choice of a turnkey contract where little or no expertise is available to carry out a multidisciplinary project. An existing plant constructed under a turnkey contract, which has proved to be efficient and is similar in its process requirements to one proposed by a promoter, may well determine the final choice, but as in most turnkey situations a fixed design will result in a less flexible system. The use of turnkey contracts has also been considered for the provision of trunk roads and in the UK a small number of design and build contracts for road schemes have been awarded. In multidisciplinary turnkey contracts, however, the contractor carries the responsibility for all aspects of the contract from conception through to commissioning and often into operating the plant and training permanent staff for the promoter.

15.7 Advantages and disadvantages of turnkey contracts

Promoter organizations are in a position to compare all the economic advantages and disadvantages of the turnkey contract for individual projects.

The advantages and disadvantages of turnkey contracts are considered below.

Advantages

- In projects undertaken by governments or state-owned enterprises, ownership and control after contract completion is retained in the hands of the owner. This is especially true in the case of the traditional turnkey contract, where the involvement of the turnkey contractor could be eliminated once the contract is completed, as the contractor would have no share in capital ownership, and there would be no conflict in policies and management of the operations of the enterprise.
- In the turnkey contract a major advantage to the promoter stems from the fact that the responsibility for the contract lies with a single source, and the promoter is relieved from responsibilities for the equipment or plant and performance.
- The turnkey contract generally ensures that the project is put into operation more rapidly than other contracts as both design and construction are the responsibility of one entity.
- When a turnkey contract extends beyond the commissioning stage

the teething problems associated with a multidisciplinary project can be resolved by the contractor's trained personnel.

Disadvantages

- The cost of a turnkey contract may be significantly higher than a traditional form of contract because cost estimates are often expressed in overall terms without a detailed breakdown.
- The turnkey contract does not allow enough participation of the promoter or familiarization with the facility that the promoter will operate after hand-over.
- The turnkey contract does not permit the normal checking procedure associated with a traditional form of contract.
- The turnkey contract should not be adopted when domestic technological services are sought to be developed by the promoter.

The turnkey system may also bring together companies in joint ventures who on an individual basis would not normally have tendered. Although joint ventures may offer many advantages, disputes may often arise between the partners regarding the contract responsibilities of each partner, with adverse effect on the project undertaken. Amongst the disadvantages is the inclination of a plant manufacturer to include a maximum of plant of his own manufacture. Other problems stem from differences between the contract conditions included in the offer and the promoter's requirements. Unfortunately these often arise because the brief and tender conditions are not clearly defined.

Generally the advantages of both design and build and turnkey contracts are that the promoter need only deal with one organization; there are no disputed responsibilities; a firm price can be obtained; and time can be shortened by overlapping the later stages of design with the early stages of construction. Because all the work is carried out by a single contractor effective quality control can be provided without the need for redundant reviews.

15.8 Concession contracts

There has been a growing trend in recent years both in the UK and overseas for principals, usually governments or their agencies, to place major projects into the private sector rather than the traditional domain of the public sector by using concession or BOOT project strategies. The adoption of this form of contract strategy has led a number of organi-

zations to consider its implementation for different types of facilities, on both a domestic and international basis and by speculative or invited offers.

Privatized infrastructure can be traced back to the eighteenth century, when a concession contract was granted to provide drinking water to the city of Paris. During the nineteenth century ambitious projects such as the Suez Canal and Trans-Siberian Railway were constructed, financed and owned by private companies under concession contracts.

The transfer element of a BOOT project implies that after a specified time the facility is transferred to the principal; this cannot be considered as real privatization. In a BOO project, however, ownership of the facility is retained by the promoter for as long as desired, and this is therefore more consistent with the concept of privatization.

In the late 1970s and early 1980s some of the major international contracting companies and a number of developing countries began to explore the possibilities of promoting privately owned and operated infrastructure projects financed on a non-recourse basis under a concession contract.

The term BOT was introduced in the early 1980s by the Turkish Prime Minister Turgat Ozal to designate a 'build, own and transfer' or a 'build, operate and transfer' project; this term is often referred to as the *Ozal Formula*.

