Allocating Risks in Public-Private Partnerships using a Transaction Cost Economics Approach: A case study

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ABSTRACT

Public-private partnership (PPP) projects are often characterised by increased complexity and uncertainty due to their idiosyncrasy in the management and delivery processes such as long-term lifecycle, incomplete contracting, and the multitude of stakeholders. An appropriate risk allocation is particularly crucial to achieving project success. This paper focuses on the risk allocation in PPP projects and argues that the transaction cost economics (TCE) theory can integrate the economics part, which is currently missing, into the risk management research. A TCE-based approach is proposed as a logical framework for allocating risks between public and private sectors in PPP projects. A case study of the Southern Cross Station redevelopment project in Australia is presented to illustrate the approach. The allocation of important risks is put under scrutiny. Lessons learnt are discussed and alternative management approaches drawing on TCE theory are proposed.

Keywords: procurement, risk allocation, transaction cost, public-private partnership, Melbourne.

INTRODUCTION

A massive demand for investment in infrastructure has been caused by rapid urbanisation in many countries (The World Bank, 2006). In order to tackle the problems within the conventional provision of infrastructure funded by governments, such as governmental inefficacies and shortage of governmental funds, a range of public-private partnership (PPP) arrangements are rapidly becoming the preferred way to provide public services in many countries, including Australia (Doloi and Jin, 2007).

DTF (2000) describe the core principle for PPPs is value for money (VFM). Risk transfer means appropriate risks can be transferred to the private sector, which is supposed to be capable of managing those risks better, and is a major VFM driver (Hayford, 2006). Accordingly, cheaper and higher-quality infrastructure services may be provided than is possible using conventional methods. However, the complexity of the arrangements and incomplete contracting nature have led to increased risk exposure for all the parties involved (Woodward, 1995). Effective risk allocation in PPP projects is therefore no easy job. Why should a given risk be transferred to private partners in one project while being retained by government or shared with another? What is the rationale for achieving an optimal distribution of risks? The answers to these questions are critically important to the success (or failure) of PPP projects (DFA, 2005a).

In this paper, the theory of transaction cost economics (TCE) is proposed to help to address these questions. The TCE approach is adopted in the analysis of the case study of a large scale transport infrastructure PPP project in Melbourne, Australia. In the following sections, risk allocation practice in PPP projects and TCE are briefly reviewed, followed by a short presentation of the research methodology. Then the PPP project in question is introduced. The allocation of two typical risks, i.e. financial risk and construction risk, are discussed in detail and TCE-oriented alternatives are provided. Finally, a brief conclusion and future research recommendations are given in the last section.

RISK ALLOCATION IN PPP PROJECTS

In traditional public projects, the public sector purchases an asset from private sector contractors and consultants whose liability is limited to the design and construction of the asset. Finance and operational risks remain with the public sector. Risk allocation in PPP projects is fundamentally different. The PPP model involves the purchase of a relatively risk-free long-term service. The government usually bears little or no asset-based risk and is entitled to reducing payments, abatements and compensation if the service is not delivered to the specified standards.

Since risk transfer is one of the major drivers for VFM, the government has to decide how the identified risks are best distributed between the partners in a PPP project. In theory, all project risks should be borne by the private sector in that service recipients only pay for satisfactory services (Ng and Loosemore, 2007). However, in reality, the government has to determine what risks it should take back to achieve an optimal risk distribution and thereby achieve VFM. It is critical for government to understand that while it is sub-optimal for the public sector to retain inappropriate risks, it is also sub-optimal to transfer inappropriate risk to the private sector (Arndt, 1999). This is because transfer of risks to the private sector comes at a price, though it is one of the key VFM drivers in a PPP transaction (Hayford, 2006). If risks rest inappropriately with the public sector, government will raise taxes or reduce services to pay for its obligations when the risks materialise. In contrast, if risks rest inappropriately with the private sector, excess premiums will be charged to the government or even directly to the end users.

