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Ranked Critical Factors in PPP Briefing

LiYaning Tang[1], Qiping Shen[2], Martin Skitmore[3], Eddie W. L. Cheng[4]

[1] PhD, Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong.
Tel.: +852 27664308; Fax: +852 27645131.
E-mail address: tlyn.tang@connect.polyu.hk

[2] Corresponding author. Chair Professor, Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong.
Tel.: +852 27665817; Fax: +852 27645131.
E-mail address: bsqpshen@polyu.edu.hk

[3] Professor, School of Urban Development, Queensland University of Technology, 2 George Street, GPO Box 2434, Brisbane QLD4001, Australia.
Tel.: +61 7 3138 1059; Fax: +61 7 3138 1170.
E-mail address: rm.skitmore@qut.edu.au

[4] Adjunct Associate Professor, Division of research, Southern Cross University, Australia.
Tel.: +61 7 5506 9372. E-mail address: eddie.cheng@scu.edu.au

Abstract:

Public Private Partnerships (PPP) are increasingly used for procuring Australian infrastructure projects. As with all construction projects, the early briefing stages are often the most crucial in determining a successful outcome. This is, however, a lack of systematic research on the type and nature of the critical factors affecting the effectiveness and efficiency of PPP during this period. A literature review is presented of PPP usage in Australia, in which four main categories of factors (procurement, stakeholder, risk, and finance) are identified, each with several sub-factors. A questionnaire survey is also described involving state government stakeholders and a

mathematical model is developed which ranks the factor involved. This is followed by an examination of the potential of the factors to help improve the PPP briefing stage for both public and private sectors.

Keywords: Critical factors, procurement, stakeholder, risk, finance, briefing stage, public private partnership, infrastructure, questionnaire survey, Queensland, Australia.

Introduction

The Public Private Partnership (PPP) is defined as "a procurement method [in] which projects are part of a broader spectrum of contractual relationships between the public and private sectors to produce an asset and/or deliver a service. They are distinct from early contractor involvement, alliancing, management contracting, traditional procurement (design & construct) and other procurement methods" (Infrastructure Australia, 2008). PPPs in Australia can be traced back to the 1980s and 1990s, such as the Gateway Motorway and Bridge, Brisbane (completed 1986); the Sydney Harbour Tunnel (completed 1992); and the Sydney Olympic infrastructure (completed 1999). More recently, three recently completed large-scale PPP projects in Queensland, are the Southbank Institute (2004) and North-South By-Pass Tunnel (2006), followed by the Brisbane Airport Link project in 2008. The Harbour Tunnel and Stadium Australia in Sydney, the M2, M4 and M5 tollways in New South Wales and the Ord River Hydro-Electric Scheme in Western Australia provide other examples of Australian PPPs in transport projects (Duffield, 2001; Jefferies and Chen, 2004).

Duffield (2005) classifies PPPs in Australia into “first” and “second” generation in a policy document released by the Victorian Government entitled “Partnerships Victoria”. This guideline was produced with the intention of securing the financial and efficient benefits that involvement of the private sector can provide without compromising community needs (Victorian Government, 2001). The “first” generation was led by the public sector to gain access to private capital by a near full transference of project risks. While in “second” generation of PPPs, state governments sought to directly control “core services” and share value-for-money outcomes with the private sector. One of the most recently released policies relating to PPPs from the Australian Government’ Department of Finance and Administration (2005) states that PPPs should be used where they can offer superior value for money outcomes relative to other procurement methods.

In addition, it has been felt by many that alternative procurement and finance arrangements for infrastructure projects are needed in the recent conditions of global credit market shocks in order to inject much needed capital and with a greater sharing of risks. In addition, many Governments have responded to the economic crises by providing economic stimulus packages and, as infrastructure projects have a significant effect on economic and social activities, the Australian Government is expanding private sector involvement in this by increasing the number of its PPP projects.

The combination of these factors has resulted in the state of New South Wales, for example, having an enviable reputation for cooperating with the private sector in the delivery of public infrastructures, particularly in the form of roads, railways and Olympic projects. A report entitled “Working with Government: Guidelines for Privately Financed Projects” was recently published by the NSW state government (New South Wales Government, 2006) to increase the benefits of,

and comment on the issues and concerns held by, the private sector to help to reinforce relationships between the public and private sectors and gain acceptance of new policies.

