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Governmental role in BOT-led infrastructure development

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Abstract

BOT-type schemes are attracting increasing interest with the growing thrust towards privatizing infrastructure projects in both developing and developed countries. However, an intelligent allocation of risks is a prerequisite to success of this relatively new procurement route, amidst the many variables and unknowns in such 'long-term' and more complex scenarios. Concerted efforts from both government and private sectors, as well as appropriate political, legal and economic environments are also essential. This paper identifies and discusses various issues that governments need to deal with, for the BOT mechanism to work smoothly. These issues are further illustrated by relevant examples from Hong Kong experience in evolving an effective BOT project management framework for transportation/tunnel projects.

Keywords: BOT-type schemes; Infrastructure projects; Governmental role; Hong Kong

1. Introduction

To achieve meaningful growth, developing countries have to promote infrastructure development, which has a positive "knock on" effect in catalyzing continuous economic development, apart from meeting basic needs. However, in proceeding towards this goal, developing countries face various constraints, among which, lack of advanced technology and inadequate public financial resources are two major drawbacks. To overcome or alleviate these constraints, developing countries are encouraging local and foreign private sector involvement in the provision of infrastructure projects or services. Global trends of privatization and reduced governmental roles extend to developed countries as well. BOT (Build–Operate–Transfer) type schemes have therefore provided an increasingly popular vehicle to move towards infrastructure development.

However, privatization has political as well as economic dimensions. Not all projects can be undertaken successfully using BOT-type schemes. A particularly cooperative public–private partnership (PPP) is a precondition for successful project procurement using BOT. Both successful and unsuccessful BOT-based projects testify to the truism that appropriate political, legal and economical environments are a prerequisite for the initiation of such schemes. Such environments must, of course, be fostered by the host government.

Many developing countries are in an initial stage of procuring projects through BOT arrangements. Specific literature discussing governmental practices in managing BOT projects is scarce. It is therefore meaningful to study such governmental practices in developing BOT-led infrastructure in order to draw lessons for the future. This research was thus launched to identify the appropriate roles of governments in the formulation and administration of BOT-type projects.

The study therefore compared common practices of BOT-type schemes in different countries and different industrial sectors. Experiences were analyzed and lessons were drawn by studying examples of both good practices and failures of BOT projects. Data and information were mainly drawn from journal/conference papers, interviews and articles in newspapers and business magazines as well as from Internet searches and follow-up email correspondence. In addition, direct correspondence with governmental agencies, project promoters, consultants, contractors and other professionals were conducted for specific views on the governmental role in successful BOT project formulation.

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2. BOT-type schemes

2.1. Background

It was reported that Turgut Ozal, a former Prime Minister of Turkey, first coined the term BOT and used the BOT approach in Turkey in 1984 as a part of the Turkish Privatization Program. However, the philosophy and origins of BOT and BOO (Build–Own–Operate) schemes can be traced back to the privately financed French canals and bridges in the 17th century [1]; the privately funded and operated trade related infrastructure for the transportation of people and raw materials following the industrial revolution; and the French concession contracts, for example, to supply drinking water to Paris in the 18th century; the Suez Canal; the Trans-Siberian railway; and the railways and power companies in the USA (which were mostly on a BOO basis, i.e., without the need to 'Transfer' back the facility).

Despite such wide-ranging precedents, the perceived need for central planning and control of critical public infrastructure precluded private sector participation in most such developments until the 1980s. The paradigm shift that mobilized the private sector more recently resulted from a combination of forces, such as the gross inadequacies of public funding capacities, particularly in comparison with the growing aspirations of burgeoning populations; the inefficiencies of government monopolies; the conspicuous availability of surplus private resources (financial, technical and managerial); and the formulation of creative non-recourse financing mechanisms, whereby projects could be self-funding (i.e. not have recourse to other assets of the stake-holders) [2]. However, experiences indicate that although the idea of complete non-recourse is central to the BOT concept, some level of guarantee/support or a comfort letter is invariably sought in practice.

2.2. Various types

A BOT project can be described as a project based on the granting of a concession by a client (usually a public or governmental agency) to a consortium or concessionaire (usually in the private sector) who is required to 'Build' (including financing, design, managing project implementation, carrying out project procurement, as well as construction), 'Operate' (including managing and operating the facility or plant, carrying out maintenance etc., delivering product/service, and receiving payments to repay the financing and investment costs, and to make a margin of profit), and to 'Transfer' the facility or plant in operational condition and at no cost to the client at the end of the concession period.

There are many alternative versions/names for BOT-type ventures, where projects are procured using arrangements which differ from the above description in one or more particular aspects, but are similar to the BOT concept. Examples of variations of BOT such as BOO are listed by Merna and Smith [3]. For the purposes of this research, these variations are considered within the umbrella of 'BOT-type' schemes. Furthermore, the Private Finance Initiative (PFI) in the UK, which provides an enabling framework for the private-sector construction of publicly-required facilities, is noted to have a similar thrust and scope to BOT.