Inappropriate risk allocation thus can damage the VFM proposition of a PPP deal. The Public Sector Comparator (PSC) and the Private Financing Predictor (PFP) are approximate measures of the whole-of-life project cost. As models that are dependent upon a range of long-term value forecasts and risk impacts, they are both highly sensitive to the allocation of risks. The risk allocation strategy is integral to determining the VFM potential of a PPP project as distinct from other delivery options (DFA, 2005c). Moreover, the accuracy of the presumed transfer of a package of risks to the private sector, together with the identification and valuation of project risks, are essential to the construction of a meaningful PPP project (DFA, 2005a). Risk allocation in PPP projects can also be seen as a way to establish financial equilibrium between partners (Medda, 2007). Inadequate risk allocation can thus raise the costs of capital and tariff levels in the investment. This often necessitates a renegotiation of the concession and a new risk allocation scheme. Such renegotiation can be a lengthy and costly process and often brings about opportunistic behaviour that increases transaction costs (Williamson, 1996).

Unfortunately, risk transfer is often handled poorly in many PPP projects (Ng and Loosemore, 2007). A common perception that privatisation involves transfer of all risks to the private sector was prevalent in many countries until recently. Although this has been found to have major limitations and many governments now recognise that privatisation is a partnership in which they must retain some risk, whether in the form of financial subsidies or the assumption of contractual responsibilities or contingent liabilities, the principle of optimal risk allocation is often not followed in many PPP infrastructure projects (Faulkner, 2004; Thomas et al., 2003). Sometimes risks will inevitably be allocated to the party least able to refuse them rather than the party best able to manage them, especially when the government maintains maximum competitive tension.

Risk management practices in PPP projects have been found to be highly variable, intuitive, subjective and unsophisticated (Ng and Loosemore, 2007). Given the critical importance of risk allocation in PPP projects, intensive research has been conducted in this research area (e.g., see Walker and Chau,1999; Faulkner, 2004; Medda, 2007; Ng and Loosemore, 2007; Thomas et al., 2003). Most research focuses on how to achieve optimal (effective or equitable) risk allocation, which seeks to minimise both project costs and the risks to the project by allocating particular risks to the party in the best position to control them (DFA, 2005b; DTF, 2000; Hayford, 2006; Kangari, 1995). This is based on the principle that the party in the greatest position of control or possessing the best capability of management with respect to a particular risk has the best opportunity to reduce the likelihood of the risk eventuation and to control the consequences of the risk if it materialises, and thus should assume it (Rahman and Kumaraswamy, 2002; Thomas et al., 2003). Allocating the risk in line with those opportunities creates an incentive for the controlling party to use its influence to prevent or mitigate the risk and to use its capacity to do so in the overall interests of the project (Ahmed et al., 1999).

Nonetheless, research in risk management is concerned mainly with process and technique, neither of which is successful in understanding which kind of existing governance structures best suits a particular risk in terms of efficiency and why (Walker and Chau, 1999). Although researchers try to understand the forces that determine the most appropriate or optimal risk allocation for a specific project, the part related to economics has not been incorporated yet. It is submitted in this paper that Transaction Cost Economics (TCE) can contribute to this and can facilitate a more logical and holistic understanding of the allocation of risks in PPP projects.

TRANSACTION COST ECONOMICS

The TCE approach developed out of the institutional economics of Commons and the analysis of administrative behaviour by the Carnegie school (Winch, 1989). This approach emerges from the economist Coase's seminal work, in which he advances his theory of the existence of firms and argued that, in the absence of transaction costs, there is no economic basis for the existence of the firm (Coase, 1937). TCE recognises that there are costs of using the pricing system and that such costs give rise to various forms of economic organisations (Coase, 1988). It represents a major attempt to combine economic and sociological perspectives on industrial organisation (Winch, 1989). This analysis supersedes neoclassical economic analysis, which assumes that economic activities can be coordinated costlessly by a system of prices. Neoclassical theory is 'simply a rhetorical device adopted to facilitate discussion of the price system' (Demsetz, 1991) and tells nothing about the organisational structure (Hart, 1990).

Transaction costs are the costs of running the economic system (Arrow, 1969). Such costs are the economic equivalent of friction in physical systems and one distinguished from production costs (Williamson, 1985). TCE poses the problem of economic organisation as a problem of contracting and assumes that (1) human agents are subject to bounded rationality, where behaviour is 'intendedly rational but only limitedly so' (Simon, 1961), and (2) is given to opportunism, which is a condition of 'self-interest seeking with guile' (Williamson, 1985).

