AN OVERVIEW OF DELIVERY STRUCTURES USED IN MAJOR AND COMPLEX INFRASTRUCTURE, PROCESS PLANT, MINING AND PUBLIC–PRIVATE PARTNERSHIP (PPP) PROJECTS

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INTRODUCTION

This paper provides an overview of some of the delivery structures used in major and complex infrastructure, process plant, mining projects, public–private partnership (PPP) projects and provides a comparison of the advantages and disadvantages of these delivery structures.

The delivery structures discussed in this paper are:

(a) Engineering Procurement Construction ('EPC');

(b) Engineering Procurement Construction Management ('EPCM');

(c) Managing Contractor;

(d) Alliancing; and

(e) Public–Private Partnership ('PPP').

CHOICE OF DELIVERY STRUCTURE

Choosing an appropriate delivery structure is far from an exact science—there is no formula into which each project's peculiarities and owner's requirements can be 'plugged in' to produce the most suitable delivery structure. Ultimately, the choice of delivery structure is a risk management exercise in itself, involving a balance of various factors, including:

(a) the degree of complexity of the engineering process in the project and how much control the principal wants over design development and construction and commissioning process;

(b) time constraints on the project delivery—for example, whether it should be executed over a normal, sequential schedule or a fast-track schedule;

(c) the experience and capability of the designers and construction contractors to be engaged to deliver the project optimally from the three key perspectives of cost, time and quality;

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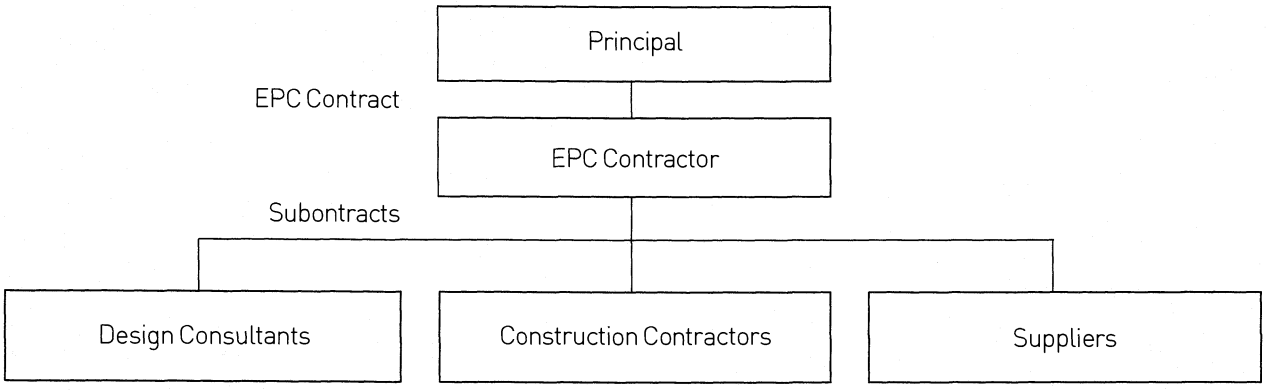
(d) the capabilities of the principal, including the degree of knowledge the principal has about the intended process, design, construction and the extent and nature of the principal's resources (including the skills and expertise of the principal's team) etc;

(e) the size of the project (in terms of dollar value and complexity); and

(f) the requirements of the financiers to the project.

EPC DELIVERY STRUCTURE

Under an EPC delivery structure, a contractor is engaged to carry out all aspects of the design, construction and commissioning of the project (at the end of which process, it is said, all the principal needs to do is 'turn the key' to start the plant, hence the term 'turnkey').



Advantages

The perceived advantages of the EPC delivery structure for a principal include:

(a) single point responsibility—the contractor is responsible whether the fault is due to a design or construction defect;

(b) costs—this form of delivery structure can be more economical as the design can take into account constructability issues (such as access, construction problems and particular methods of working employed by the contractor) which can result in substantial savings;

(c) time—it allows fast track construction due to phased construction;

(d) there is but one overall contract for the principal to manage, with design (including often process know-how) and construction provided by a single contracting organisation; and

(e) the principal obtains the significant extra legal promise (not usually obtainable in either of the alternative delivery structures) of a warranty of fitness for purpose from the contractor.