2.3. Applications of BOT-type schemes

To date, such BOT-type schemes have been used in power, water supply, transport, telecommunication, and process plant sectors. Walker and Smith [4] and Lam [5] listed many BOT projects, and also described their main features and risk management experiences.

3. Difficulties and pitfalls with BOT

The World Bank estimated in 1997 that the developing countries worldwide would spend a total of US$ 200 billion on infrastructure development each year, and the Asian countries would account for 80% of this expenditure. The Asian Development Bank predicted that electricity demands in the Mekong sub-region including Thailand, Vietnam, the Yunnan Province of China, Lao PDR, Cambodia and Burma will increase from 14,500 MW in 1993 to more than 90,000 MW in the year 2000. The capital requirements to meet these electricity and associated needs is estimated to be more than US$ 230 billion [6]. Bottlenecks in the mobilization of public funds and foreign debt have enhanced the interests of developing countries in the provision of infrastructure projects through BOT-type schemes. Many developing countries set up special agencies to oversee BOT-type projects, for example, the BOT Investment and Development Corporation in China and the BOT Center in the Philippines. Various BOT projects are advertised in newspapers, business magazines and on the Internet, and favorable conditions are formulated to attract private finance.

However, BOT-type schemes are not a panacea. Owing to the many inherent uncertainties and risks, projects of this kind cannot be successfully implemented unless the host government gives necessary support, prepares an adequate legal framework, ensures the right political and commercial environment, and provides minimal guarantees to maintain a balanced risk-return structure [7]. If one or more risks is not properly addressed, it (they) could lead to under-achievement of the objectives, or even total failure of the projects.

On the one hand, due to high risks and inadequacy of government guarantees, the private sector may show

little interest in many projects designated by governments to be carried out through BOT schemes, so that these projects have never even materialized. For example, although in May 1996 the Turkish Government planned 179 BOT projects amounting to US$ 32.4 billion, it was reported that only four power plant projects of about US$ 126 million are under construction [7]. Many urgent energy and transportation projects planned on a BOT basis failed to materialize also because of poor organization of governmental agencies in packaging the projects, insufficient legal arrangements, lack of coordination between private and public sectors and unwillingness of the Turkish Government to provide guarantees against the risks originating from Turkey's unstable economical and political environments [7].

On the other hand, even if host governments are willing to provide adequate guarantees and mobilize suitable support at the outset, these do not necessarily lead to eventual success of project development. The government should continue to play an active role in the whole process of the project circle to ensure quality, efficiency and customer satisfaction. Balanced efforts from the government are indispensable to achieve a win–win success for both the public and the private sectors.

Pahlman [6] reminded us that 'there is no free lunch', and the notion that BOT is a way of creating public infrastructure at little or no cost to the public purse is of course nothing more than wishful thinking. The private sector will only invest in a project if it is reasonably certain that it can make an adequate profit. Whether the investment is recouped through road/tolls, electricity sales or other tariffs, it is the users who ultimately pay the cost of the project. Several BOT ventures have already run into problems due to cost overruns, unrealistic price and income projections, and legal disputes between private operators and the government. In virtually all these cases, it has been the government and the general public — not the private operators, who have ultimately shouldered the cost of failure. The assumptions and premises underpinning the BOT model need to be critically re-examined on rigorous economic terms. The following are two BOT examples that were unsuccessful in achieving the envisaged win–win state.

3.1. Bangkok elevated transport system (BETS), Thailand

Thailand experienced an unprecedented economic growth for most of the past decade (witnessing an average 8.5% GDP growth from 1990 to 1995). Still, many 'bottlenecks' constrained uniform growth due to inadequate infrastructure and utilities, among which are the mass transit systems. However, the Thai Government by itself could not fund the demands for developing mass transportation. So, many transport infrastructure projects were developed by the private sector through BOT arrangements. The BETS is one of them, which was planned to construct a 60 km elevated rail system and a road through the heart of the capital.

Hopewell (Thailand) was selected to develop the project under a BOT scheme. Hopewell was granted the right to develop 900,000 m^2 of land along the proposed route in addition to collecting tolls for a concession period of 30 years.

Although Stage I of the project was supposed to be completed by the end of 1995, only a few piled foundations had been erected at the end of 1997. The Thai Government ultimately terminated the project. Tam and Leung [8] identify the problems leading to the non-realization of the project, including some major changes introduced following several changes of governments. Examples of such problems include a sudden request to change from an elevated to an underground scheme, and the lack of governmental assistance in resolving the conflicts with a nearby competitive tollway.

