

Risk-Sharing Mechanism for PPP Projects – the Case Study of the Sydney Cross City Tunnel

APC Chan, PTI Lam, DWM Chan and E Cheung*

ABSTRACT

The Cross City Tunnel in Sydney, Australia is a good example of how the improper allocation of risks could affect the success of a Public Private Partnership (PPP) project. It is not incorrect for risks to be passed on to the private sector, especially when they are able to manage them. But maybe there should be a ‘partnership’ in place when the private sector is unable to manage all the risks themselves. Some critiques considered this project as an unsuccessful PPP as the Government has had to cope with handling much public opinions dissatisfaction and criticisms for their inaccurate traffic forecasts, leading to the investor making a financial loss. This paper aims to derive a risk-sharing mechanism for projects similar to the Cross City Tunnel, by reviewing the underlying causes leading to the ‘failure’ of this project. In addition, the objectives are to ensure that appropriate risk allocation is achieved in the best interests of all parties so as to make the project successful. Unpredictable circumstances and inaccurate predictions of the Government could make it difficult if not impossible for the private sector to handle the project. In these situations the Government should step in, share the responsibilities and overcome the problems encountered with the consortium. The Government should be able to offer assistance in these circumstances in the form of finance, manpower, governmental procedures, etc. depending on the need. In addition, this paper advocates that such mechanism should be in place for similar projects in the future. Benefits for both sector parties are anticipated when this mechanism is included in the project contract. After all, a PPP is a ‘partnership’ and the parties should work together to overcome obstacles for mutual benefit.

KEYWORDS

Public private partnership
Sydney Cross City Tunnel
Risk sharing mechanism

**Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong*
E-mail: bsesther@polyu.edu.hk

INTRODUCTION

The definition of a PPP has been reported by numerous researchers. Each definition varies slightly depending on the author, jurisdiction and the time. As the Cross City Tunnel (CCT) in Sydney, Australia is a New South Wales Government infrastructure project, it is therefore logical to consider their definition of a PPP. According to the New South Wales Government the term ‘public private partnership’ (PPP) is used to mean:

‘An arrangement for the provision of assets or services, often in combination and usually for a substantial or complex “package”, in which both private sector supplier and public sector client share the significant risks in provision and/or operation’. (Infrastructure Implementation Group, 2005).

In this definition the emphasis is on both the public and private parties sharing a large proportion of the risks in a PPP project. In reality it is not always the case that an equal split of risks is experienced. Often the public sector takes up minimal risk and aims to pass on as many risks as possible to the private sector. This occurs more commonly in developing countries or jurisdictions where the Government has less experience in this alternative procurement method. This paper therefore aims to derive a risk-sharing mechanism for projects similar to the CCT. In addition the objectives are to ensure that appropriate risk allocation is achieved; and that the aims of all parties are to make the project successful. The New South Wales Government further

describes that:

‘Privately financed projects involve provision by investors of equity capital and debt capital to fund what might otherwise be wholly publicly funded projects financed from NSW Government borrowings and/or budget revenue’.

This further emphasizes the importance of the financing of PPP projects. Passing on financial risks is appealing to governments.

The PPP form of procurement is recognized as an effective way of delivering value-for-money public infrastructure or services. It seeks to combine the advantages of competitive tendering and flexible negotiation, and to allocate risk on an agreed basis between the public sector and the private sector (Akintoye et al. 2005). It is essential for the public client and the private bidders to evaluate all of the potential risks throughout the whole life of the project. Public and private sector bodies must pay particular attention to the procurement process while negotiating contracts for a PPP to ensure a fair risk allocation between them. Systematic risk management allows early detection of risks and encourages the PPP stakeholders to identify, analyze, quantify and respond to the risks, as well as take measures to introduce risk mitigation policies (Akbiyikli and Eaton 2004). A fundamental principle (Grimsey and Lewis, 2002) is that risks associated with the implementation and delivery of services should be allocated to the party best able to manage the risk in a cost

effective manner. A delicate balance has to be sought amongst private sector capacity, government regulatory function and public satisfaction.