Disadvantages

The perceived disadvantages of the EPC delivery structure include:

(a) the checks and balances that are usually present when design and construction are separate do not usually exist, as the design and construction are being performed through one entity;

(b) under-design—this is not frequently detectable by the principal's team, and may result in recurrent operational or maintenance problems and costs in the completed facility;

(c) the difficulty of making any genuine assessment or comparison of prices submitted by tenderers where designs differ ('comparing apples and oranges');

(d) if the principal finds that it must direct significant variations (usually where it has not fully or properly expressed its needs up front in the user brief/design brief), the EPC contractor will usually be able to extract a significant price for carrying them out; and

(e) a principal must generally rely solely on one organisation for recovery of compensation if something goes wrong with the project. There are very few organisations that will be able to provide adequate financial guarantees to ensure that there is substance behind the contracting party in the event of a claim for the total failure of the project (which could be a big risk consideration for a project of the size of the Stanwell magnesium plant).

Hybrids

There have also been hybrids of the EPC structure used. For example, under a novated EPC approach, the principal engages design consultants (under contracts obliging them to agree to being novated at the principal's direction to a construction contractor) to carry out the design to an appropriate stage (generally speaking, a stage that is sufficiently advanced for the principal to feel comfortable that it will receive the type and standard of facility it is seeking, but not so advanced that the benefits of an experienced construction contractor's buildability and other time-saving

practical input will be lost), and then the principal engages a construction contractor who agrees to accept the novation of, and responsibility for, the work of the design consultants who enter into new (novated) contractual arrangements with the contractor.

The perceived advantages for the principal include:

(a) the close relationship between the principal and the design consultants at the early stages of the project retains for the principal the opportunity to monitor and provide direct input into the design process;

(b) a closer relationship between the contractor and the design consultants in the later stages of the design process (than is usually achieved under the EPCM or managing contractor delivery structures) so that the design can take account of constructability issues and methods of working of the contractor; and

(c) the principal still enjoys the benefits of an EPC delivery structure (including obtaining a warranty for fitness for purpose from and single point of responsibility in the contractor, and a higher degree of certainty in the design process compared to the standard EPC structure).

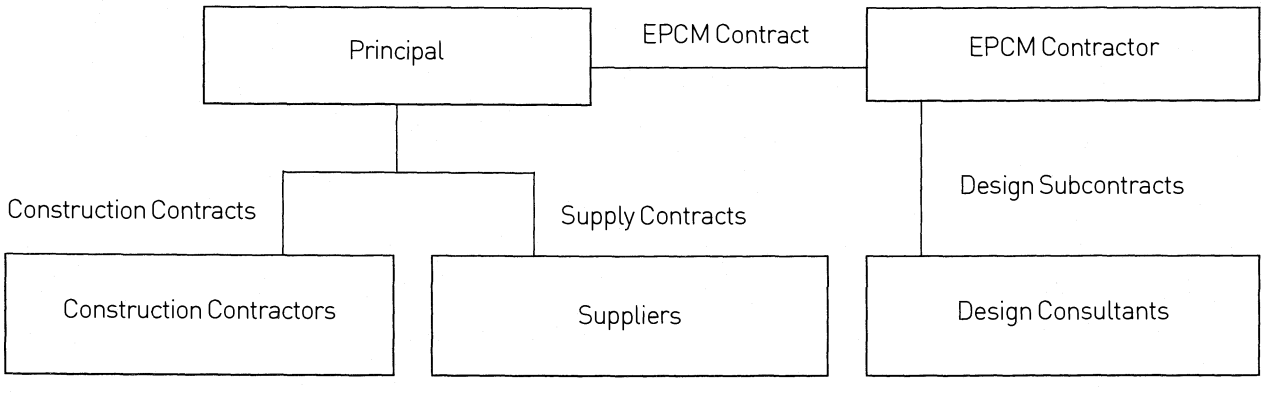
The novated EPC delivery structure's principally perceived disadvantage is that it can be more expensive delivery structure, as there will usually be a degree of 'double charging', as the contractor will usually need to review the designer's design in order to be comfortable with taking over responsibility for it.