3.2. Tha Ngone bridge project, Lao PDR

In 1992, an Australian company, Transfield, identified the need and suggested that the Government of Lao PDR develop through BOT arrangements a vehicular bridge across the Nam Ngum River at Tha Ngone to replace an existing ferry. A 50/50 joint venture company between Transfield and the Government was established. Financing was arranged by Transfield on behalf of the joint venture company from a Laos bank on a project finance basis with some co-finance being provided by an Australian financial institution. Documentation was executed and construction commenced in October 1993. The bridge was opened to traffic in July 1994. Tha Ngone Bridge is located on a major arterial route about 25 km outside Vientiane, the capital of Laos. It is a steel box girder bridge, approximately 200 m in length, developed as the most cost effective and time efficient solution.

Part of the agreement with the Government in building the bridge was that Transfield had exclusive rights to that crossing, and therefore, the ferry had to stop operating. The traffic volume was much lower than the developers and Transfield had initially projected. Fewer logging trucks were crossing the bridge and many motorists were willing to take longer alternative routes to avoid paying tolls. Tolls were increased to the point where the toll for each category of vehicle was about twice what it had been to go across by the ferry. Although Laos is categorized by the World Bank as a severely indebted low-income country, the tolls were pretty high even by Australian standards. For example, a small pick-up truck had to pay more than AUD$ 2 for a single crossing. Many complaints flowed into the Laos Government and the Government eventually decided to exercise its option to buy out Transfield's share in the

bridge at a pre-agreed price in 1995. It was said that the tolls the Laos government is collecting at Tha Ngone are not enough to even cover the interest on the loan they had to take out to buy out Transfield. This was supposed to be a BOT project for a period of around 15 years, yet a year down the line it had already fallen apart [6].

4. Creating favorable investment environments

BOT is not merely a device for governments to develop infrastructure projects by transferring all the risks to the private sector and thus shedding off all their responsibilities. Rather, it requires appropriate allocation of risks, assigning risks to those best placed to control them. For BOT schemes to work, there should be a suitable, if not supportive legal, political and commercial environment, and certain kinds of project-specific government guarantees may be necessary.

4.1. Win–win principle

There are various risks associated with BOT projects, such as social and political risks, environmental risks, technical risks, as well as economic risks. They may emerge at different stages of the project life cycle. Social and political risks include internal resistance, labor resistance, nationalization, political influence, uncertainty of government policy and instability of government, corruption including bribery, unfair process of selection of private investors, changes in laws and regulations, inefficient legal process and legal barriers. Economic risks include devaluation risk, foreign exchange risk, inconvertibility of local currency, inflation risk, interest risk and small capital market demand and supply risk, incapable investors, too small number of interested investors, general liability risk, management risk, and price escalation. Woodward [9], and Charoenpornpattana and Minato [10] studied risk allocation and sharing in respect of project financing and privatization.

The governments in developing countries must address two critical aspects in using foreign investment through BOT schemes to develop infrastructure projects. One is to successfully attract foreign funds to infrastructure development projects that are particularly needed in their countries. The other is to ensure that the projects be developed efficiently to provide an acceptable service to the public. So, win–win solutions for both the private and the public interests are needed for successful BOT-based infrastructure development.

4.2. Adequate legal and regulatory framework

The willingness of the private sector to develop infrastructure projects depends very much on the legal environment where the projects operate. To attract private sector participation in infrastructure development, the government has to develop a legal and regulatory framework, as well as a financial environment, conducive to investment and attractive to foreign investors. An adequate legal framework implies that BOT developers can structure a contractual vehicle that will be compatible with that country's laws. Each BOT project has a project-specific concession agreement between government and concessionaire. Dispute resolution is an important issue to be addressed. A neutral arbitrator, preferably one in another country (other than the host country), acceptable to both the government and the concessionaire, should be selected to increase the confidence of foreign sponsors and financiers. Corruption may be spawned by the lack of an adequate legal framework.

On the other hand, over-regulation can burden and frustrate BOT and should be avoided. In the United Kingdom, it takes 15 years on average to deliver an operational trunk road from the time the government first thinks about it; whereas, actual construction takes only two or three years. Many investors are put off by the wearisome length of the planning and public inquiry process [11]. Realizing that a modified or multi-stage approach to the public inquiry hurdle is needed to encourage BOT-type projects, the UK authorities have now reduced the amount of detailed submissions by project promoters in the initial phase and greater consultation prior to detail scheme design, initiating a shorter, more formal hearing immediately before the construction to confirm the final implications of a project. Due to government initiative, public support and ground-work done previously, the Tunnel Act passed by the UK parliament on July 23, 1987 took only 16 months from its first reading on March 15, 1986 [4]. To help encourage private sector involvement, governments should allow compensation for abortive costs for a proposal which wins government approval but fails at a subsequent public inquiry. For example, the government agency for roads in UK assumed liability for bidding costs of three PFI road schemes [12].