In general, the typical processes for delivering PPP projects in New South Wales include five major steps (Figure 1): 1. project identification; 2. project approval; 3. planning assessment; 4. project delivery; and 5. project implementation (Infrastructure Implementation Group, 2005). Before a project is even considered it will go through a series of governmental in-house procedures to decide whether it is a public facility or service that is needed. If it is decided to be necessary,

the project will have to be approved via the Gateway review process and to see which procurement option it should adopt. Planning assessment via a number of different line agencies would be necessary. Finally the project will be offered to the market, consortia will bid for it and the Government will select the most suitable candidate after a long series of negotiations. The project will typically be designed and constructed over 3 to 5 years. It will then be put into operation and maintained for a further 25 to 30 years as the concession period. Thereafter, the project will normally be returned to the Government, completely ending its life as a PPP project.

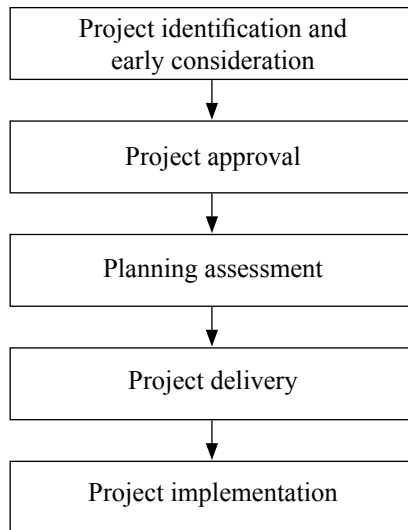


Figure 1 Typical processes for delivering PPP projects in New South Wales, Australia (Adapted from the Infrastructure Implementation Group, 2005)

BACKGROUND OF THE SYDNEY CROSS CITY TUNNEL (CCT) PROJECT

The primary objectives of the CCT project were to reduce through traffic in Central Sydney and as a result easing traffic congestion and improving environmental amenity in the central business district, and on streets approaching the central business district, and to improve the east to west traffic flows (Roads Traffic Authority, 2003).

The CCT is a 2.1 km twin two-lane motorway that runs east and west underneath the busy central business district of Sydney. It opted for a design-build-operate (DBO) arrangement under a 30-year concession agreement. The project was part of a network of a new transportation infrastructure plan of the Roads and Traffic Authority of the New South Wales Government. Its large project sum of AUD680 million meant that a PPP was an attractive option to the New South Wales Government.

The initial concept of the tunnel was mooted in 1998 (Cross City Tunnel Pty. Ltd., 2007). After a series of complex consultations, exhibitions, modification and approvals the private sector was finally asked for an expression of interest on 15 September 2000 (Roads Traffic Tunnel, 2003). In response, a total of eight consortia expressed interest by 23 October 2000. Three consortia were shortlisted and asked to submit detailed proposals for the project on 8 June 2001. All the three consortia submitted their proposals by

the closing date of 24 October 2001. It was announced on 27 February 2002 that the Cross City Motorway Pty. Ltd. was selected as the winning consortium.

The construction for the project commenced on 28 January 2003. It was delivered ahead of schedule and took only 31 months to construct (typical for PPP projects). The tunnel was officially opened for service to the public on 28 August 2005. Unsurprisingly the project attracted the private sector from within Australia and abroad. The selected consortium included strong financiers, Cheung Kong Infrastructure of China, Bilfinger Berger of Germany and RREEF Infrastructure of Australia. They would bring in equity and recover the cost of design, construction, operation and maintenance via the tolls collected. Therefore the project company, Cross City Motorway Pty Ltd, was allocated all the demand risk for the project. Innovation was introduced by the contractor. The tunnel was the first motorway in Sydney to have full electronic tolling. There were high levels of expectations by all the parties and the traffic forecast for the tunnel was predicted to be 90,000 vehicles per day.