Social infrastructure projects such as schools, courts, and hospitals are targets for the use of PPPs in Australia. As higher levels of architectural design are required for these building types, projects risks in the form of quantitative definitions of value for money are the focus of policy makers (Commonwealth of Australia, 2006; New South Wales Treasury, 2006). Participants in states such as Western Australia suggest that they would like to use more PPPs with an alliance agreement. Compared with Western Australia, however, the New South Wales and Victoria states have taken quick action to profit from their previous experiences in the use and selection of PPPs for infrastructure projects (Love et al., 2008).

With its large topographical landscape and rapidly growing urban sprawl, the emphasis on traditional economic infrastructure projects such as roads appears to be set to continue in future in Australia. As a result of their more defined revenue streams, the use of PPPs for the procurement of these kinds of projects appears to have been successful. Their application to social infrastructure projects such as hospitals and schools seem to be rather less so however (Jefferies, 2006). Meanwhile, state governments in Australia continue to devolve their control of core activities to the private sector, especially during the operations stage (Curnow et al. 2005), to the point where it may be that the involvement of the private sector is reaching an unsustainable level as their scope for recovering sufficient financial rewards diminishes.

The PPP briefing stage

A brief is a formal document produced at the end of the project briefing stage that defines the detailed stakeholder requirements. The briefing stage was defined by Kelly and Duerk (2002) as "the process of gathering, analysing, and synthesizing information needed in the building process in order to inform decision-making and decision implementation". The term "architectural programming (AP)" is normally used in the US to present the similar stage (Yu, 2006). AP was defined by Hershberger (1999) as "The first stage of the architectural design process in which the relevant values of the client, user, architect, and society are identified; important project goals are articulated; facts about the project are uncovered; and facility needs are made explicit". Gathering site and regulatory information, the formation of the project team and consultants, presentation of design ideas and project team experience, and testing the project's economic structure are all activities involved in the briefing stage.

Decisions made in briefing need to be clearly recorded for architects to be aware of their likely consequences in practice (Andreu and Oreszczyn, 2004). Industry has attempted to improve the briefing stage to better capture client/owner needs and several aids have been developed, such as the web-based tool proposed by Hansen and Vanegas (2003) to automate the briefing stage and provide clear statements of client/owner requirements to streamline information gathering and retain knowledge. Other techniques such as fuzzy logic and quality function deployment (Yang et al. 2003; Seo et al. 2004) have also been developed to enhance the briefing process.

Due to the importance of PPP and briefing, several studies have sought to identify their critical success factors. For example, Kumaraswamy et al., (2007), Salman et al. (2007), Jefferies et al. (2002) and Thomas, et al. (2003) identified the factors affecting the success of PPPs in many

countries including Australia. The factors which influence briefing have also been identified (e.g. Yu, 2006), but no studies to date have focused on the critical factors involved in PPP briefing. The research presented in this paper, therefore, addresses this gap in knowledge. This can be divided into four main groupings

1. procurement issues
2. stakeholder issues
3. risk issues, and
4. finance issues

Procurement issues

Analysis of the existing literature indicates a total of 15 procurement-related factors (Table 1). For example, Leung et al. (2008) suggest that "formal briefing sessions" and "regular formal meetings" influence project success and participant satisfaction in construction projects. Also, Yu et al.'s (2008) Hong Kong survey found significant implications for industry practitioners in producing briefing guidelines, while the Construction Industry Board (1997) suggest that a "clear and agreed objective" and "carefully thought-out requirements" are critical for the success of the briefing process, with the former necessarily requiring an understanding of the values of the organization. In addition, Blyth and Worthington (2001) found "defining the process", "timely decision taking" and other key areas to be essential to briefing success, while London et al. (2005) have found establishing the client/owner's requirements to be a problematic issue involved. \