4.3. Political environment

There should be a central high-powered authority overseeing, if not in charge of BOT projects. There may be divergent objectives between national and provincial/municipal governments, or among different governmental departments. This authority is needed to coordinate and reconcile conflicts where necessary, and to address issues with which the individual participants in a BOT project are not capable of dealing in isolation. An intermediary organization, for example, the BOT Investment and Development Corporation in China or BOT Center in Philippines, is necessary to act as a bridge, effectively linking foreign investors with governmental bodies and public needs in domestic infrastructure projects.

Furthermore, the government's perspective needs to shift from the traditional regulatory stance to a liberal and dynamic outlook that can synergize with the best strengths from private enterprise.

4.4. State credibility

The incumbent government has the sovereign right to commit that state to a policy pledge. However, the concession periods of BOT projects usually far exceed the term of office of the government. Sponsors and financiers need to have faith in the continuation of the original concession agreement after any change of government. Governmental revocation of the concession agreement may cause very unfavorable effects on the private sector's interest and confidence in investing in that country. For example, a Thai court ordered the opening of a US$ 125 million expressway in Bangkok which had been kept closed by a toll dispute. The opening of the road in early 1993 was delayed when the government, apparently trying to appease road-users, told the Bangkok Expressway Co. Ltd. (BECL), who had a 30-year concession to build and operate the road, that it could only collect two-thirds of the toll agreed in the original contract. Foreign bankers were 'not amused' and one is quoted as saying, 'the Thai people and the Interior Ministry will never know the damage that has been done' [4]. Legal agreements were allegedly not upheld and commitment to building the remainder of Bangkok's much-needed infrastructure was thus expected to suffer because international funders and contractors were at this point led to perceive Thailand as a more difficult place to do business. Evidence of this manifested itself in 1994, when there was no funding support for a proposed US$ 600 million Thai railway project. The concessionaire, Thai Kanjanapas, had to cancel their US$ 600 million Euro-convertible debenture issue due to lack of interest [4].

4.5. Developing domestic capital market

Compared to developed countries, developing countries usually lack mature capital markets. Strong domestic capital markets will enable the private developers and investors to borrow money for non-recourse project financing from financial institutions, and eventually to 'float off' the projects on local stock markets. For example, some toll roads in mainland China have been developed through BOT-type arrangements by Hong Kong based companies and local partners and are listed on the Hong Kong Stock Exchange, Shanghai Securities Exchange and/or Shenzhen Stock Exchange.

4.6. Competitive bidding

Governments should adopt more competitive bidding/tendering protocols for BOT projects to achieve optimal efficiencies and facilitate the selection of the most suitable developers. The evaluation of BOT proposals should also be conducted in a transparent environment to ensure fair competition, and to avoid criticism of sponsor selection or political favoritism.

The tender costs for BOT projects are much higher than traditional projects. For example, Birnie [13] compared tender costs of PFI projects in UK with those of Design and Build and traditional projects: It appeared from the bar charts presented that tender costs for PFI projects ranged from 0.48–0.62% of the total project costs, as compared to 0.18–0.32% for Design and Build projects, and 0.04–0.15% for traditional projects. Apart from the additional estimates/evaluation needed, this is also due to the long lead-time and complexity of contractual and financial relationships. The government should provide detailed information about a BOT project to facilitate bid preparation, including the government's objectives and procedures for tender evaluation. Government should at least compensate the winning tenderer's tender costs if the project is abandoned due to reasons not arising from the tender. The 1996 UK Treasury guidelines also recommended that no more than three or four tenderers should proceed to final tendering stage, and the preferred bidders should be selected early with an agreed short timetable for the award of tender. Alternative schemes (unsolicited proposals) and new ideas or concepts should be encouraged to facilitate the 'optimal' project solution.

4.7. Land acquisition

Land acquisition is a complicated issue in many BOT projects, and complex procedures often need to be followed. Many projects are delayed and some are dropped due to land acquisition problems. For example, some BOT road projects in Bangkok, Thailand and Guangzhou, China have been delayed due to late delivery of land, and related cost overruns. Assistance from the government is necessary to achieve timely acquisition of land, especially for projects stretching across different provinces, where governmental coordination is crucial.

4.8. Options of governmental guarantees

To further promote private sector involvement in BOT projects, the government may identify and provide flexible project-specific guarantees against economic risks. The following are various options that may be considered to counteract some of the risks that may otherwise discourage prospective investors:

- Minimum revenue stream guarantee
- Foreign exchange guarantee
- Repatriation of projected revenues
- Guarantees against high inflation and interest rates

- Offshore escrow account
- Tax holidays, tax relief and exemptions, relaxation of taxes of imported materials and equipment
- Government input component into project equity
- Government compensation if changes occur in the current monetary laws or new regulations affecting the investment
- Extension of concession period in case of force majeure
- Subordinated loans and emergency loan facilities
- Property development rights and utilization of existing facilities
- Tariffs/tolls adjustment mechanism
- No second competitive facility guarantee
- Guarantees of raw material supply (e.g. coal, water, etc.)
- Guarantee of product purchase (e.g. electricity, water, etc.)