TCE further maintains that there are rational economic reasons for organising some transactions one way and other transactions another. The principal dimensions with respect to which transactions differ are (1) asset specificity, the degree to which an asset can be redeployed to alternative uses and by alternative users without sacrificing productive value (Williamson, 1996), (2) uncertainty, which may arise from 'state of nature' or changes in the external environment affecting a system (Rao, 2003) or when incomplete contracting and asset specificity are joined (Williamson, 1996), and (3) frequency, which admits the fact that the pair-wise identity of the parties matters and has pervasive consequences for the organisation of economic activity (Williamson, 1996). The consequent organisational imperative is to 'organise transactions so as to economise on bounded rationality while simultaneously safeguarding them against the hazards of opportunism' (Williamson, 1985). By assigning transactions to governance structures in a discriminating way, transaction costs are economised (Williamson, 1985).

The essential insight of TCE is that in order to economise on the total cost of a good or service, both production costs and transaction costs must be taken into account (Williamson, 1985, 1996; Winch, 2006). A production technique that has the lowest production costs might not be the economising choice if transaction costs are also taken into account (Winch, 2001). While a traditional economic analysis can identify the most efficient choice of production technique, it cannot explain the most effective use of that production technique (Winch, 2006). It is noteworthy that transaction costs are always assessed in a comparative institutional way (Williamson, 1996). Empirical research on transaction cost issues remains whether organisational relations align with the attributes of transactions as predicted by transaction cost reasoning or not (Williamson, 1985).

Risk allocation in PPP projects is suitable to be viewed from a TCE perspective because any issue that can be formulated as a contracting problem can be investigated to advantage in transaction cost economising terms (Williamson, 1985). The suitability also arises from many features of PPPs, which include incomplete contracting, long-term partnership, heavy investment into assets, complex uncertainty, etc. (Jin and Doloi, 2008). In this paper, it is submitted that, concisely, choosing a strategy for allocating a given risk could actually be viewed as the process of deciding the proportion of risk management responsibility between internal and external organisations based on a series of characteristics of the risk management service (RMS) transaction in question.

The physical and human asset specificities are the major characteristics of an RMS transaction in a PPP project because they bear the most relevant and influential ramification. Whilst the problems of physical asset specificity arise post-contract through 'fundamental transformation' (Williamson, 1985) and especially relate to particular types of civil engineering projects (Winch, 1989), human asset specificity is more widely relevant to construction projects because detailed knowledge is held in a firm, usually by a relatively small number of people (Reve and Levitt, 1984; Walker and Chau, 1999). The most important specified human assets in RMS transaction would be the organisational capability of managing a given risk (Jin and Doloi, 2008).

Transaction frequency is another major characteristic of an RMS transaction. Although it is low in construction, often effectively unity for most client-supplier dyads (Winch, 2002), this is one of the areas in which many clients are making changes with the aim of achieving learning benefits. Transaction frequency is expected to influence the governance over RMS transaction because PPP *per se* indicates a higher level of transaction frequency due to its long-term commitment (Williamson, 1996).

Uncertainty is the third major characteristic. In fact, it is the level of uncertainty that the parties involved in the construction industry face that most clearly distinguishes the construction industry from others (Stinchcombe, 1959). The project process is basically a process of the progressive reduction of uncertainty through time (Winch et al., 1998). However, PPP projects usually bear the feature of much prolonged uncertainty due to their decades of lifecycle and the difficulty in foreseeing future uncertainties, especially those inherent in later stages.

The appropriate choice of RMS transaction governance mode is a function of the aforementioned characteristics (Williamson, 1975). These characteristics become troublesome in interaction with each other (Winch, 2001). Without asset specificity, any negotiations to handle unforeseen events can be made when they occur. Without uncertainty, complete contracts can be written in advance to foreclose opportunistic behaviour that arises from asset specificity. Without frequency, it would be difficult to determine whether or not there is any return on investing in transaction-specific governance modes.

A public partner could manage a risk entirely in-house (hierarchy). Transaction costs may include the cost of setting up a team and monitoring its performance, among others. This is the case when asset specificity is relatively high and combined with high levels of uncertainty (Williamson, 1996). Arguably, transaction and production costs are lower than the costs for the same level of RMS procured through the market. Otherwise, a public partner may purchase the required RMS entirely from the market or carry out the task together with a supplier. Transaction costs may include the cost of devising the service contract and monitoring the service provider, among others. This is the case when asset specificity is relatively low and consequently market power prevails (Williamson, 1996). The current industrial practices are investigated against these TCE principles in the case study.