Table 1. Procurement-related factors

Procurement-related factors	Remarks
Clear goals and objectives	Briefing is a process which should have a clear goal and/or objectives.
Experience of the brief writer	An experienced person is needed to develop a brief.
Clear end user requirements	A brief needs to make clear what the end user requirements are.
Development of a framework agreed by the key parties	During briefing, the process to formulate a brief needs to be agreed by the key parties.
Control of process	The public sector should lead throughout the briefing process.
Adequate time for briefing	Briefing should be allocated with adequate time.
Consensus building	A consensus of the brief amongst the various stakeholders needs to be developed during the briefing stage.
Proper priority setting	Priority of decision to be made should be agreed by the key parties in briefing.
Time for freezing of brief documents	A schedule should be set for the completion of the brief.
Flexibility of briefs to cater for changes	Flexibility in briefs should be provided to cater for possible changes.
Good record of decisions made	Decisions made should be recorded in details.
Identification of client/owner requirements	Identification of client/owner requirements should be done during briefing.
Thorough understanding of client/owner requirements	Client/owner requirements should be thoroughly understood.
Feedback from completed projects	Feedbacks from completed projects are needed to improve briefing.
Clear and precise briefing documents	A clear and precise brief should be available at the end of the briefing.

Stakeholder issues

Achieving efficiency and effectiveness of relationships among stakeholders during the briefing process is considered by many to be especially crucial in PPPs. In reviewing the literature, 18 factors were identified which may affect this (Table 2). For example, the Construction Industry Board (1997) claim that trusting relationships among stakeholders are important; Blyth and

Worthington (2001) consider clear and comprehensive communications to be key aspects; and Chan et al. (2003) found that 'improved relationship amongst project participants' and 'improved communication amongst project participants' produced the most significant benefits obtained from the use of partnering in PPP projects.

Table 2. Stakeholder-related factors

Stakeholder-related factors	**Remarks**
Experience of the client	The client/owner should have related experience of briefing.
Clear management structure	The client/owner needs a clear management organization structure for briefing.
Knowledge of client's responsibility	Knowledge of the client's responsibility is needed.
Skilful guidance and advice from project manager	Project manager should give appropriate guidance and advice during briefing.
Holding workshops for stakeholders	Workshops for stakeholders should be held regularly.
Good facilitation	Good facilitation of briefing should be given to stakeholders.
Selection of briefing team	Briefing team needs proper participant selection.
Clarity of roles of stakeholders	Roles of stakeholders should be clarified clearly.
Sufficient consultation with stakeholders	Briefing needs sufficient consultation with stakeholders.
Experience of stakeholder group	Stakeholders' experience of attending briefing should be considered.
Balance of the needs/requirements of different stakeholders	Needs/requirements of different stakeholders need to be balanced.
Knowledge of consultants	Knowledge of consultants should be considered.
Knowledge of statutory and lease control of the project	Knowledge of statutory and concession period control of the project are needed in briefing.
Team commitment	Team commitment should be clear.
Honesty	Honesty among stakeholders is critical for briefing.
Openness and trust	Openness and trust should be built among stakeholders.
Open and effective communication	Briefing needs open and effective communication.
Agreement of brief by all relevant parties	Agreement on the brief should be obtained among all relevant parties.

Different experiences from projects and lessons from existing projects allow stakeholders to respond more freely to the briefing document. The more public and private sector cooperation results in more knowledge relating to the briefing stage being shared (Jin and Doloi, 2008). Balancing requirements among partnerships is critical as too much or too little contribution from both sides can lead to overlaps or oversights of the activities and risks involved. Similarly, Jin and Doloi (2008) also claim the effective management of cross-cultural business communications during the briefing stages to be an equally crucial issue.

Risk issues

In Australia, PPP is seen as an opportunity for state governments to avoid risks by purchasing outputs. It is therefore never too late for risks to be allocated in PPP briefing. How well the private sector manages the risks transferred to it and how the public sector manages the contract over the concession period involved influences the extent to which long-term value for money can be achieved in PPPs (Australian Department of Finance and Administration, 2005). It is necessary, therefore, to identify the key risks during PPP briefing and explicate initial thinking on risk allocation. These considerations, in conjunction with the findings in the literature, resulted in the identification of nine factors relating to risk issues in the PPP briefing stage summarised in Table 3.

Table 3. Risk-related factors

Risk-related factors	Remarks
Commencement of risk register	Risk issues needs to be identified in the briefing stage.
Special risk assessment	Special risk assessment should be set for the brief.
Quantification consequences of risks	Consequences of quantitative project risks should be considered.
Estimation probabilities of risk	Probability of project risks should be estimated.
Calculation value of risks	Cost of project risks should be calculated in briefing.
Identification desired risk allocation	Desired project risk allocation should be determined during briefing.
Possible allocation of responsibilities and risks between the Government and the private sector	Possible allocation of responsibilities and risks of the project between the Government and the private sector should be set in the brief.
Well measurement of risk management/mitigation	Risk mitigation management of the project need to be well measured.
Calculation transferable risks and retained risks	Project-related transferable risks and retained risks should be calculated in the brief.