In our experience, EPC delivery structures are most commonly used in the delivery of power generation facilities (including co-generation facilities), water and wastewater treatment facilities, gas processing facilities, and transportation projects (including road and rail) where the process technology is either less sophisticated or is fairly mature (and thus principals require less control over the detailed design), the construction market has a large pool of contractors who are experienced and capable of successfully delivering projects using this mode of delivery structure (and are willing to give a warranty for fitness for purpose to the principal).

EPCM DELIVERY STRUCTURE

Under an EPCM delivery structure, the principal engages an EPCM contractor to carry out the engineering design, and to manage the procurement and construction of the project. The principal will enter into direct contracts with the suppliers and construction contractors for the project.

EPCM delivery structures are usually used in the delivery of large process plants involving more sophisticated process technology, and where the principal is keen to take a 'hands on' approach throughout the project, often with an expectation that getting things right will take constant 'fine tuning' variations to the design. Some examples include the Lihir gold processing facilities in Papua New Guinea, the Boyne Island Aluminium Smelter project in Gladstone, Queensland and BHP's HBI plant in Port Hedland, Western Australia.



Advantages

The perceived advantages of the EPCM delivery structure include:

(a) time—it allows fast track construction due to phased construction and project delivery can be competitive in overall design–construction time as compared with an EPC approach; and

(b) the principal has better control over the design development (than in an EPC approach) especially where the process technology is more complex while at the same time, the design can take into account constructability issues (such as access, construction problems and particular methods of working employed by the contractor) by using the construction management skills of the EPCM contractor.

Disadvantages

The perceived disadvantages of the EPCM delivery structure include:

(a) there is usually no firm project cost established until construction is well underway;

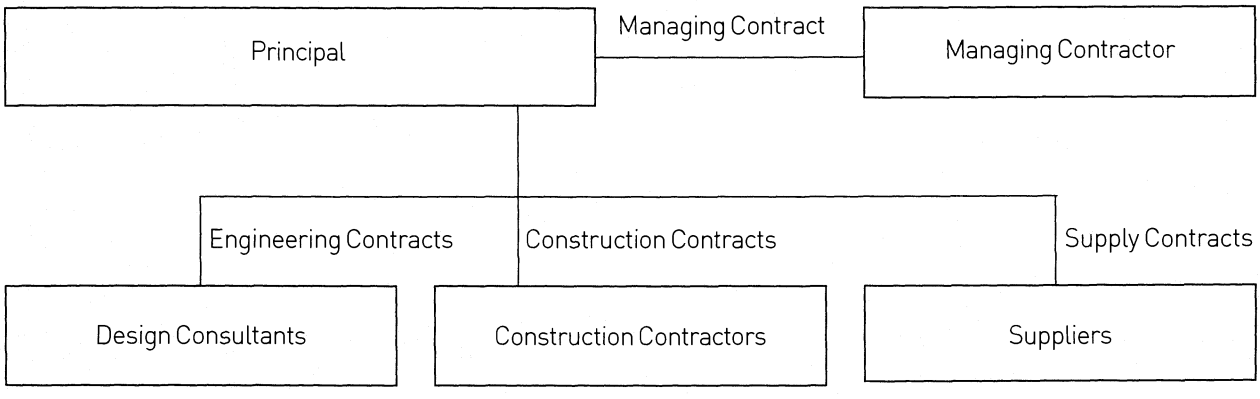
(b) neither the EPCM contractor nor the construction contractors warrant that the project when completed, will achieve all of the operational requirements of the project (that is, no warranty of fitness for purpose);

(c) there is the risk that the overall quality and performance of the project may be subordinated to the EPCM contractor's desire to maximise the cost and time performance–based elements of its remuneration. For example, because of the inability to project costs, various techniques are often adopted such as awarding a larger portion of the project early in the project or setting targets for each portion of the project work and then trying to maintain the targets. The techniques used to minimise cost overruns can sometimes compromise the quality of the project. In addition, the opportunity for the EPCM contractor to cover up its own design deficiencies by the way it construction manages is greater; and

(d) the successful integration of design and construction functions and avoidance of changes/ modifications to the design are largely left to the EPCM contractor, and the principal may not be aware of potential conflicts of interest or weaknesses in the EPCM contractor structure that may interfere with economical and timely project completion.

MANAGING CONTRACTOR APPROACH

The managing contractor approach is more akin to a project management approach. Under that delivery structure, the principal engages a managing contractor (who is usually a large and experienced contractor) to assist it in only the management aspects of the project delivery process. The principal enters into direct contracts (supervised on its behalf by the managing contractor) with the design contractors, the construction contractors and the suppliers.