A number of benefits were sourced from materials published and released from the project company Cross City Motorway Pty Ltd (Cross City Tunnel, 2007) and the government agency client the Roads and Traffic Authority of New South Wales (Government Roads Traffic Authority, 2007). These parties claimed that as a result of the Cross City Tunnel project the following benefits would be experienced:

- 34 traffic signals avoided (16 sets westbound and 18 sets eastbound);
- Major reduction of traffic across the central business district;
- Improved quality of life for pedestrians and cyclists in the central business district;
- Higher reliability of bus services in the central business district;
- Cut trips across the city to approximately 2 minutes, from up to 20 minutes by avoiding traffic lights;
- Improved access and movement within the city for taxis, delivery vehicles, cyclists and pedestrians;
- Make city streets safer and more pleasant for pedestrians, residents and business people by removing intrusive through traffic and providing more footpath space in some streets;
- Reduced traffic noise levels; and
- Better air quality by taking cars off surface streets.

Despite the benefits of the PPP which have been highly publicized, some may consider that there are also many ‘failures’ in the project. The next section takes a closer look into these ‘failures’.

UNDERLYING CAUSES LEADING TO ‘FAILURE’

CCT has been perceived as an unsuccessful project by the general public and as a result the government’s image has suffered (Jean 2006). To illustrate some of the negative portrayals of the project, some headlines related to the project were

sought and are shown in the Appendix. Among these seven headlines, three are related to the toll. This shows that the toll is probably one of the key factors affecting the satisfaction level of the general public towards the CCT, and also one of the issues that is highly sensitive among them.

The PPP has been given a bad name and investors have been driven away from New South Wales, at least temporarily (AAP General News Wire 2006a). The CCT encountered severe difficulties in reaching the predicted traffic volume. Motorists expressed their unhappiness about the high toll levels (AAP General News Wire 2006b) and the government closing off the surface roads to direct the traffic into the CCT (AAP General News Wire 2006c). These problems resulted from the inaccurate traffic forecast and a flawed concession agreement. Currently, the CCT has entered into receivership and the concessionaire has written off their equity (Project Finance, 2007).

In this project it has been unfortunate that the public client and the private consortium have argued openly in public. Newspapers have reported them criticizing each other for their faults (Field 2006a). The Premier spoke out publicly expressing his frustration that motorists were able to use the toll road without paying. He criticized the operators for not enforcing the charge and how it was unfair for the motorists who did pay (AAP General News Wire 2006d; Field 2006b). On the other hand the consortium also criticized the Premier for failing to demonstrate leadership (AAP General News Wire

2006e). It can be seen how the media has portrayed a tense battle between the public and private sectors. This is an image that nobody wants to create for any project whether it is delivered by a PPP or not. But being a PPP project creates an even higher sensitivity, as taxpayers will query whether they are actually getting value for money from the Government's decision.

Following the unfortunate events experienced, the private consortium requested the Government to pay them a toll subsidy and compensation for the road changes. Unfortunately the two parties were unable to come to a satisfactory agreement (AAP General News Wire 2006f). But in order for the CCT case not to be repeated the Government considered paying the consortium compensation for the Lane Cove Tunnel, which is also in Sydney, if unfortunately traffic forecasts for that are also predicted inaccurately (Cratchley and Jean 2006a; 2006b). This action from the government was positive as it showed that they were aware that there were problems in the CCT project, and that they should share the responsibilities by undertaking more of the risks rather than passing the pressure solely to the private consortium.

In 2005 the New South Wales Government produced a report titled 'Review of Future Provision of Motorways in NSW' (Infrastructure Implementation Group, 2005). The report reviews recent road projects, including the CCT, in order to improve future similar projects. It is unfortunate that more barriers are set up to protect

the Government, as a result of which further risks are passed on to the private sector. For example, in the document they expressed their preference for bidders with the 'lowest' toll. This line of thinking is similar to selecting the lowest cost bidder, which should not be the only way to select the consortium. Instead, value for money for the project overall should be their main concern. By focusing on the toll only, other important features adding to value may be neglected such as innovative techniques and skills used in the project to make it more efficient and as a result creating value for money. The quality of the work may also suffer.