Finance issues

The final set of six finance-related factors are summarised in Table 4. For example, Akintoye et al. (2003) found that key factors include the high cost of the procurement process, lengthy and complex negotiations, difficulty in specifying the quality of service needed, pricing facilities management services, potential conflicts of interests among those involved, and the public sector clients/owner's' inability to manage consultants. These factors appear to be critical to solving the financing issues of PPPs. Funding and budgets need to be established and allocated during PPP briefing. In Western Australia, for example, the use of PPPs has been very limited and they have not been typically ascribed to the public sector's procurement portfolio as has happened in other states. Usually, the proposed procurement approach does not allow for the consideration of PPP

options, mainly due to the need for the consideration of political and financial issues by the state's Department of Treasury (Love et al., 2010).

Table 4. Finance-related factors

Finance-related factors	Remarks
Practical budget and programme	Practical budget and programme of the project should be needed.
Prepared biding for funds through the RAE process	Bidding for funds from the Government should be prepared via the policy bureau through the resource allocation exercise process.
Conduction socio economic studies	Socio-economic studies regarding the project need be conducted.
Demonstration how PPP can achieve the best value for money	Whether and how PPP can achieve the best value for money should be indicated.
Proposed commercial arrangement	Proposed commercial arrangement including contract duration, payment mechanism, and other partnership/financial arrangements should be formulated in the brief.
Good financial standing of the private partner	Good financial standing of the private partner needs be considered in briefing.

Research method

The empirical research comprised a questionnaire survey of government departments with direct involvement in PPPs and conducted in south east Queensland from August to October 2010. The target departments were: the Department of Education and Training, Department of Infrastructure and Planning, Department of Transport and Main Roads, and Department of Treasury. All have working experience with PPP projects, including Brisbane's Southbank Institute, North-South By-Pass Tunnel and the Airport Link project. 78 completed questionnaires were received, representing a response rate of 26.4%.

Respondents answered the questionnaire based on a particular PPP project in which they had participated in two sections: (1) background information, mainly relating to type and nature of the PPP project involved, and the respondent's role and experience in the project; and (2) the four categories of factors (procurement-related, stakeholder-related, risk-related, and finance-related) likely to affect the success of PPP briefing rated on a Likert scale of 1-5, where 1 represents 'strongly disagree' and 5 represents 'strongly agree'.

Data analysis

More than half of the respondents (56.4%) work in infrastructure projects (including railways, tunnels, roads etc.), while 43.6% had experience in PPP building projects such as hospitals and schools. All except one response relate to new build work. 20 respondents (25.6%) are from professional groups including contractor/suppliers, engineers, and surveyors, with the remaining 50 (74.4%) being managers (administrators, client/owner representatives, contract managers, financial managers and legislative councillors). In all, 47 and 31 respondents respectively are directly and indirectly involved in the briefing stage.

Homogeneity tests

Before calculating values for the factor rankings, comparisons based on different background variables were made to test the homogeneity of the data. Table 5 provides the mean scores for each of the procurement-related factors for the buildings and infrastructure projects together with the 2-tailed t-test p-values. This indicates significantly different ($p<.05$) mean scores for 9 factors. In general, therefore, it seems that the results are not homogeneous across project types,

with the procurement-related factors having a higher influence on building projects than infrastructure projects.

Similar results were also obtained in comparing the mean scores stakeholder-related factors, risk-related factors and finance-related factors, with 13, 5 and 3 respectively significant differences being found (see in the Appendix).

As contractors and clients always have different opinions in the briefing stage, homogeneity tests were also carried out on this aspect, again with similar results showing many significant differences in mean factor scores for the contract of client/owner respondents (see in the Appendix).