Advantages

The perceived advantages of the managing contract delivery structure for a principal include:

(a) the construction management skills of the managing contractor can be utilised without the inherent conflict of interest of it also being the designer. The managing contractor can play an active role in evaluating design tendered by design contractors, so as to effect value engineering to reduce costs and to make suggestions as to how to improve the performance outcome of the design;

(b) individual project components are performed by the most expert specialists in those fields, so that each risk is spread to those best equipped to take it and thus hopefully minimised, without 'putting all eggs in one basket';

(c) there can be independent evaluation of costs, schedules and construction performance (including evaluation for changes/ modifications in design);

(d) full time, objective co-ordination between the design and construction contractors (both horizontally, between different designers or between different construction contractors, and vertically, between designers and construction contractors) is available; and

(e) if the management function is well executed, project delivery can be competitive in overall design-construction time as compared with the EPC approach and the EPCM approach.

Disadvantages

The perceived disadvantages from the principal's perspective include:

(a) in using a phased construction approach, the principal begins the project before the total project price is established. An issue is whether early completion is a sufficient trade off for this cost risk;

(b) the principal has certain responsibilities and obligations under the construction contracts that must be met in a timely manner—for example, delays in the design development or supply of principal-supplied materials and equipment can have serious time and cost consequences for the principal;

(c) similar to an EPCM delivery structure, it would be difficult to procure a warranty for fitness of the plant from the managing contractor, the design contractors or the construction contractors as the managing contractor is not performing either design or construction and neither the engineering contractors nor the construction contractors are solely responsible for both the design and construction of the project;

(d) the success of project implementation to a great extent stands or falls on the planning, estimating and project management skills and resources of the managing contractor; and

(e) the managing contractor does not usually give a guarantee either in terms of overall price or the quality of the work (this contrasts that of the EPC contractor).

ALLIANCING

What is an Alliance?

Alliances are not new. They range in size from handshake agreements between two companies to mega-deals involving many participants.

An alliance is a business relationship between organisations in which they share risks, pool strengths, or integrate business functions for mutual benefit.

Each participant in an alliance remains a distinct entity. The benefit of an alliance is not the length of the alliance relationship but rather the value of each alliance participant under that alliance relationship.

Alliance Projects in Australia

Alliancing was first used in Australia in the 1980s on the Wandoo and East Spar offshore gas projects. The operator of the Wandoo oilfield constructed and installed the Wandoo B platform using an alliance with four construction and design companies. In the East Spar project, there was an alliance between the operator and engineering/construction contractors for the design and construction of two subsea wells, a subsea gathering system and multiphase pipelines. Since those offshore projects, alliancing has been used on other infrastructure and service areas including process plants, roads, dams, railways, water and sewerage treatment plants, and outsourcing of services including facilities management, steel plants, railway infrastructure maintenance, process plant facilities, etc.

Advantages

Some of the reasons given as perceived advantages of the alliance approach on those projects were:

(a) flexibility to vary development concept while maintaining schedule and cost;

(b) joint owner/contractor approach to safety and environmental objectives;

(c) non-adversarial approach with common, rather than conflicting, project objectives;

(d) reduced project management costs due to fewer contracts and interfaces and an integrated team;

(e) reducing bidding time and costs; and

(f) flexible access to contractor's resources, thereby avoiding the need for the client to develop a large in-house engineering group.

Types of Aliances

Broadly speaking, alliancing can be categorised into the following:

(a) 'pure' or 'project' alliances, which include projects such as Sydney Water's Northside Storage Tunnel Project and Priority Sewage Project, the Queensland Clean Fuels Project, the National Museum of Australia Project, Western Australian Water Corporation's Woodman Point Project and a number of road projects by the Queensland Department of Main Roads, including the Georgina River Bridge and the Port of Brisbane Motorway. These types of alliances are also increasingly being used in New Zealand, including the Freeflow Alliance road project in Auckland and the Project Aqua hydro-electric project. They are also used by the Defence Materiel Organisation in the ANZAC Ship and Project Djimindi, the anti-submarine warfare lightweight torpedo projects; and

(b) 'impure' or 'strategic' alliances, which include outsourcing of major rail infrastructure capital and maintenance works by the then NSW Rail Infrastructure Corporation, State Rail Authority of NSW and BHP Steel, of facilities management by NSW Police, Alcoa, Incitec, and of EPC and maintenance services by Santos, and the TVR telecommunications project in New Zealand.