In the report it was also mentioned that in Victoria all the main variables which would affect the commercial outcome of the project for all parties would be negotiated at the bidding stage. But in New South Wales the toll level or the possibility of a Government contribution would not be open to negotiation. Therefore whether value for money for the taxpayers is achieved is questionable. The report has indicated that the New South Wales Government is clearly aware of their faults, but whether they actually rectify the situation remains to be seen.

To consolidate the findings reported by the press discussed previously, the underlying causes leading to the 'failure' of the CCT project include:

- Inaccurate traffic forecast;
- High toll levels;
- Government closing off the surface roads to direct the traffic into the CCT;
- Flawed concession agreement;

- The public client and the private consortium arguing openly in public;
- No toll subsidy and / or compensation from the government;
- The toll level or the possibility of a Government contribution was not open to negotiation.

APPROPRIATE RISK ALLOCATION

Grimsey and Lewis (2002) identified nine main risks affecting all types of infrastructure projects. These included technical risk, construction risk, operating risk, revenue risk, financial risk, force majeure risk, regulatory/political risk, environmental risk, and project default. On the other hand Lam et al. (2007) identified seven key risk allocation criteria:

- Whether the party is able to foresee the risk;
- Whether the party is able to assess the possible magnitude of the consequences of the risk;
- Whether the party is able to control the chance of the risk occurring;
- Whether the party is able to manage the risk in case it occurs;
- Whether the party is able to sustain the consequences if the risk occurs;
- Whether the party will benefit from bearing the risk; and
- Whether the premium charged by the risk-receiving party is considered reasonable and acceptable for the owner.

According to the terms and conditions set out in the Project Deed of the CCT, the private consortium accepted

more or less all the risks associated with the project. The private sector is often willing to take up large risks to gamble for their desired returns. The Government is also concerned about the consortium's readiness to accept risk (Ahadzi and Bowles 2004). But it is a surprise that the Government was willing to allow the private sector to take up such a large proportion of the risks. However in the arrangement the social responsibility will always be the public sector's. Therefore the Government should consider whether the consortium is able to handle the risk effectively. The risks that the consortium agreed to take on board in the Project Deed included (Roads Traffic Authority, 2003):

- All risks associated with the financing, design, construction, operation, maintenance and repair costs of the project;
- The risks that traffic volumes or project revenues may be less than expected;
- Income tax risks; and
- The risks that their works or operational and maintenance activities might be disrupted by the lawful actions of other government and local government authorities or a court or tribunal.

Clifton and Duffield, 2006 undertook a study where they looked into the risk allocation structure for several recent PPP projects in Australia. One of these cases included the CCT (Table 2) and realized that the risks for each party were quite evenly spread. But further study showed that the intensity of the risks allocated to the private sector was actually much greater compared to

those allocated to the Government, as shown in Table 1:

Risk Allocated to Government	Risk Allocated to Consortium
Native title risks	Design, construction and commissioning risks
Force majeure	Delay and completion risks
Uninsurable risks	Ground/geotechnical conditions risks
Legislative and Government Policy	Operation and maintenance/facility management risks

Table 1 Risk allocation structure for the CCT (Clifton and Duffield, 2006)

Shen et al. (2006) studied the risk allocation for public sector projects in Hong Kong. From the literature they identified a number of major risks affecting public sector projects. In their analysis they selected the Hong Kong Disneyland as a case study. This case study demonstrated which risks would be most suitably allocated to each party. The study concluded that the public sector should be allocated the site acquisition risks, inexperienced private partner risk and legal and policy risks. On the other hand, the private party should be allocated the design and construction risks, operation risks and industrial action risks. Lastly, Shen et al. (2006) advocated the importance of there being some risks which both parties should share. These include development risks, market risks, financial risks and force majeure. Although Shen et al.’s 2006 study was conducted for a project in another country and of a different nature; it is believed that these shared risks as mentioned could also apply to other PPP projects such as the CCT. The CCT

suffered immensely due to the market and financial risks. If these were shared risks as suggested by Shen et al. (2006), the intensity of the damage to the consortium could have been minimized.