For example, in the BOT-based 850 km North–South Highway project in Malaysia, the Government guaranteed to reimburse the concessionaire for traffic volume shortfall, foreign exchange and interest rate losses. In the Karachi Power Plant in Pakistan, the Government guaranteed return on equity, against currency depreciation and underpayments by power purchasers.

5. Project quality, public satisfaction and national development

The foregoing discussion indicates that some minimal governmental guarantees against political, commercial and financial risks of private investors are needed in addition to a favorable investment environment, in order to promote private sector finance of infrastructure projects. However, private sector investments do not automatically lead to successful infrastructure projects — achieving quality, efficiency, and good service to the public. Furthermore, the right balance should be achieved in governmental support/guarantees, i.e., without making it too easy for the private sector at the expense of the public. If BOT schemes are not well structured, natural resources in developing countries could be wasted and depleted by the project promoters. As Pahlman [6] pointed out, the notion that the private sector is more efficient than the state can only be supported in situations of vigorous competition and a free market principle that tends to be conspicuously absent in the case of public infrastructure projects. When private developers are provided with too many subsidies, guarantees and protection against competition, there is no evidence that efficiency gains will be made.

The government should be proactively involved and retain a dynamic role in the whole project development process, including project identification, feasibility, request for proposals, evaluation of proposals, tender negotiation, franchisee award, checking of design and construction quality, and continuous monitoring of project operation performance and service quality.

5.1. Feasibility study considerations

Developing countries should usually have short-term and long-term infrastructure development programs, outlining the scope and priorities of future infrastructure projects. In the context of their particular financial strengths and weaknesses, the governments can determine what proportion of infrastructure facilities (and what projects) need to be developed by mobilizing private sector funds. When a project is intended to be developed through a BOT scheme, the government should carry out a pre-feasibility and then a feasibility study to assess the applicability of the BOT approach to a specific project.

Social, political and environmental impacts, as well as financial, economic and technical viability should be evaluated carefully. Indirect costs or external costs such as unfavorable environmental impacts and social dislocations/resettlement should be fully assessed. Proper rectification and mitigation measures should be conceived where necessary. Even though the private sector may increase efficiency, projects procured through BOT schemes usually entail higher pricing and toll/tariff structures, which may not conform to existing domestic pricing mechanisms. Attention should be paid to the social acceptability of the project and the public affordability of the service price. Some BOT-type projects were canceled or ran into serious problems due to negative public reactions as outlined in previous sections, for example, the Thailand BETS and Ngone Bridge, Lao PDR. National security and technology transfer concerns should be addressed. Long-term control of major infrastructure projects by foreign companies may have repercussions on a nation's security and independence, hence security-sensitive projects (e.g. spanning national borders) are usually not considered for BOT schemes. Furthermore, except of course in BOO-type projects, a BOT-type project will be transferred to the government or its designated agency after the concession period. Foreign technology and management expertise should be effectively transferred to the domestic (local) team to ensure smooth and efficient operation of the facilities after transfer.

In analyzing the financial viability of a BOT-type project, evaluation tools, such as return on investment (ROI), net present value (NPV) and payback period (PP), can be used to indicate the project's likely financial characteristics. The many uncertainties in BOT projects also indicate the usefulness of incorporating sensitivity analyses in their evaluation, as was discussed by Woodward [14].

5.2. Selection of the most suitable private partner — BOT concessionaire

The crucial issue of success of a BOT-type project lies in the selection of the most suitable private partner — the chosen concessionaire. This can be realized through a competitive tendering process, comprising identification of project philosophy and objectives, tender qualification, evaluation of tender proposals, negotiation, and award of the concession.

Research into, and discussions about critical success factors (CSFs) for BOT infrastructure projects have been conducted by Tiong [15,16], Tiong et al. [17], Tam [18], Morledge and Owen [19] and Gupta and Narasimham [20]. Tiong and Alum [21] further identified the distinctive winning elements (DWEs) from among the three identified sub-factors of the CSFs: (1) technical solution advantage, (2) financial package differentiation and (3) differentiation in guarantees. They identified seven DWEs relating to the CSF of technical solution advantage: proven technology, shortest construction period, most cost-effective solution, most sound solution, most innovative solution, least environmental impact and safest for construction. There were six main DWEs identified for the CSF of financial package differentiation: lowest tolls or tariff, strongest financial commitments, lowest construction cost, highest ratio of equity to debt, largest revenue or profit sharing with government, and shortest concession period. There were five main DWEs corresponding to the CSF of differentiation in guarantees: winner seeks the least government guarantees and incentives, guarantee of minimum and stable toll increases, guarantee of standby credit in case of cost overruns, winner guarantees to share revenues and profits with the government, and arrangement of fixed interest rates for bank loans.