RESEARCH QUESTION AND METHODOLOGY

Based on the literature review, the main research questions identified in this study are whether the current risk allocation practices in PPP projects are TCE-oriented and whether they are appropriate and efficient. Accordingly, the research objectives are to demonstrate how major risks inherent in PPP projects were distributed, to investigate the management performance of those risks in the adopted risk allocation patterns, and to propose more effective strategies for allocating those risks following the TCE approach.

The research fieldwork was carried out in two consecutive phases, which include an industry-wide questionnaire survey for a quantitative analysis and a case study for a qualitative analysis. This paper reports the findings of the case study. The Southern Cross Station Redevelopment project (SCSR or the Project), formerly known as Spencer Street Station Redevelopment project in Melbourne, one of the first projects of its kind in Australia procured using the PPP method, is selected in this research. Data about the Project are collected from a range of sources, including a semi-structured interview with the project director, contract documentation, government and private sector reports, newspaper articles, and journal articles.

The following sections present the information gathered from above sources and provide detailed discussion and suggestion on the risk allocation issues involved in this social-economical-hybrid transport infrastructure PPP project.

CASE STUDY

BACKGROUND INFORMATION

The SCSR project, worth AU$700 million, is currently one of the largest social and economical infrastructure projects procured using the PPP approach in the State of Victoria, Australia. The project adopts Partnerships Victoria policy, which was formulated in 2000 (DTF, 2000). It is expected that the exposure of governments adopting PPP models to risks such as cost and time overruns is minimised.

The Southern Cross Station (SCS or the Station) is Victoria's gateway for interstate rail and coach travellers and also Melbourne's gateway for regional rail and coach travellers and a second major hub for suburban train travel to and from the CBD. Special domestic and international events such as the Australian Tennis Open and the Melbourne Cup (a horserace) are also serviced by the Station. The Station is unique in its scope of intermodal passenger transport services facilitating travel by suburban trains, regional trains, interstate trains, special events trains, coach and bus services, and trams and taxis. The facility was also designed to provide for a proposed Melbourne Airport Transit Link (MATL) and a possible interstate Very High Speed Train (VHST). It was estimated that the capacity requirement of the facility in 2050 will be a peak passenger flow of 30,000 people/hour (DoI, 2002).

The Project comprises four elements, namely the transport interchange facility, rail modifications, signaling upgrade, and commercial development. As one of Melbourne's principal arrival and interchange hubs for passengers, the Station has both economic and social significance. The Project was expected to offer a unique opportunity to respond to the strategic status of the transport interchange with world class architecture of enduring quality and to act as a catalyst to encourage significant growth and bring new transport users to the area (DoI, 2002).

The state government of Victoria (the Government) first publicly announced the redevelopment plan in February 2000 in order to link Melbourne to its regional hinterland, which was an integral part of the Government's AU$1.5 billion Linking Victoria policy aiming to invest in transport infrastructure, such as railways, roads, and ports. The Project was planned to be completed before the 26th Commonwealth Games that were held in Melbourne in April 2006. In July 2001, the Government called for expressions of interest (EOIs) for the Project in pursuance of Partnerships Victoria policy (Lindsay, 2003) and announced three shortlisted consortia on October 11, 2001, which were (1) ABN AMRO (developer), Leighton Contractors (design, construction and refurbishment contractor), and Daryl Jackson Architects associated with Grimshaw Architects (architects); (2) Australand, the Commonwealth Bank, and Ashton, Raggatt, McDougall; and (3) Rothschild & Sons with Multiplex, and Denton Corker Marshall (Finlay, 2001). The bidding costs were around $2-3 million without any guarantee of success (Fitzgerald, 2004).

The State Rail Authority of Victoria was set up to operate the station's rail function on the Government's behalf. Civic Nexus Pty Limited (the concessionaire or consortium), led by ABN AMRO, won the bid in July, 2002. The major stakeholders involved in the project are illustrated in Figure 1. The winning proposal included a 42,000 square metre wave-like roof, a 30 bay bus station, and airport-style baggage and concourse facilities. In the original vision, Civic Nexus proposed that the adjoining land should form a 'massive new mixed-use precinct that will incorporate a 50,000 square metre commercial office tower, two residential apartment towers with about 500 apartments and up to 15,000 square metres of retail space, including a supermarket and other specialty stores' (Lindsay, 2003).