Pure Alliance

A 'pure' or 'project' alliance typically includes the following key features:[1]

(a) the parties are collectively responsible for performing the work and generally assume collective ownership of all risks associated with delivery of the project;

(b) the project owner pays the non-owner project participants for their services on a 100 per cent open book compensation model which covers the project costs and project specific overheads, a fee to cover corporate overheads and 'normal' profit, and an equitable share of the 'pain' or 'gain' depending on the project outcomes compared with the parties' joint targets. The downside to the non-owner project participants is usually limited to the loss of the corporate overheads and normal profit;

(c) the project is governed by a joint body (typically called the Project Alliance Board or Alliance Leadership Team) comprising senior representatives of the project owner and non-owner project participants, of which all decisions are unanimous;

(d) day-to-day management of the project is by a senior management team (typically called the Alliance Management Team) and seamless integrated project teams where all project members are chosen and allocated tasks on a 'best for project' basis; and

(e) the parties agree to resolve issues or disputes within the alliance with no recourse to litigation except in the case of 'wilful default'.

Impure or Strategic Alliance

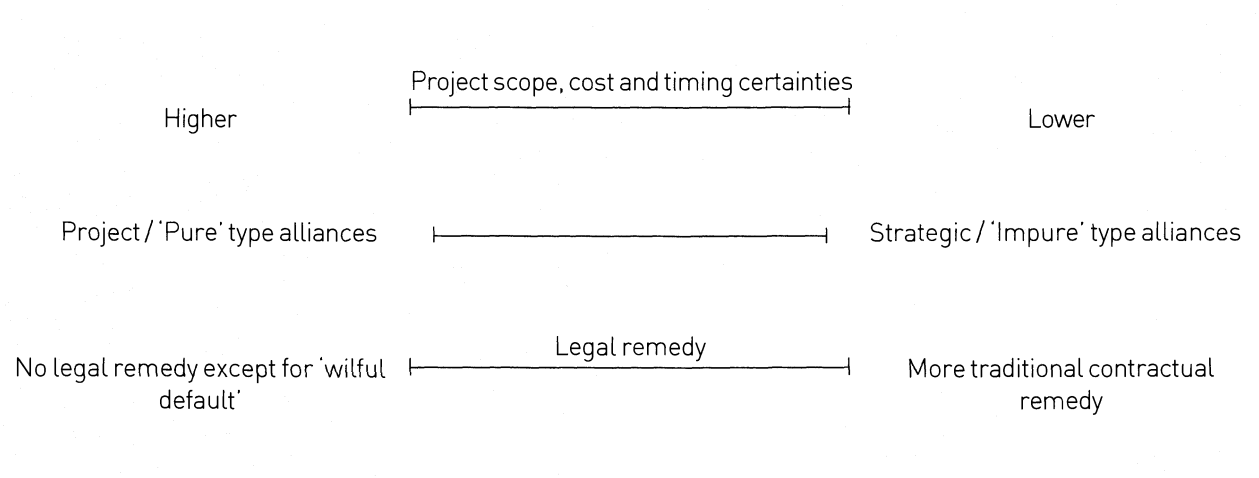
'Impure' or 'strategic' alliances are similar to the 'pure' alliances in terms of management structure (such as use of alliance boards, alliance management teams and integrated project teams), remuneration structure (such as performance based payment structure based on use of key performance indicators (KPIs)) and obligations of the parties to work co-operatively and in good faith.

However, in 'impure' alliances, the non-owner alliance participants (rather than all alliance participants) typically retain discrete liability for breach of their obligations under the alliance contract, and are specifically obliged to discharge their obligations under the alliance contract. In these and other respects, these types of alliances retain more of the features of traditional contracting, than is the case with 'pure alliances' relying on the management and remuneration structures adopted to drive alliance-style behaviours, but with a less radical approach to risk assumption and liability.