The above-mentioned CSFs and DWEs can be further codified into specific criteria for proposal evaluation. There are two commonly used techniques for the evaluation of BOT proposals. One is the multi-attribute utility analysis (MAUA) that mobilizes an evaluation technique used in other multiple criteria scenarios. The other is the Kepnoe–Tregoe decision-making technique. It involves a classification of 'essential' and 'desirable' attributes ('musts' and 'wants' criteria) followed by weighting, rating and consolidated scoring against the 'wants' criteria. Walker and Smith [4] and Birgonul and Ozdogan [7] discussed the use of the former, while Harris and McCaffer [22], Tiong and Alum [23] and Lloyd [24] discussed the use of the second.

5.3. Continuous assessment of project success

A public–private partnership is established through the Concession Agreement after the most suitable private partner is identified. The government should be involved in the whole procurement process by taking an active part in the project team. For example, in Seattle's Tolt Treatment Facilities, DBO (design–build–operate) scheme reported by Kelly et al. [25], a project team was established, comprising water quality, engineering and policy and administrative leadership in Seattle Public Utilities (SPU). In addition, specialty skills were added with representatives of the City Council Staff, Mayor's office, and other independent technical, legal, and financial advisors. The project team continuously monitors project progress, maintains timely and productive team communications and discussions of quality control and quality assurance measures. Critical aspects are periodically assessed and improved as useful. They include quality control, design upgrades, works and operational improvements as well as issues relating to safety, environmental impact, schedule, budget, payments, maintenance and capital replacement, customer service and satisfaction, and toll/tariff adjustment [25].

In addition, an independent third party checking of design and construction works is necessary. The practice is adopted by the Hong Kong Government in the procurement of most major public works. The third party takes on the responsibilities of certifying that the designs for temporary and permanent works throughout the project life are in accordance with the stipulated criteria, codes of practice and design standards, and of ensuring that construction is undertaken in accordance with the checked and certified design, and in compliance with construction standards, directives, specifications, and any special requirements.

6. Hong Kong experience of managing BOT projects

The first major project in Hong Kong developed through a BOT scheme was the Cross Harbor Tunnel (CHT), the first road tunnel across the Victoria Harbor between Hong Kong Island and Kowloon. The CHT has operated successfully since 1972, when it was opened to traffic, encouraging the Government to use BOT in four subsequent road tunnel projects: Eastern Harbor Crossing (EHC), Tate's Cairn Tunnel (TCT), Western Harbor Crossing (WHC) and Route 3 Country Park Section [R3(CPS)], i.e. Tai Lam Tunnel and Yuen Long Approach Road. Table 1 provides some comparative information about these projects.

6.1. Feasibility study

Before deciding to adopt a BOT scheme, the Government needs to confirm that the private sector is able to develop the project under acceptable risks and gain reasonable but not excessive returns. Furthermore, a good quality service should be provided and the tolls/charges should be acceptable to the public. A feasibility

Table 1
BOT tunnel projects in Hong Kong[a]

Project name	Tunnel length (m)	Immersed tube length (m)	Number of lanes	Traffic design capacity (v/d)	Planned construction period (months)	Actual construction period (months)	Concession period (years)	Construction start date	Opening date	Approximate cost	
										HK$ (million)	US$ (million)
CHT	1852	1064	Dual 2	90,000	47	36	30	09/69	08/72	320	56
EHC	2255	1860	Dual 2, +2 tracks	90,000	42	37.5	30	07/08/86	21/09/89	4400	564
TCT	4000		Dual 2	90,000	37	34	30	11/07/88	01/06/91	2150	277
WHC	2000	1360	Dual 3	135,000	48	44	30	02/08/93	01/04/97	7500	969
R3(CPS)	3800		Dual 3	135,000	38	38	30	31/05/95	30/07/98	7250	936

[a] CHT: Cross Harbor Tunnel; EHC: Eastern Harbor Crossing; TCT: Tate's Cairn Tunnel; WHC: Western Harbor Crossing; R3(CPS): Route 3 Country Park Section.

study is carried out by the Government, which incorporates engineering feasibility, financial analysis, environmental impact assessment and legal aspects. The Government usually mobilizes a team chosen from among Hong Kong's leading engineering, financial and legal consultants to conduct the study.

6.2. Arrangements for tendering

Once a decision is made to implement a BOT project, the Government prepares an Information Booklet for Prospective Tenders. The Booklet is free to any interested organization and includes information about the franchise, project scope, program, the project brief, conforming and alternative proposals, tender assessment considerations, tender deposit, tender period and guidance for collection of the project brief. The project brief provides more detailed information to potential tenderers.