Traffic revenue risk has been identified as one of the most critical risks impacting the commercial success of road projects delivered by a PPP (Singh and Kalidindi 2006). In order to overcome traffic revenue risk, the annuity-based build-operate-transfer (BOT) model has been presented as a good solution. Unlike the traditional BOT type road economic projects, the concessionaire will be paid a fixed semi-annual annuity by the governmental client. This approach is similar to that used for the social infrastructure PPP projects such as hospitals and schools which are paid by a regular fixed payment. Similarly the annuity-based BOT model will require the concessionaire to achieve certain milestones and standards. The payment will be used to cover the design, construction, maintenance and operation

of the road and its facilities. As a result the concessionaire does not undertake any of the traffic revenue risk. This approach ensures that the governmental client must also undertake their fair share of risks. The risk allocation framework shown in Table 2 shows the appropriate risk allocation for each party under the annuity-based BOT model. Amongst the sixteen risks listed, nine are undertaken by governmental clients. In general the concessionaire is responsible for the risks related to the construction and operational

performance of the facility. Other risks which are less predictable and controllable are taken by governmental clients. By adopting this approach the business case may not be as attractive to the private sector. The private sector is often willing to take up more risks in return for the possibility of financial benefits. The private sector should not be solely responsible for taking these decisions. Instead the government should also consider whether they should allow the private sector to take up large risk.

Risk Allocated to Government	Risk Allocated to Consortium
Pre-investment	Delay in financial closure
Resettlement and rehabilitation	Time and cost overrun during construction
Permit/approval	Time and cost overrun during operation and maintenance
Delay in land acquisition	Non-political force majeure
Delay in payment of annuity	Performance standards
Change of scope	Lane availability
Traffic revenue risk	Interest rate risk
Change in law	
Political risk	

Table 2. Risk allocation framework for the annuity-based BOT model (Singh and Kalidindi 2006)

Another payment mechanism similar to the annuity-based BOT model was proposed, in that the patronage risk stays with the government (Aziz 2007). The shadow-toll design-build-finance-operate (DBFO) system is similar to the BOT system except shadow tolls are used instead of real tolls. The government will pay a toll per vehicle per road kilometer instead of the end users paying the toll. Another

option is the performance-based DBFO system. For this payment mechanism the services and the operational performance of the contractor are emphasized rather than the usage of the facility.

From the experience of several road projects including the CCT, the New South Wales Government identified some lessons learnt (Infrastructure

Implementation Group, 2005):

- Need for consultation and communication over the life of project procurement;
- Need for improved community consultations and messages;
- Responsibility of Government client over procurement life of project;
- Greater onus on the consortium to accept full responsibility over the whole life of the concession period.

The fourth lesson learnt indicates that the Government feels that they have accepted too much of the project risks. Therefore they appear to be keen to ensure that the consortium will take a larger responsibility for risks in future.

RISK SHARING MECHANISM

A PPP should be adopted primarily based on value for money. Obviously the package is accompanied by various other advantages which are attractive to the government such as private financing and the transfer of risks. But the decision to adopt a PPP should not be solely based on these additional advantages.

As discussed previously risks should always be allocated to the party best able to handle them. The party allocated the risk should be the one most able to prevent it from occurring. And if the risk does occur the allocated party should be the one most able to minimize the consequences.

The inaccurate traffic forecast was the main reason that led to the collapse of

the project company. As a result of this fault other actions were taken by the concessionaire to overcome the reduced traffic flow. These actions led to further complications which in turn ruined the partnership agreement between the public and private sectors.

In the case of the CCT the inappropriate allocation of risks was believed to be the root cause. In some cases the Government may subsidize or compensate the concessionaire if the project revenue is less than expectation or if the contract is terminated. But often there is much argument as to the amount which this subsidy or compensation should be.

To prevent similar cases from occurring, an optimal risk-sharing mechanism is presented. The risk-sharing mechanism can be adopted in projects of a high risk nature. The CCT was a project of high risk due to its scale and significance. In this risk-sharing mechanism, projects which are traditionally economic infrastructure projects such as transportation projects can adopt a regular fee payment from the government instead of bearing the revenue risk. This approach is similar to social infrastructure projects. As mentioned previously in this paper other researchers have also reported the possibility and feasibility of this arrangement for economic infrastructure projects.