This type of alliance is generally used more for projects or situations where the parties are better able to identify, assess and quantify the risks assumed. They are more generally used for conventional construction projects (as compared to the more 'risky' projects such as offshore platforms or where the project alliance participants are working under severe time and delivery constraints) and for outsourcing of services (such as plant maintenance, facilities management, and rail infrastructure maintenance).

Risk Spectrum

The diagram below shows the risk spectrum for the different forms of alliancing.



Setting up a Successful Alliance Structure

The parties to a new alliance relationship should not underestimate the cultural changes likely to be required by them to achieve the necessarily more open relationship and the transition for parties who are used to working in a principal/contractor relationship to work as 'blended teams'.

For a successful alliance relationship, the parties must have a clear set of objectives, careful selection processes and an excellent working relationship between the alliance participants.

It is important that all of the alliance participants have senior executives in charge of their involvement. However, that goes beyond simply anointing an alliance 'godfather'. The strategic alliance participants ideally need to develop a class of alliance executive to build capability not only in existing but also in future alliances.

In setting a successful alliance structure, there are various aspects which are notable:

(a) benchmarking;

(b) senior management involvement and commitment;

(c) evolution of the alliance;

(d) aligning the alliance with the contractor's strategy—top management must articulate a clear link between where it expects the contractor's future profit pools will be, how to capture them and where such an alliance fits in that plan;

(e) building systems and processes—alliance input needs to come from the middle and bottom, not just the top, of organisations—while the alliance parties may have draft alliance mission statements or project charters, there needs to be a fuller infrastructure which may include tools such as corporate policies, best practice guidelines and practice notes; and

(f) staff appropriately—to work effectively, teams must be balanced and personally compatible.

PUBLIC-PRIVATE PARTNERSHIP ('PPP')

Background

Over the last 10 years, there has been a marked increase in Australia in co-operation between governments and private sector for the development, financing and operation of an array of infrastructure ranging from tollroads, water and sewerage treatment plants, sewerage outfall tunnels, power stations, hospitals, schools, prisons to defence-related equipment. These Public-Private Partnership (PPP) projects were primarily driven by governments trying to implement projects without recourse to public funding and also by governments to improve the quality and efficiency of delivering these infrastructure projects and ongoing services to the public.

In Australia, PPP projects to date have been generally based on the Build-Operate-Transfer (BOT) model and have been essentially project financed by the private sector. They are more commonly known as private financing initiatives or PFIs or PFI PPPs.

Some recent projects that have been delivered or have been proposed to be delivered in Australia using a PFI PPP approach include:

(a) Roads (NSW—Cross City Tunnel, Western Sydney Orbital, Lane Cove Tunnel, M4 East; Victoria—Mitcham Frankston Freeway; Queensland—Gateway);

(b) Rail Facilities (Victoria—Spencer Street Redevelopment; NT/SA—Alice Springs to Darwin Rail Project);

(c) Prisons (Victoria—Sale Rural Men's Prison, Men's High Security Prison, Correctional Facilities Project);

(d) Educational Facilities (NSW Schools project—nine schools for the Department of Education; Queensland—Southbank TAFE);

(e) Hospitals (Victoria—Mildura Hospital, Berwick Hospital, and Royal Woman's Hospital (Melb); NSW—Mater Hospital (Newcastle) and the Long Bay Forensic Hospital); and

(f) Water and sewerage services (NSW—Prospect Water Filtration Plant, Wyuna Water, Gerringong/Gerroa Wastewater; South Australia—Riverland water projects).

PPP Policies

The Commonwealth and each State and Territory government have established their own set of guidance and policy materials on the delivery of PPP projects:

(a) Commonwealth—Commonwealth Policy Principles for the Use of Private Financing 2002;

(b) ACT—Government Purchasing Policy and Principles Guidelines 2000;

(c) Victoria—Partnerships Victoria 2000;

(d) Queensland—Public Private Partnership Guidance Materials 2002;

(e) New South Wales—Working with Government: Guidelines for Privately Financed Projects 2001;