15.9 Definition of BOOT projects

A build-own-operate-transfer (BOOT) project, sometimes referred to as a concession contract, may be defined as:

a project based on the granting of a concession by a principal, usually a government, to a promoter, sometimes known as the concessionaire, who is responsible for the construction, financing, operation and maintenance of a facility over the period of the concession before finally transferring the facility, at no cost to the principal, as a fully operational facility. During the concession period the promoter owns and operates the facility and collects revenues in order to repay the financing and investment costs, maintain and operate the facility and make a margin of profit (Smith and Merna, 1992).

Other acronyms used to describe concession contracts include:

FBOOT	finance, build, own, operate, transfer
BOO	build, own, operate

BOL	build, operate, lease
DBOM	design, build, operate, maintain
DBOT	design, build, operate, transfer
BOD	build, operate, deliver
BOOST	build, own, operate, subsidies, transfer
BRT	build, rent, transfer
BTO	build, transfer, operate
BOT	build, operate, transfer

Many of these terms are alternative names for BOOT projects, but some denote projects that differ from the above definition in one or more particular aspects, but which have broadly adopted the main functions of the BOOT strategy.

15.10 Organizational and contractual structure

A typical BOOT structure illustrating the number of organizations and contractual arrangements that may be required to realize a particular project is shown in Figure 15.1.

The key organizations and contracts include the following.

Principal: responsible for granting a concession and the ultimate owner of the facility after transfer. Principals are often governments, government agencies or regulated monopolies. The structured contract between the principal and promoter is known as the *concession agreement*. It is the document that identifies and allocates the risks associated with the construction, operation, maintenance, finance and revenue packages and the terms of the concession relating to a facility. The preparation and evaluation of a BOOT project bid is based on the terms and project conditions of the *structured concession agreement* (SCA).

Promoter: the organization that is granted the concession to build, own, operate and transfer a facility. Promoter organizations are often construction companies or operators or joint venture organizations incorporating constructors, operators, suppliers, vendors, lenders and shareholders.

The following organizations and contracts may be included within the BOOT project strategy:

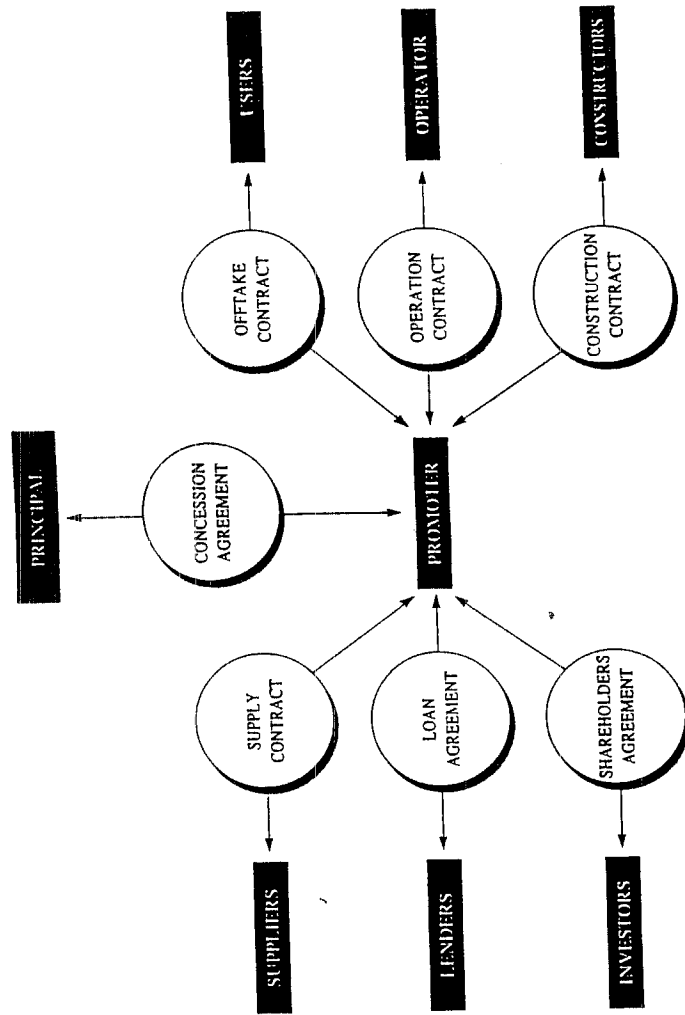


Figure 15.1 Organizational and contractual structure for BOOT.