In PPP projects, government might choose to transfer most or even all of the risks to the private partner. The transfer however does not come without costs in that private partners are experts at fully factoring the risk premium into the PPP deals. According to the Government, the Project has a net present value (NPV) of AU$300 million and gives a real rate of return at 9.7% or a nominal rate of return at 12.2% allowing for an inflation rate of 2.5% per annum. However, it is suggested that the risk-adjusted discount rate used by the Government to assess the NPV of cost, e.g. the annual fee the government would pay, was too high (Fitzgerald, 2004), and should be the rate at which government pay interest if it financed the project by itself (Davidson, 2006). Using a discount rate of 5.8% which is the interest rate when the government borrows capital, the NPV of the Project is AU$422 million. Therefore, that is to say the Government had decided to pay a risk premium of AU$122 million, which is more than one sixth of the project value, for transferring all the risks relating to the Project to the private partner (AAR, 2002b; Davidson, 2006). Whether VFM has been maximised is questionable.

By the time of data collection, the Project was very close to the end of the construction phase. It was thus possible to investigate the allocation strategies for all risks (except for those in the operation and maintenance stages) and their impact on project performance. However, it may be more meaningful to focus on those risks, the allocation of which made greater impact, both positive and negative. Therefore, only two risks, i.e. the financial and construction risks, are discussed in the following sections.

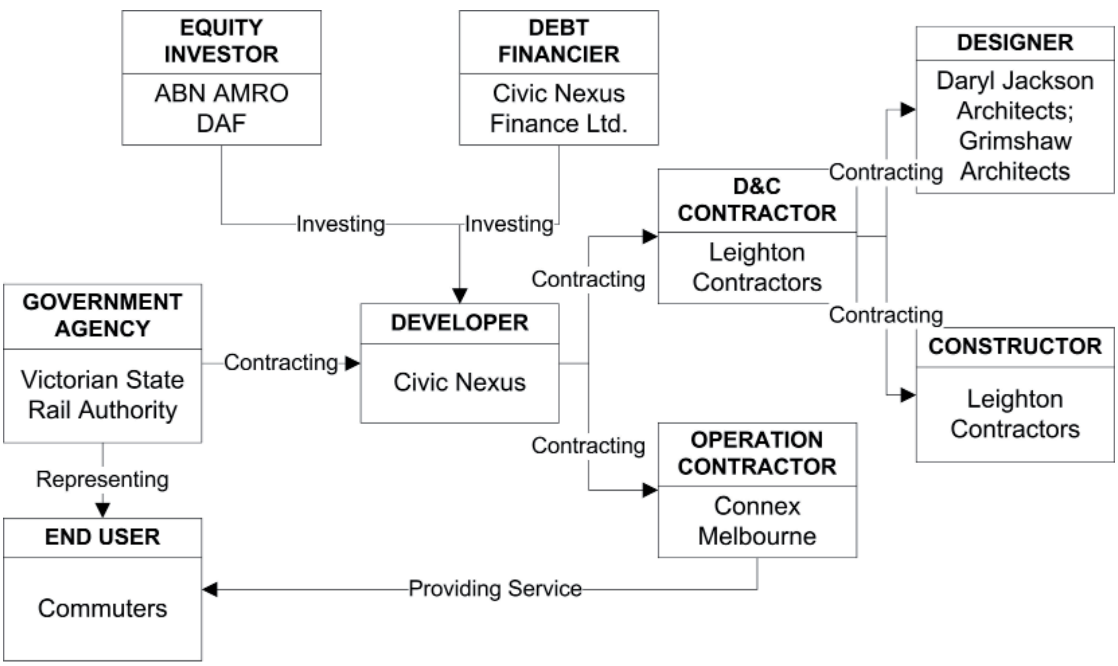
FINANCIAL RISK

In August, 2002, the Government finalised the agreement with Civic Nexus. The station was then valued at $350 million and Civic Nexus would also build associated developments worth another $350 million, including a shopping mall and three office-residential towers (Packham, 2002). The Government would pay Civic Nexus $34 million per annum for 30 years. In return, Civic Nexus would be responsible for maintaining the facility. Afterwards, the ownership of the Station would be transferred to the Government (Davidson, 2002). This payment stream was equivalent to an NPV of AU$309 million at a nominal pre-tax discounting rate of 8.65% and involved a saving against the risk-adjusted cost of the PSC at 5% (Fitzgerald, 2004). In addition, Civic Nexus would pay the Government $66 million for commercial development rights via a 99-year lease for properties adjacent to the Station (Lindsay, 2003).