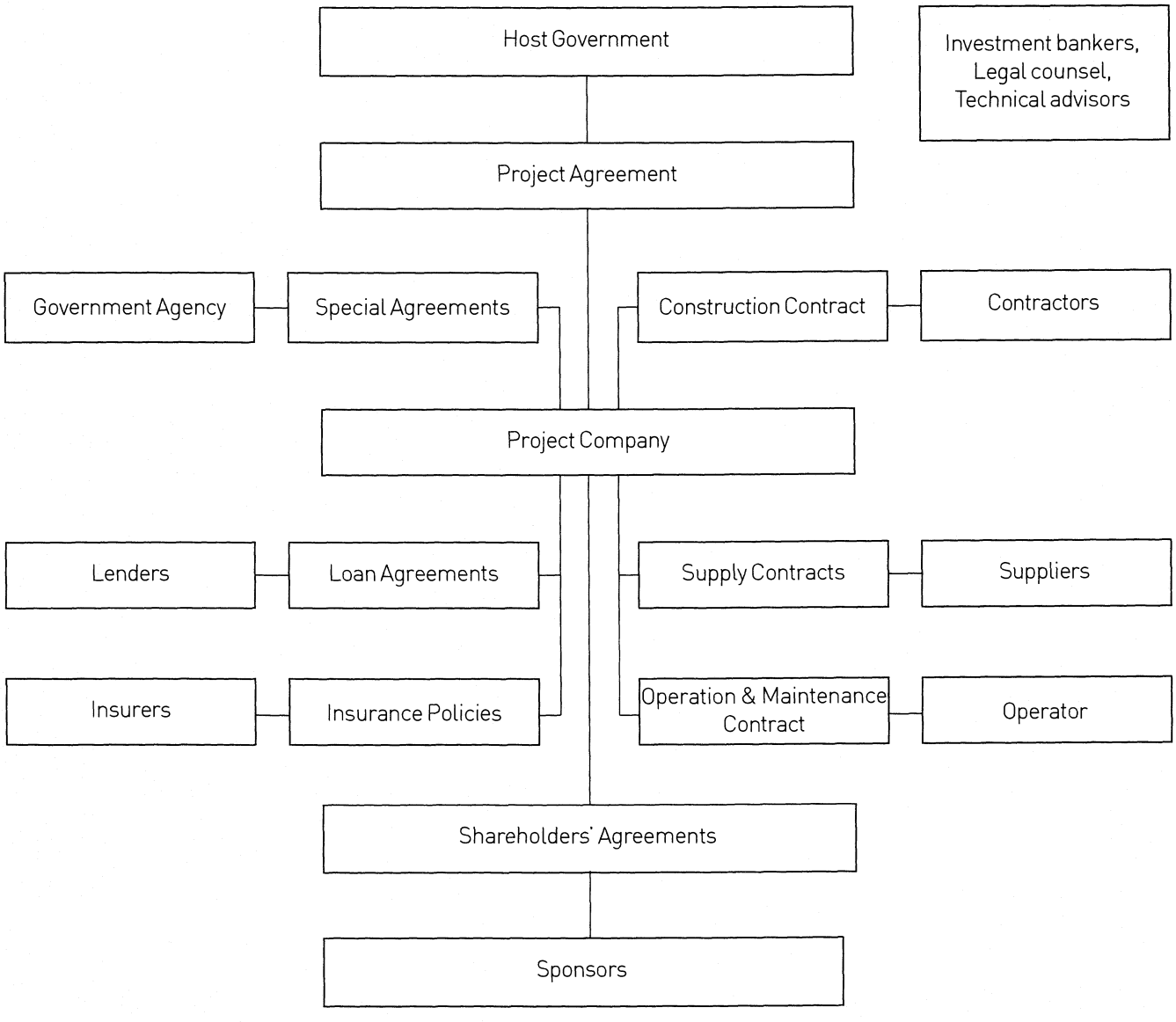
(f) Western Australia—Partnerships for Growth 2002;

(g) South Australia—Partnerships SA: Private Sector Participation in the Provision of Public Services 2002;

(h) Tasmania—Private Sector Participation in Public Sector Infrastructure Provision—Policy Statement and Guiding Principles 2000; and

(i) Northern Territory—Territory Partnerships Policy Framework 2003.

STRUCTURE OF A BOT PROJECT



Source: UNIDO BOT Guidelines

Key Principles

The structure of a PFI PPP deal generally comprise of:

(a) a concession agreement between the government and the private sponsor;

(b) the private sponsor entering into a design and construct contract for the project and a long term operation and maintenance agreement; and

(c) the funding arrangements comprising various financing and equity documents.