Supply contract:

contract between the supplier and promoter. Suppliers are often a state-owned agency, a private company or a regulated monopoly who supply raw materials to the facility during the operation period.

Offtake contract:

in contract-led projects such as power generation plants a 'sales' or 'offtake contract' is often entered into between the user and the promoter. Users are the organizations or individuals purchasing the offtake or using the facility itself. In market-led projects, however, such as toll roads or estuarial crossings, where revenues are generated on the basis of directly payable tolls for the use of a facility, an offtake contract is not usually possible.

Loan agreement:

the basis of the contract between the lender and the promoter. Lenders are often commercial banks, niche banks, pension funds or export credit agencies who provide the loans in the form of debt to finance a particular facility. In most cases one lender will take the lead role for a lending consortium or a number of syndicated loans.

Operations contract:

contract between the operator and the promoter. Operators are often drawn from specialist operation companies or companies created specifically for the operation and maintenance of one particular facility.

Shareholder agreement: contract between investors and the promoter. Investors purchase equity or provide goods in kind and form part of the corporate structure. These may include suppliers, vendors, constructors and operators and major financial institutions as well as private individual shareholders. Investors provide equity to finance the facility, the amount often determined by the debt/equity ratio required by lenders or the concession agreement.

Construction contract:

contract between the constructor and the promoter. Constructors are often drawn

from individual construction companies or a joint venture of specialist construction companies. Constructors can sometimes take, and have taken the role of promoters for a number of BOOT projects both in the UK and overseas.

15.11 Concession agreements

In BOOT contracts a concession agreement is used as the basis of the contract. The concession agreement forms the contract between the principal and the promoter, and is the document that identifies and allocates the risks associated with the construction, operation and maintenance, finance and revenue packages and the terms of the concession relating to a facility over the lifetime of the concession before transfer of the facility to the principal.

The statutory concession agreement is adopted when governments are required to ratify a treaty that may lead to legislation and consequent concessions. The terms of a concession granted under statute may usually only be altered or varied by the enactment of further legislation. Under this form of agreement the promoter (concessionaire) would be required to enforce his rights by making an application to the courts for judicial review of a principal's (government's) actions. In the case of concessions granted under statute, third parties may potentially have the right to apply to the courts to enforce provisions of the concession that the government do not wish to apply. A statutory concession agreement was adopted for the Channel Fixed Link project.

The contractual concession agreement is often adopted when one government organization enters into an agreement with a promoter to undertake a specific concession. In the contractual agreement either party may amend or relax the terms of the agreement. Under such an agreement any breach of the concession by the principal would entitle the promoter to damages, and in some cases specific performance of the terms of the concession. In the contractual concession only the parties to the concession can enforce the terms. A contractual concession agreement was adopted for the North-South Expressway in Malaysia.

In some cases the concession agreement is a hybrid form of both contractual and statutory elements. This form of agreement is often adopted when a principal or promoter requires an element of legislative control and the benefits associated with the contractual agreement. If for example planning consent is considered a major requirement for

implementation of the concession then a statutory element may be incorporated into the hybrid form to cover this requirement.

15.12 Procurement strategies

BOOT projects are procured by invited tender from the principal or by a speculative bid from a promoter group to an individual principal. In the case of an invited bid many elements of the risk may be determined by the 'terms of invitation'. In the case of a speculative bid the promoter will need to approach the principal to determine his obligations under the terms of the concession agreement. Worldwide, about 60% of BOOT projects are awarded as the result of speculative tendering, but within the EU this percentage is much lower.

Speculative bids

A speculative bid is one by which a promoter approaches a principal with a proposed scheme considered commercially viable by the promoter and requests the principal to grant a concession to the promoter to build, own and operate a facility for a defined period of time before transferring the facility to the principal. A speculative bid is for a concession usually undertaken by the principal and requires the promoter to prepare a concession agreement as the basis of the bid. Many BOOT projects begin when promoters approach governments privately to propose a much-needed project that government finds difficult to finance from the public sector budget.