Experience and lessons gained from the above five-tunnel projects have helped the Hong Kong Government to develop a well-structured competitive tender selection process for BOT projects. Tenders are invited by means of notices in local and international newspapers. The Government offers pre-tender clarifications if asked by individual tenderers during the tender period. Where clarifications are not deemed as confidential to a particular tenderer, they are provided to all tenderers. Where a tenderer requests a confidential response to a query and the Government agrees that the reply would not require to be sent to other tenderers, then the clarification is sent on a confidential basis to that tenderer. Where a tenderer requires a confidential reply and Government considers that reply should be copied to other tenderers, then the tenderer concerned is informed prior to clarification of the Government's view regarding confidentiality and is given the option of withdrawing the request for clarification [24].

6.3. Tender assessment and negotiation

The Government forms a tender assessment panel to assess the tenders. The chairman of the panel for road tunnel projects is usually from the Transport Bureau, while other members are drawn from the Finance Bureau, Highways Department, Transport Department and other related departments. Financial and legal consultants are also enlisted. Each department is responsible for its own area of expertise and assesses whether the tender proposals submitted can meet the Government's requirements. The Transport Bureau coordinates queries raised by the panel members and any requested clarification from the tenderers. These questions and answers will form part of the Project Agreement. Tenders have been assessed on recent projects with the assistance of the Kepner–Tregoe technique.

The Government negotiates with tenderers in an attempt to achieve the best deal for the public, for example, reducing the project costs and minimizing toll levels. Tender assessments are updated as the negotiation process proceeds and follows tenderers' submission of revised proposals. Once the final assessment is completed, the Executive Committee is asked to endorse the selection of the preferred tenderer for further negotiations on the final terms and conditions of the project agreement and for the draft of the enabling bill (Ordinance).

The whole process is also monitored by the Independent Commission Against Corruption (ICAC), which has played a major role over many years in minimizing corruption levels in Hong Kong.

6.4. Project agreement

The project agreement, together with the enabling Ordinance, is the foundation upon which the project is developed towards a win–win result. Its contractual contents include details of obligations and rights as

regards the franchise and franchisee, financing and taxation, design and construction, operation and maintenance, land issues, tolls and termination, budgeted project costs, any guarantee agreements, the underwritten offer, design and checking procedure and change procedure.

6.5. Contractual arrangement

There are many parties involved in a BOT project, so various contracts exist between them. The general structure of contractual arrangements for BOT projects in Hong Kong is shown in Fig. 1, which was developed on the basis of project-specific structures previously indicated by Lloyd [24], Hill [26] and Cheung et al. [27].

6.6. Design and construction quality control

The project agreement requires the franchisee to appoint an independent design checker and works checker to ensure the quality of design and construction. The procedure is divided into three steps: design approval-in-principle, design development and checking, and works checking.

6.7. Toll adjustment mechanism

The Government aims to achieve a low and stable toll regime through the franchise period. For the WHC and R3(CPS), a toll adjustment mechanism was initiated for nine categories of vehicles. The rationale for the toll adjustment mechanism is to maintain a low and stable toll regime, while allowing the franchisee the option to increase tolls under certain conditions at specified dates, in the hope of achieving a reasonable but not excessive level of return.

For this purpose, the Government and the franchisee agree upon a maximum and minimum level of estimated net revenue (ENR) for each year, and a defined number of Anticipated Toll Increases (ATIs) on specific dates during the franchise period and the amount of each ATI. At the end of each operating year, the franchisee submits to the Government an audited statement of its Actual Net Revenue (ANR) for that year. The franchisee has the option to implement ATIs on the specific dates provided that the ANR is below the maximum ENR for the year prior to those dates. The mechanism also allows the franchisee to bring forward an ATI from other years, should the ANR fall below the minimum ENR. However, should the ANR in any year be in excess of the maximum ENR, all excess revenues are paid into a Toll Stability Fund. The Government has the sole right to utilize the Fund to stabilize tolls by deferring an ATI on Specified Dates by paying to the franchisee the difference between the ANR and the maximum ENR for the year concerned; alternatively, the Government may defer the bringing forward of an ATI where the ANR falls below the minimum ENR, by paying to the franchisee the difference between these two amounts.