In order to finance the construction, Civic Nexus issued three tranches of bonds. The first two tranches were a AU$135 million indexed bond with a 30-year maturity, and a AU$200 million fixed-rate bond with a 12-year maturity due on September 15, 2014 (Lindsay, 2003). Due to the existence of a series of mechanisms to cover risks, both bonds attracted investors with the former issued at 50 basis points above the Commonwealth indexed bond of 2015 and the latter at 67 basis points above the swap rate (Anonymous, 2002). In April, 2003, Civic Nexus issued the third tranche of bonds, a US$73.9 million one maturing in September, 2014, which specifically targeted US investors. ABN AMRO was the underwriter and provided a 12-year cross currency swap to mitigate the currency risk (Lindsay, 2003). In addition, Leighton Contractors provided AU$60 million in case there were construction overruns or failure, which in fact is a license fee that Leighton Contractors paid to the State Rail Authority of Victoria.

In December, 2003, ABN AMRO announced that it had formed a Social Infrastructure Strategic Alliance with Development Australia Fund Management Ltd. (DAF) to acquire and manage Social

Figure 1: Major stakeholders in the Southern Cross Station redevelopment project



Infrastructure investments for superannuation funds. Whilst ABN AMRO retained a 25% interest in the project until sometime after the commissioning, DAF gained a 75% equity stake in the station for an undisclosed amount (ABN AMRO, 2003). The financial structure is demonstrated below in the flowchart (see Figure 2).

Financial risk refers to the risk that the financiers will not provide or continue to provide funding to the project, that financial parameters will change, and that the financial structure is not sufficiently robust to provide fair returns to debt and equity over the life of the project (DTF, 2001). However, the odds at which financial risk may materialise are greatest in the early stage of a PPP project. By that time, huge capital investments of limited alternative usage have not been made yet (Winch, 1989). Therefore, asset specificity was not as high as that in later stages. As discussed above, transaction frequency is typically low in construction (Winch, 2002). Besides, the partners in the Project had never cooperated on similar projects before. According to TCE, risk management service bearing such features is better governed in the market regardless the condition of uncertainty factors (Williamson, 1996). That is to say the financial risk should be transferred to the private partner anyway. By further examining the uncertainties in the Project, it was found that the legislative and regulatory framework systems were stable and adequate, the approval process was efficient and convenient, community attitude was supportive, regional economic conditions were stable, and financial and insurance markets were mature and stable. In a nutshell, major environment uncertainty factors were not volatile. Besides, only financially reputable and capable parties were part of shortlisted bidding groups and the most reputable and capable consortium was awarded the contract. This also mitigated the financial risk (DTF, 2001). Therefore, the allocation of financial risk is appropriate because the practice generally followed TCE theory and the financial risk was mitigated by the private consortium, the risk bearer. The analysis is summarised in Table 1.

CONSTRUCTION RISK

Construction risk refers to the events occurring during construction that prevent the facility being delivered on time and on cost (DTF, 2001). According to Partnerships Victoria, the private consortium is generally required to 'enter into a fixed term, fixed price building contract to pass the risk to a builder with the experience and resources to construct so as to satisfy the private party's obligations under the contract' (DTF, 2001).

The Project is notable for the architectural design of a unique roof to cover the railway platforms. The roof was initially conceived as an environmentally performing element to facilitate the extraction of the diesel fumes expelled from the interstate and regional trains without recourse to mechanical ventilation. The roof's fluid dynamics was computer modelled to prove that fumes trapped in upturned wells high above the platforms could escape naturally through holes cut into the top of each well, covered with a louvred cap, to aid escaping fumes and prevent downdrafts. This roof, which has a two-way curvature and measures a massive 4.2 hectares, presented a major design and construction challenge due to the requirement that the Station would have to continue full operation during construction.