The essential element of any project financing is that the project financier's recourse is to the project's assets and revenue stream. This is often described as limited recourse financing.

There are three overriding considerations when designing the risk allocation structure for a project-financed deal for delivery of projects:[2]

(a) the cost of the project in its entirety—whilst the government wants to transfer most of the risks to the private sector and the private sector wants to reduce its risk exposure, the main consideration is the efficiency gains and costs for the project in its entirety;

(b) all substantial project risks have to be identified, allocated and managed, and the project risks have to be managed by a combination of financial resources and firm contractual commitments; and

(c) the risk allocation structure has to be sufficiently sound (or sensible) to cope with a combination of worse-case scenarios for the project.

It is difficult to generalise about the risks applicable to any specific project. The nature and extent of a project and the circumstances and risk appetite of individual sponsors and their project financiers will affect how each project risk will be managed and priced. The views of the project financiers will determine the mix of debt and equity to be used, and the creditworthiness and the bankability of the project will depend on the set of consistent and inter-related agreements between the project parties.

Traditionally, in major projects or projects involving project financing, the most common approach is for project owners to enter into fixed time/fixed price 'turnkey' contracts for the delivery of the project so that the risk of cost overruns, delay risks and technology risks (depending on the technology used in the project) are passed to the contractor. The owner would normally effect insurance for those risks which the parties are unwilling to assume.

Influences on Risk Allocation

In a recent survey carried out by the Victorian government,[3] respondents ranked the following three factors as being the most important on the actual (final) risk allocation for PFI PPP projects. They were:

(a) commercial requirements;

(b) bargaining power; and

(c) the financiers' requirements.

Rational risk allocation and the government's preferred risk regime were ranked fourth and fifth respectively.

As that report stated, the importance of commercial requirements indicates that sponsors do expect a risk premium in return for risk bearing. Respondents also indicated that bargaining power was seen as the next most important factor as the bargaining power largely rested with the government (at least until the selection of the preferred proponent). Whilst it is considered that it is essential for governments to retain competitive tension in the bidding process to gain the best outcomes, it is also argued that governments need to ensure that

they do not use this bargaining power to transfer risks to the private sector which cannot be reasonably managed by them. This will result in higher risk premiums or 'projects may fail if these risks arise and cannot be well managed'.

As discussed in the previous section, financiers' requirements are a major influence on final risk allocation. This is the case for most current PFI PPP projects. The financiers must be comfortable with the risk to which their funds are exposed.

Value for Money

For governments, in choosing the appropriate form of delivery structure (whether for a PFI PPP or non-PFI PPP project), an important question is whether the parties will deliver 'value for money' and if so, how to optimise that value. Value for money is an expression of the economy, efficiency and the effectiveness in which the public sector bodies operate.

Generally, the major factors considered when assessing value for money in PPP programs are:

- risk transfer—relieving the government of the substantial, but often undervalued, cost of asset-based risks;
- whole of life costing—fully integrating up-front design and construction costs with ongoing service delivery, and operational, maintenance and refurbishment costs;
- innovation—providing wider opportunity and incentive for innovative solutions as to how service requirements can be delivered;
- asset utilisation—greater opportunities to generate revenue from use of the asset by third parties (which may reduce the cost that government would otherwise have to pay as sole user);
- output based specification—services are specified as outputs and payment is linked to the quality and timing of their delivery;
- performance measurement and incentives—these act as a means of securing the delivery of the services;
- private sector management skills—ability of the private sector to deliver management and operational efficiencies;
- competition—the value for money of a project is easier to demonstrate where there has been an effective price-led competition.[4]

REFERENCES

1. Ross, J, 'Introduction to Project Alliancing' paper presented at the PCI Alliancing Contracting Conference, Sydney, April 2003.

2. UNIDO BOT Guidelines, Chapter 8, Risk Identification and Management.

3. Department of Treasury and Finance, Private Provision of Public Infrastructure, Risk Identification and Allocation Project, Survey Report, 1999.

4. In 'Partnerships Victoria' projects, bids are assessed against benchmarks to ensure value for money, as compared with the cost to government to deliver the project itself. The Public Sector Comparator benchmark can be used calculate the full, risk-inclusive cost of providing the service over the life of the project. Other factors such as non-quantitative risks in the proposed service levels and capabilities are taken into consideration in the overall assessment.

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