In projects involving new transport infrastructure projects a speculative bid is considered as one in which the private sector promotes an innovative project from concept to meet a perceived market need.

Invited bids

An invited bid is one by which the principal invites a number of promoters to bid in competition for the privilege of being granted a concession to operate a facility normally undertaken by the principal or one of his organizations. An invited bid is often a solicitation of bids based on a speculative proposal made open to tender.

In the case of invited bids for transport infrastructure projects a route will have been through a public inquiry, and the public sector seeks the support of the private sector to design, build, finance and operate a route. Alternatively, the government may have defined the transport

corridor and requires the private sector to select the actual route, assemble the land, design, build, own and operate the project on the basis of a time-limited concession. In the UK the practical consequence of privately financed projects requires each project to be authorized individually by an Act of Parliament. In invited bids such as the Dartford River Crossing a hybrid bill procedure was adopted to authorize the project's go-ahead, and the invitation involved:

- the identification by the government of a corridor for the proposed route;
- a competition for the financing, building and operation of a road serving the corridor, inviting bids from private companies;
- the promotion by the government of a hybrid bill to authorize the road, the tolls, land acquisition and arrangements for the concession.

Competitive bids for BOOT projects should follow the normal procedure for awarding public works projects; ideally the government would identify the project and define the project specifications, nature of government support, the proposed method of calculating the toll or tariff, the required debt/equity ratio and other parameters for the transaction.

The government would then invite preliminary proposals, with the winner selected on the basis of normal competitive criteria such as price, experience, track record of the promoter, or on the basis of side benefits to the host country.

15.13 Concession periods

Concession periods are sometimes referred to as a lease from government. The concession period normally includes the construction period as well as the operation and maintenance period before transfer to the principal. However, in the case of the Shajiao Power Plant constructed in China, the concession period of 10 years excluded the construction time. In the Macau Water Supply Project a concession period of 35 years included the refurbishment of existing plants rather than construction of new facilities but also permitted the principal to repurchase the rights if deemed necessary. This agreement also permits the concession to be extended by mutual agreement of the parties, which in effect constitutes an addendum to the contract. A provision for an extension of the concession period, in this case the operating period, may be included in the concession agreement to protect a promoter against the principal

defaulting on his contractual obligations, which may result in projected returns not being met. Typical concession periods range from 10 to 55 years when granted by governments under a BOOT initiative.

In infrastructure projects the concession period is often longer than for industrial facilities. Concession periods of between 10 to 15 years may be successfully financed, but principals need to accept that the project economics must be strong enough to bear the enhanced depreciation rate over such short periods as well as the return required on the capital investment. In the Dartford Crossing project the concession period was a maximum of 20 years, which could be terminated at no cost to the principal as soon as surplus funds had been accrued by the promoter to service all outstanding debt.

The concession period should be sufficient to:

- allow the promoter to recover his investment and make sufficient profit within that period to make the project worthwhile;
- but not allow the promoter to overcharge users when in a monopolistic position having already recovered his investment and made sufficient profit.

The commercial viability of a concession contract and the difficulty and uncertainty of predicting revenues over long periods of time is a major obstacle to many promoter organizations. If there is flexibility in the concession agreement to adjust the concession period then this may reduce the promoter's risk and allow predicted revenues to be achieved.

15.14 Existing facilities

In a number of concession contracts an existing facility is included as part of the concession offered or requested. This may be a requirement of the principal in an invited bid, or offered as an incentive by a promoter in a speculative bid. In some industrial/process facilities, however, a promoter may only agree to tender a particular project provided he is given operational control of an existing facility which may affect the performance of the facility to be tendered.

The operation of an existing facility often guarantees the promoter an immediate income, which may reduce loans and repay lenders and investors early on in the project cycle. The commercial success or failure of an existing facility must be considered by the promoter at bidding stage in order to determine the success or failure of the proposed concession.

Principals can influence pricing mechanisms by making available to promoters existing facilities that are capable of earning revenues during the construction period. In the Sydney Harbour Tunnel project, revenues generated by the existing bridge crossing are shared between the principal and the promoter, which enables the promoter to generate income to service part of the debt prior to completion of the tunnel.