Under this mechanism, the consortium of high-risk economic infrastructure projects will be paid via a regular fee payment. In this way the payment will be based on project performance rather

than usage. As in social infrastructure projects certain risks are still taken by the concessionaire, such as those associated with the design, construction, operation and maintenance. But the other risks should be dealt with by the Government including revenue risk.

Although the economic package for projects paid by a regular fee may not be as attractive to the private sector, this type of mechanism for high-risk projects can help to protect the private sector. By protecting the private sector the government will also benefit, since as always the ultimate responsibility lies with them. The government may be able to pass on most of the financial risks but they cannot avoid the social responsibility. Hence this proposed mechanism is believed to benefit all parties involved.

The details of the proposed risk-allocation mechanism will vary depending on the project itself. But it is likely that the payment will be a regular fee paid to the concessionaire based on performance and activity milestones. Under the agreed payment the concessionaire will deliver a service to the public according to standards as agreed to in the contract. If the concessionaire under-performs then they will be penalized by a deduction of their fees. In this way the concessionaire is monitored by the project's performance rather than usage of the facility. In the CCT project the concessionaire had to bear the revenue risk, hence their main priority was to generate revenue. They used toll prices and redirecting traffic to bring in revenue which just caused

public frustration. Although the local government could have prevented these actions, they did not step in. If the consortium had not needed to worry about the revenue, the public would have been more satisfied. As a result the public perception of the facility, the project company and the Government would have been very different!

CONCLUSIONS

The CCT was designed as part of a large infrastructure network plan for New South Wales, Australia. Due to its complexity and size, a PPP appeared to be an attractive delivery method. Under the PPP procurement the financing would be provided by the private sector. Also expertise and innovation which would otherwise be unavailable within the Government could be sought. As a result the Government managed to pass on many of the project risks to the private sector. Obviously for a project of this size there would be abundant financial opportunities for the private sector, hence they were very willing to take up the associated risks for the chance to be involved. The situation could have been a win-win case but unfortunately this was not actually what happened.

Media reports have reflected the CCT as an unsuccessful PPP project. For the consortium this may have been the case. For the Government, although they have received some negative critiques, at the end of the day they have still constructed a world-class infrastructure facility. For the general public, the scandal may have been more

amusing than having a serious effect. It is not easy and probably impossible to distinguish whether any case is either solely successful or a failure. Instead it is believed that lessons can be learnt from each case.

This paper has looked into a highly-profiled case and tried to recommend solutions to overcome the potential obstacles. As a result a more suitable risk-sharing mechanism for projects similar to the CCT has been presented to achieve win-win service outcomes.

ACKNOWLEDGEMENT

The content of this paper is based on the initial findings of an ongoing research study which aims to develop a best practice framework for implementing a PPP in Hong Kong. The work described in this paper was fully supported by a grant from the Research Grants Council of the Hong Kong Special Administrative Region, China (RGC Project No. PolyU 5114/05E).

REFERENCES

AAP General News Wire (2006a), War of Words Erupts again Between Lemma and Tunnel Boss, *AAP General News Wire*, 4 August 2006.

AAP General News Wire (2006b), Cross City not viable, higher prices not the answer, *AAP General News Wire*, 26 August 2006.

AAP General News Wire (2006c), Lane Cove Tunnel Road Changes May Be As Bad As Cross City, *AAP General News*

Wire, 21 August 2006.

AAP General News Wire (2006d), Motorists have right to be angry over toll inequities, *AAP General News Wire*, 20 September 2006.

AAP General News Wire (2006e), Cross City Boss says Lemma Fails to Show Leadership, *AAP General News Wire*, 4 August 2006.

AAP General News Wire (2006f), Tunnel Operators Seek Millions in Compensation for Changes, *AAP General News Wire*, 26 August 2006.

Ahadzi M and Bowles G (2004), 'Public-Private Partnerships and Contract Negotiations: An Empirical Study', *Construction Management and Economics*, 22 :9, 967-978.