Nonetheless, Civic Nexus, the concessionaire, fully bore all risks relating to the Project, including the construction risk. They were 'responsible for and not entitled to make any claim in connection with construction means, methods and techniques used to undertake the Interchange Facility works' and had to 'provide everything necessary for the design, construction and commissioning of the Interchange Facility Works' (AAR, 2002a). Civic Nexus further transferred the full construction risk to Leighton Contractors, the construction contractor via a fixed term and fixed price design and construction (D&C) contract. However, the requirement of continuing station operation and the unique design of the wave-like roof greatly limited the construction methods available. Consequently, the roof structure had to be designed as a prefabricated entity with structurally stable components. These components were cleared of tracks and associated infrastructure including overhead electrified wires during erection when the train station was not running. It was impossible to prop the roof during its construction and hence the roof columns had to be rigid enough to provide lateral stability. As a result, the size of the prefabricated structural elements had to be maximised to minimise the required number of structural lifts during construction. Besides, pre-finishing

Figure 2: Financial structure of the Southern Cross Station redevelopment project

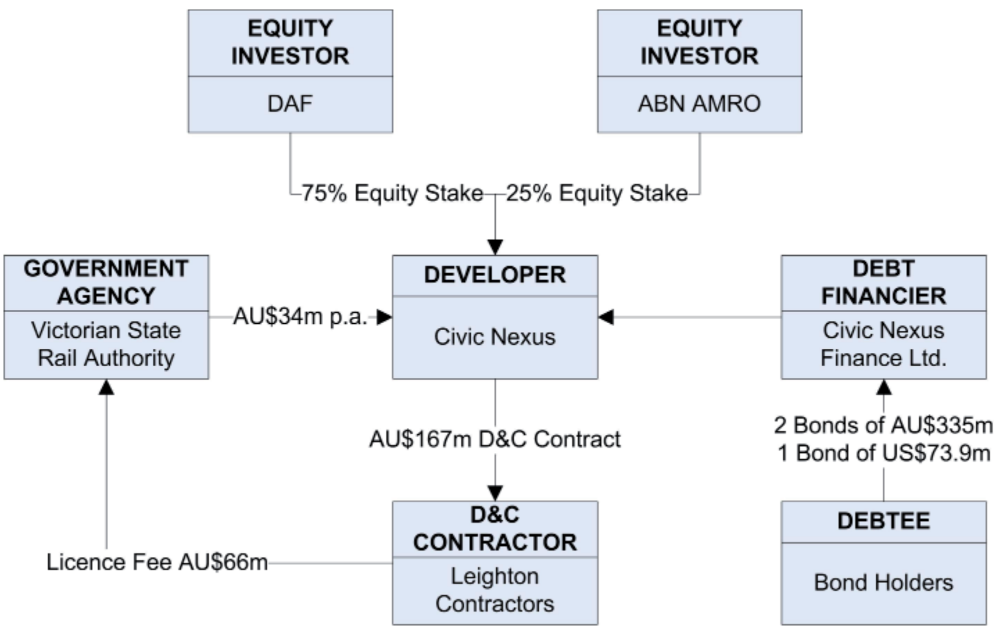


Table 1: RMS transactions and TCE-orientated recommendations for the Southern Cross Station redevelopment project

		Risks in the Southern Cross Station redevelopment project	
		Financial Risk	Construction Risk
Transaction characteristics	Asset specificity	Physical assets specificity is relatively low; human assets specificity is medium	Physical assets specificity is increasingly high; human assets specificity is medium
	Transaction frequency	Low because partners had never cooperated on similar projects before	Low because partners had never cooperated on similar projects before
	Uncertainty	Relatively low because of stable and adequate legislative and regulatory system, efficient and convenient approval process, supportive community attitude, stable regional economy, and mature and stable financial and insurance markets, etc.	Relatively high because of highly complex and innovative design, subsequent problematic constructability, construction contractor's relatively scarce experience in similar projects, rigid lump sum D&C contract, and interrupted and ineffective communication among partners; and consequently contractor's low commitment
RA strategy	TCE-Oriented	To totally transfer to the concessionaire	To share between the public client and the developer OR between the developer and the construction contractor by, e.g. cost plus contracts
	Adopted in the Project	Totally transferred to the developer	Totally transferred to the developer and subsequently to the construction contractor
RMS outcome	If TCE-Oriented	Risk may be mitigated effectively and efficiently; Transaction costs may be reduced	Risk may be mitigated effectively and efficiently; transaction costs may be reduced
	Actual outcome	Risk was mitigated effectively and efficiently; Transaction costs were reduced	Risk materialized and caused renegotiations and claims; transaction costs, such as the costs of claims and renegotiations, were greatly increased