Assets capable of producing earnings that can be used to pay capital costs, debt service and operating expenses are a familiar feature of BOOT projects.

A concession to operate a section of existing highway generated \$16m for the promoter of the North-South Expressway in Malaysia. The concession to operate existing tunnels as part of the Dartford Bridge Crossing project offered an existing cash flow but required the promoter to accept the existing debt on those tunnels. An existing concession also formed part of the concession agreement for the Bangkok Expressway; this arrangement required the operation and maintenance of an existing toll highway, with generated revenues being shared between the principal and the promoter.

15.15 Classification of BOOT projects

BOOT projects may be classified on the basis of the method of procurement, the type of facility, the location of the facility and the method of revenue generation.

Speculative-invited

In a speculative bid the promoter will determine which costs and risks should be borne by his own organization and which should be borne by the principal and other parties involved. In an invited bid the principal will determine the concession and the costs and risks to be borne by the promoter under the terms of invitation.

Infrastructure-industrial/process

The components of each of the packages of an infrastructure project will contain costs and risk levels that are different from those considered for an industrial or process plant. An infrastructure project may require large capital expenditure during construction but operate on a small budget. A process or industrial facility, however, may require a low

capital expenditure but require a high operating budget over the operation phase.

The number and types of risks associated with a BOOT project may often be determined by the type of facility and the number of contracts and agreements to be included.

Infrastructure facilities may often be considered as static or dynamic facilities. A road or fixed bridge facility may be considered as static, as the facility offers no moving parts and requires no input of raw materials or power; usually the static facility will have a smaller operation and maintenance cost than a dynamic facility. A light transit railway facility will require a major power source during the operation phase, which will result in operational costs being higher than for a static facility.

Domestic-international

The location of a project will determine the host country's political, legal and commercial requirements, which will be a major factor in project sanction. In a domestic project the promoter will often be aware of the country requirements and have access to local financial markets. In international projects promoters may need to carry out in-country surveys to determine risks associated with meeting the requirements of the concession and determine how revenues may be repatriated to service loans. In effect each international project will be determined by the constraints of the host country government.

Market-led-contract-led

One of the major risk areas associated with BOOT projects is the generation of revenues, which often leads to market-led revenues being far more uncertain than those based on predetermined sales contracts. The commercial risks to be considered in a BOOT project are often determined by the revenue classification.

The demand for a toll road that depends solely on revenues from users may be much lower than forecasted at feasibility stage, this may be due to increased costs of fuel or a reluctance by users to pay tolls. In the case of a water treatment plant revenues will be contract-led, and provided demand is met and an effective price variation formula takes inflation into account a promoter may consider the risk associated with revenue negligible compared with other risks.

In a number of market-led projects promoter organizations will often seek contract-led revenue streams to reduce the risks associated with revenue generation. In a toll road facility promoter organizations may

approach haulage contractors and enter into take-or-pay agreements for the use of the facility; in effect the promoter organization is providing lending organizations with a guaranteed source of revenue, which will reduce the risks associated with the finance package.

In summary, the number of organizations, contracts, data and resources required to meet the project and the major risk areas will be determined by the classification of the project.

15.16 Projects suitable for BOOT

BOOT projects are a means of meeting the needs associated with population growth, such as housing, water sanitation and transportation; industrial growth such as power, infrastructure and fixed investments; tourism and recreation such as airports, hotels and resorts; and environmental concerns such as waste incineration and pollution control. Developing nations are receptive to the idea of funding such projects under a BOOT strategy, which will often reduce the capital and operating costs and reduce the risks normally borne by the principal. Provided sufficient demand exists for these projects, revenue streams can be identified and the commercial viability determined by promoters and lenders.

The two most fundamental constraints on project development are economics and finance. In a BOOT project the promoter must cover operating expenses, interest and amortization of loans and returns on equity from project revenues. However, promoters often consider the suitability of a project based on global market forces and the commercial viability of a project, which affect the profitability rather than the facility itself.

Any public service facility that has the capacity to generate revenues through charging a tariff on throughput may be considered suitable for a BOOT strategy provided suitable financing can be achieved. The most successful BOOT projects will be those in the small to medium range – up to US\$500m – as private sector equity requirements for such projects are usually obtainable.