Akbiyikli R and Eaton D (2004), 'Risk Management in PFI Procurement: A holistic Approach'. Paper presented at the *Proceedings of the 20th Annual Association of Researchers in Construction Management (ARCOM) Conference*, Heriot-Watt University, Edinburgh, UK.

Aziz AMA (2007), 'A Survey of the Payment Mechanisms for Transportation DBFO Projects in British Columbia', *Construction Management and Economics*, 25:5, 529-543.

Clifton C and Duffield CF (2006), 'Improved PFI/PPP Service Outcomes through the Integration of Alliance Principles', *International Journal of Project Management*, 24:7, 573-586.

Cratchley D and Jean P (2006a), Govt May Compensate Lane Cove Tunnel Operators, *AAP General News Wire*, 28 August 2006.

Cratchley D and Jean P (2006b), State Government May Compensate Lane Cove Tunnel Owners, *AAP General News Wire*, 28 August 2006.

Cross City Tunnel Pty. Ltd. (2007), <http://www.crosscity.com.au>, Retrieved 30 May 2007.

Field K (2006a), Childish Act Shows NSW Not Open For Business, *AAP General News Wire*, 10 October 2006.

Field K (2006b), Sydney's Cross City Tunnel Operators to Pursue Toll Cheats, *AAP General News Wire*, 20 September 2006.

Grimsey D and Lewis M (2002), 'Evaluating the Risks of Public Private Partnerships for Infrastructure Projects', *International Journal of Project Management*, 20:2, 107-118.

Infrastructure Implementation Group (2005), *Review of Future Provision of Motorways in NSW*, New South Wales Government.

Jean P (2006), Cronulla Riot, Tunnel Were My Toughest Days: Lemma, *AAP General News Wire*, 3 August 2006.

Lam KC, Wang D, Lee PTK and Tsang YT (2007), 'Modelling Risk Allocation Decision in Construction Contracts', *International Journal of Project Management*, 25:5, 485-493.

Li B, Akintoye A, Edwards PJ and Hardcastle C (2005), 'The Allocation of Risk in PPP/PFI Construction Projects in the UK', *International Journal of Project Management*, 23:1, 25-35.

Project Finance (2007), 'Skies not the limit', *Project Finance*, April 2007.

Roads Traffic Authority. (2007), <http://www.rta.nsw.gov.au/constructionmaintenance/majorconstructionprojectssydney/crosscitytunnel/index.html>, Roads Traffic Authority of New South Wales Government, Retrieved 30 May 2007.

Roads Traffic Authority (2003), *Cross City Tunnel: Summary of contracts*, Roads and Traffic Authority of New South Wales Government.

Shen LY, Platten A and Deng XP (2006), 'Role of Public Private Partnerships to Manage Risks in Public Sector Projects in Hong Kong', *International Journal of Project Management*, 24:7, 587-594.

Singh LB and Kalidindi SN (2006), 'Traffic Revenue Risk Management Through Annuity Model of PPP Road Projects in India', *International Journal of Project Management*, 24:7, 605-613.

APPENDIX

Examples of Newspaper Headlines relating to the CCT when it opened (Infrastructure Implementation Group, 2005)

Appendix Examples of Newspaper Headlines relating to the CCT when it opened
(Infrastructure Implementation Group, 2005)

Tunnel cuts William St to one lane to trap drivers

The Daily Telegraph, 6 October 2005

'Cheap' tunnel buyback mooted

Australian Financial Review, 17 November 2005

\$105m TOLL OUTRAGE

Motorists pay
hidden charge
to cross city

The Daily Telegraph, 6 October 2005

CROSS CITY GROVEL

Three weeks toll-free
but roads still colgged

**Taken for
a ride**

Tunnel at the crossroads

The Daily Telegraph, 14 October 2005-12-02

Sydney Morning Herald, 13 October 2005

Changes to
contract led
to high tolls

Drivers
to feel
squeeze

The Daily Telegraph, 17 November 2005

Sydney Morning Herald, 28 November 2005