Note: RA: risk allocation; RMS: risk management service

had to be maximised prior to erection to minimise the time spent in finishing the structure once it was in place.

Leighton Contractors' operating time was severely restricted by some work on the unique wave-roofed building, which could only be done when trains were not running. Leighton was thus in conflict with train operator Connex Melbourne, who wanted to keep the trains running as much as possible, over the access to the construction site (Tomazin and Myer, 2006). By May, 2004, Leighton Contractors cited the confined working environment, site access issues, the demands of the franchisee train operators, and the complex design variations as the major causes of their problems. This conflict, remaining unsolved, turned into a dispute and Leighton Contractors ultimately made a claim for the resultant losses. Interestingly, the Government agreed to compensate Leighton for the cost and time overruns though the construction risks have been transferred at the cost of the risk premium.

In the Project, construction risk was high because the design was highly complex and innovative, the constructability was accordingly problematic, the construction contractor's experience in similar projects was relatively scarce, the lump sum D&C contract was rigid, and the communication among partners was not smooth and effective. Consequently the contractor's commitment was low although they chose to accept the risk probably due to the need for work (Barnes, 1983). In short, major uncertainty factors that may trigger the construction risk were highly active or volatile and risk bearer's risk management capability was not sufficient. More importantly, the asset specificity became much higher because on the one hand, the necessity to make huge capital investments of limited alternative usage rapidly leads to a small numbers situation where a supplier cannot withdraw due to such transaction specific investments; on the other hand, once a supplier has started work, typically the costs of replacing that supplier are quite high, both in straight financial terms and perhaps more so in terms of project progress (Winch, 1989). Besides, a supplier may choose to hold up the project program and hence disrupt the production, thereby causing 'temporal specificity' problems (Masten et al., 1991).

Such situations are common in PPP projects, where high performance specifications are involved (Masten et al., 1991). Under such circumstance, according to TCE, the risk management service would be better governed in hierarchy or hybrid forms rather than market (Williamson, 1996). In the Project, the construction risk could have been better tackled if the Government or the concessionaire had retained part of the risk by entering into a flexible contract with Leighton Contractors, such as a cost plus contract. The analysis is also summarised in Table 1.

CONCLUSION

This paper presents a review of risk allocation in PPP projects and points out that previous research in risk management has been unsuccessful in understanding which kind of existing governance structures best suits a particular risk in terms of efficiency and why. It was therefore argued in this paper that that the TCE theory can help incorporate the part related to economics into risk management research, thereby providing a logical and holistic understanding of the allocation of risks in PPP projects. A thesis was proposed that drawing on TCE, choosing a risk allocation strategy could actually be viewed as the process of deciding the proportion of risk management responsibility between internal and external organisations based on a series of characteristics of the risk management service transaction in question.

In order to illustrate the proposed TCE approach, a case study of the AU$700 million SCSR project in Melbourne, Australia was conducted and presented. The focus was on the financial and construction risks, the appropriate allocation of which is critical to the success or failure of PPP projects. It was found that the allocation of the financial risk in the case study generally followed the TCE approach and led to a satisfactory outcome. In contrast, the rationale for the allocation of the construction risk in the case study was found incompatible with the TCE approach and the adopted distribution strategy resulted in a financial loss to the government. In pursuance to the TCE, an alternative allocation strategy was proposed to better manage the construction risk when the investment is specific and huge, the business environment is highly uncertain, and the potential risk-bearer is incompetent and uncommitted, which was the situation in the case study project.

The proposed TCE approach can thus be easily adapted and applied to the decision-making process of the allocation of other risks in various construction projects, especially the complex, long-term, multi-stakeholder PPP projects. Nonetheless, the approach needs to be further verified in a quantitative way in the future.

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