Tolled highways, bridges and tunnels, water, gas or oil pipelines and hydroelectric facilities are considered suitable projects, as a private economic equilibrium is obtainable. However, subsidies are often necessary for high-speed train networks and light rail trains, as prices paid by users are often low and governments generally prefer to control prices.

The characteristics of BOOT projects are particularly appropriate for

infrastructure development projects such as toll roads, mass transit railways and power generation, and as such they have a political dimension of public good that does not occur in other privately financed projects.

15.17 Risks fundamental to BOOT projects

The two types of risk fundamental to BOOT projects are elemental risks and global risks. Elemental risks are defined as those risks that are contained in the elements of the project; global risks are defined as those risks outside the elements of the project that nevertheless influence the concession agreement.

Many of the global risks are addressed and allocated through the concession agreement, with elemental risks retained either by the promoter or allocated through the construction, operation and finance contracts. The author has developed a structured concession agreement based on the terms of the concession and the project conditions specifically for BOOT contracts. This structured concession agreement is used as the basis for risk analysis, bid preparation and bid evaluation.

There are two phases when risks associated with financing BOOT projects occur:

- the pre-completion phase relative to construction risks (the construction phase);
- the post-completion phase relative to operational risks, with the first few years of operation being the major operation risk (the operation phase).

Promoters are exposed to risks throughout the life of the project, which may be summarized as:

- failure at several stages of the project;
- failure in the later stages of the project when considerable amounts of money have been expended in development costs;
- failure of the project to generate returns, without the opportunity to recover costs.

Risks associated with market prices, financing, technology, revenue collection and political issues are major factors in BOOT projects. Risks encountered on BOOT projects may also include physical risks such as damage to work in progress, damage to plant and equipment and injury

to third persons and theoretical risks such as contractual obligations, delays, *force majeure*, revenue loss and financial guarantees.

The major risk elements of a BOOT project may be summarized as:

<i>Completion risk:</i>	the risk that the project will be not completed on time or to budget.
<i>Performance and operating risk:</i>	the risk that the project will not perform as expected.
<i>Cash flow risk:</i>	the risk of interruptions or changes to the project cash flow.
<i>Inflation and foreign exchange risk:</i>	the risk that inflation and foreign exchange rates effect the project costs and revenues.
<i>Insurable risks:</i>	risks associated with equipment and plant (commercially insurable risks).
<i>Uninsurable risks:</i>	<i>force majeure</i> .
<i>Political risk:</i>	risks associated with sovereign risk and breach by the principal of specific undertakings provided in the concession agreement.
<i>Commercial risk:</i>	risks associated with demand and market forces.

Demand risks associated with infrastructure projects are much greater than those for facilities producing a product offtake, as an infrastructure project is static and cannot normally find another market whereas a product may be sold to a number of offtakers through the life of the concession. Facilities producing an offtake bear the risk of product obsolescence and competition, which usually leads to market risks dominating, especially when operation and maintenance costs are high and concession periods short.

15.18 BOOT package structure

The structure of a BOOT project is highly sophisticated, requiring the full participation of all the parties involved in identifying and allocating the relevant project risks and responsibilities and an appreciation of the political, legal, commercial, social and environmental considerations that have to be taken into account when preparing BOOT project sub-

missions. The process of developing a BOOT project is immensely complicated, time-consuming and expensive.

The major components of a BOOT project include:

<i>Build:</i>	design, manage project implementation, carry out procurement, construct and finance.
<i>Own:</i>	own the asset for the concession period and the licence for the equipment used.
<i>Operate:</i>	manage and operate plant, carry out maintenance, deliver product or service and receive offtake payment.
<i>Transfer:</i>	hand over plant in operating condition at the end of the concession period.

The number of components and their timing over the concession period need to be identified at an early stage of a project. This should be addressed in a format that can be utilized to identify the obligations and risks of each organization involved in the project so that an equitable risk allocation may be determined.