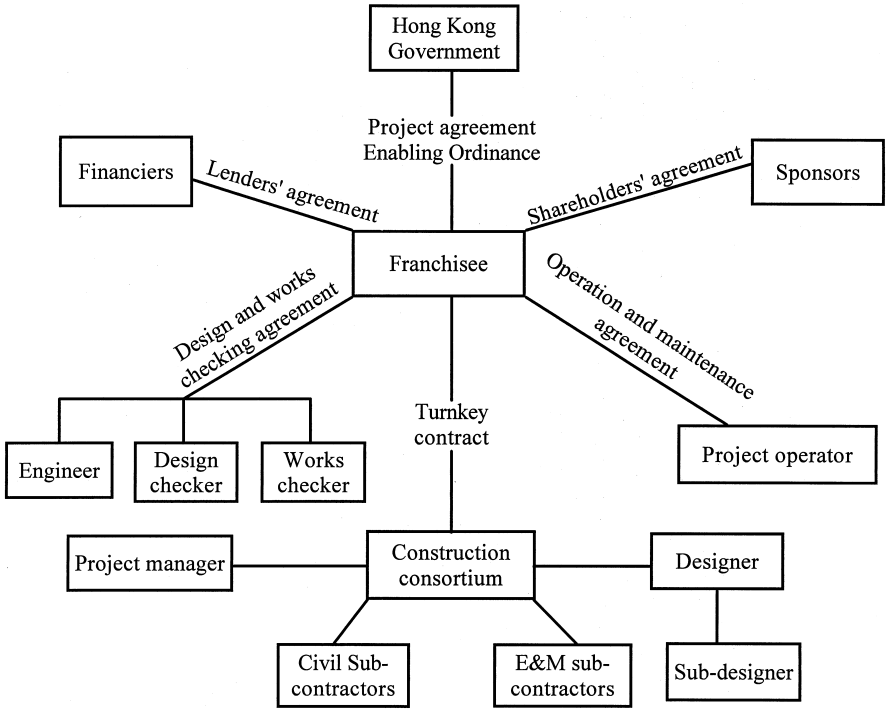

Fig. 1. Structure of a general BOT project contractual arrangement in Hong Kong.

6.8. Operation, maintenance and transfer

The franchisee is required to submit an operation procedure for the Government's approval and the procedure has to be tested on site after approval and prior to commissioning to confirm its workability. The procedure covers all aspects of traffic management, such as monitoring, control, diversion, road closure, accident handling and security. In addition, all the electrical and mechanical facilities have to be operated for seven consecutive days to test their functionality.

All structures including slopes and earth retaining works should be capable of being conveniently and economically maintained, so that their reliability is unimpaired by any deterioration throughout their design life. Proper designs and construction measures should be taken to minimize and facilitate maintenance work. For elements of construction to be handed over to the Government for future maintenance, the ultimate maintaining authority must endorse the design and the completed works with regard to maintenance aspects. The franchisee should prepare a maintenance manual indicating all requirements for inspection and maintenance.

The franchisee is responsible for maintaining all the facilities within the franchise area during the franchise period. Apart from submitting a regular maintenance report and records to the Government, the franchisee has to employ an independent consultant to annually audit the maintenance standard and submit a report to the Government during the franchise period.

The franchisee should transfer all assets of the project to the Government at the end of the franchise period. These assets include all the roads, buildings, machinery, equipment, maintenance vehicles and tools. The first BOT built tunnel in Hong Kong (the CHT) was so transferred on September 1, 1999.

7. Conclusions

Inadequate public financial resources, lack of domestically accessible advanced technology and other constraints, increasingly turn governments of developing countries towards the international private sector for the development of public infrastructure. BOT-type schemes are regarded as an effective means of non-recourse project financing. However, privatization has political as well as economic dimensions. BOT projects are fraught with many difficulties, requiring favorable legal, political and economic environments and particularly cooperative public–private partnership, if they are to be successful. The government, as the major client of such projects, plays a key role in creating the prerequisite environments and in consolidating the constructive partnership. Governments have two more major obligations in respect of BOT schemes: to effectively attract desperately needed funds for national infrastructure development; and to ensure efficient use of the usually high-priced private funds to provide critical public benefits. BOT-type schemes must thus achieve win–win outcomes for both the private and the public interests. So, on the one hand, the government has to create a favorable investment environment in which the private sector feels it can obtain attractive returns. However, the government must ensure that projects be developed efficiently, providing good quality public service.

Also, in the context of both broader and long-term national development strategies, the government should carry out a pre-feasibility study followed by a detailed feasibility study to determine (in stages) whether a particular project is suitable for a BOT-type scheme and what forms of governmental guarantees should be provided. A well-structured competitive tender evaluation procedure is crucial to the selection of the most capable promoter/concessionaire for a specific project. In addition, the government should keep track of the whole project development process and play a proactive role to ensure win–win results for the public and private sector partnership. This requires early and continuing government involvement in the project team, as well as timely and constructive team communications and quality management measures.

The Hong Kong model in developing BOT-type schemes, that has mainly evolved from the experience and lessons in developing five major BOT tunnel projects over more than 30 years, provide pointers to good governmental practice. Similarly, other experiences on different categories of BOT-type projects in many other countries also contain a rich vein of information/knowledge that should be mined and refined to extract valuable lessons for improving governmental roles in future BOT-led infrastructure development.

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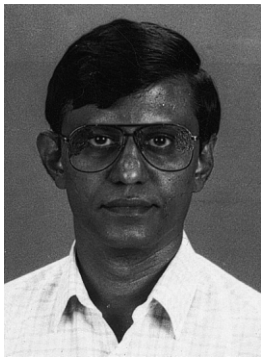

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