BOOT contracts may be determined by four major packages:

- *Construction package.* Containing all the components associated with building a facility, normally undertaken in the pre-completion phase and may include: feasibility studies, site investigation, design, construction, supervision, land purchase, commissioning, procurement, insurances and legal contracts.
- *Operational package.* Containing all the components associated with operating and where applicable owning the facility and may include: operation, maintenance, training, offtake, supply, transfer, consumables, insurances, guarantees, warranties, licences and power contracts.
- *Financial package.* Containing all the components associated with financing the building, and in some cases the early stages of operation and may include: debt finance loan, equity finance loan, standby loan agreements, shareholder agreements, currency contracts and debt service arrangements.
- *Revenue package.* Containing all the components associated with revenue generation and may include: demand data, toll or tariff levels, assignment of revenues, toll or tariff structures and revenues from associated developments.

This structure incorporates all the components of a BOOT contract into discrete packages over both the pre-completion and the post-completion

phase of the concession period. The type of facility, its location and revenue realization would effectively be contained in one of the packages. Having identified and allocated components into the four packages a promoter organization could then determine the risk associated with each package and how such risks would be shared. The package structure provides a rational basis for financial appraisal of BOOT contracts, for the allocation of risk within the concession agreement and contractually between the parties concerned, and for the structure of the tendering process.

15.19 Advantages and disadvantages of BOOT projects

The BOOT project may offer both direct and indirect advantages for developing countries:

- promotion of private investment
- completion of projects on time without cost overruns
- good management and efficient operation
- transfer of new and advanced technology
- utilization of foreign companies' resources
- new foreign capital injections into the economy
- additional financial source for priority projects
- no inroads on public debt
- no burden on public budget for infrastructure development
- positive effect on the credibility of the host country.

The introduction of new technologies, project design and implementation and management techniques are considered as advantageous to developing countries; the disadvantages however are host country constraints and financial market constraints.

A major advantage of a BOOT project is the financial advantage to a government, as its off balance sheet impact does not appear as a sovereign debt.

The advantages to an overseas principal are that he does not need to compete for scarce foreign exchange from the state purse, there is a specific need for the project, and risks are transferred to the promoter. The most important attractions to governments of Asian developing countries is off balance sheet financing, transfer of risk, speedy implementation and an acceptable face of privatization.

The involvement of the private sector and the presence of market forces in BOOT schemes ensure that only projects of financial value are considered.

There are arguments for and against BOOT projects. The arguments for are as follows.

- *Additionality.* This would offer the possibility of realizing a project that would otherwise not be built
- *Credibility.* This would propose that the willingness of equity investors and lenders to accept the risks would indicate the project was commercially viable
- *Efficiencies.* The promoter's control and continuing economic interest in design, construction and operation of a project will produce significant cost efficiencies, which will benefit the host country
- *Benchmark.* The usefulness to the host government to use a BOOT project as a benchmark to measure the efficiency of a similar public sector project
- *Technology transfer and training.* The continued direct involvement of the project company would promote a continuous transfer of technology, which would ultimately be passed on to the host country. A strong training programme would leave a fully trained local staff at the end of the concession period
- *Privatization.* A BOOT project will have obvious appeal to a government seeking to move its local economy into the private sector.

The arguments against:

- *Additionality.* Commercial lenders and export credit guarantee agencies will be constrained by the same host country risks whether or not the BOOT approach is adopted
- *Credibility.* This benefit may be lost if the host government provides too much support for a BOOT project, resulting in the promoter bearing no real risk
- *Complication.* A BOOT project is a highly complicated cost structure, which requires time, money, patience and sophistication to negotiate and bring to fruition. The overall cost to a host government is greater than that of traditional public sector projects, although proponents of the BOOT approach argue that overall costs are less when design and operating efficiencies are taken into account and compared with public sector alternatives.

Although there are a number of advantages and benefits associated with BOOT projects very few BOOT proposals have reached the construction stage. A review of BOOT schemes by an EU Commission concluded that there were three key problems associated with BOOT

projects: availability of experienced developers and equity investors; the ability of governments to provide the necessary support; and the workability of corporate and financial structures.

The risks associated with BOOT projects are far greater than those considered under traditional forms of contract as the revenues generated by the operational facility must be sufficient to pay for construction, operation and maintenance and finance. The uncertainty of demand and hence revenues, cost of finance, length of concession periods, levels of tolls and tariffs, effects of commercial, political, legal and environmental factors are only some of the risks to be considered by promoter organizations.

Further reading

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