Table 5. Type of PPPs and procurement-related factors

Factors	Sig.(2-tailed)	Average mean	Mean of infrastructure projects	Mean of building projects
Clear goal and objectives	0.000	4.73	4.52	5.00
Identification of client/owner requirements	0.000	4.73	4.52	5.00
Clear and precise briefing documents	0.000	4.73	4.52	5.00
Feedback from completed projects	0.000	4.67	4.41	5.00
Thorough understanding of client/owner requirements	0.000	4.60	4.30	5.00
Good record of decisions made	0.000	4.59	4.27	5.00
Flexibility of briefs to cater for changes	0.014	4.56	4.39	4.79
Time for freezing of brief documents	0.000	4.46	4.05	5.00
Proper priority setting	0.005	4.01	3.86	4.21
Experience of the brief writer	0.104			
Clear end user requirements	0.068			
Development of a framework agreed by the key parties	0.674			
Control of process	0.073			
Adequate time for briefing	0.104			
Consensus building	0.481			

Ranking analysis

In view of the heterogeneous nature of the data, it is clear that the different background information of PPPs should be taken into consideration. To do this, samples in which background information is closer to the majority of the collected data was assigned a higher score, and vice versa. Denoting the number of respondent by *N*, each respondent is represented as a vector, where the dimension is the same as the factor number. The sample is denoted as $\mathbf{x}_i = (x_{i,1}, x_{i,2}, ..., x_{i,d}) \in R^d$, where d is the dimension number. The background information variables can be regarded as class labels (Duda et al., 2000; Bishop, 2006; Hastie et al., 2008) used to distinguish the samples from the different groups. Consequently, the data from the 78 respondents are grouped into several classes of background information. For example, respondents who chose the same type of the PPP project are grouped into one class. The class label for $\mathbf{x}_i$ is denoted as l_i . A variable *k* is introduced to represent the different background information types. This ranges from 1 to 4 to denote "the type of the PPP project", "the nature of the PPP project", "the role in the PPP project" and "the experience form in the PPP project" respectively.

To distinguish the data sample in each background group, the weight for each sample $\mathbf{x}_i$ is defined as

$$w_{\mathbf{x}_i} = \frac{1}{4}\sum_{k=1}^{4} w_{l_i}^k = \frac{1}{4}\left(w_{l_i}^1 + w_{l_i}^2 + w_{l_i}^3 + w_{l_i}^4\right) \qquad \textbf{(1)}$$

where $w_{l_i}^k$ is the weight for $\mathbf{x}_i$ with class label l_i in background type k .

For background information type k , the weight is computed as:

$$w_{l_i}^k = \exp\left(-\frac{1}{2}\left(\boldsymbol{\mu}_{l_i}^k - \boldsymbol{\mu}^k\right)^T \boldsymbol{\Sigma}^{-1}\left(\boldsymbol{\mu}_{l_i}^k - \boldsymbol{\mu}^k\right)\right)$$
$$= \exp\left(-\frac{1}{2}\left(\boldsymbol{\mu}_{l_i}^k - \boldsymbol{\mu}\right)^T \boldsymbol{\Sigma}^{-1}\left(\boldsymbol{\mu}_{l_i}^k - \boldsymbol{\mu}\right)\right) \quad \textbf{(2)}$$

where $\boldsymbol{\mu}_{l_i}^k$ is the mean of class l_i in the background variable k. $\boldsymbol{\mu}^k = \boldsymbol{\mu}$ is the mean of total N data samples. $\boldsymbol{\Sigma}$ is the covariance matrix of data, which is

$$\boldsymbol{\Sigma} = \frac{1}{N-1}\sum_{i=1}^{N}(\mathbf{x}_i - \boldsymbol{\mu})(\mathbf{x}_i - \boldsymbol{\mu})^T \quad \textbf{(3)}$$

The weight score in **(2)** is used to reduce the influence of the outlying distributed data samples. For example, if the class mean $\boldsymbol{\mu}_{l_i}^k$ in background class k is far away from the total data mean $\boldsymbol{\mu}$, a small weight is given to the samples $\mathbf{x}_i$ with class l_i. Contrarily, if the class $\boldsymbol{\mu}_{l_i}^k$ in background class k is near to the total data mean $\boldsymbol{\mu}$, a large weight is given, since the samples in that background variable represent the majority of the collected data. The covariance matrix $\boldsymbol{\Sigma}$ is used to compute a better distance function instead of the Euclidean distance (Duda et al., 2000). Moreover, the weight has the property of ranging from 0 to 1.

The weight for background k is the same as the exponential term of a multivariate Gaussian distribution in class l_i

$$\frac{1}{(2\pi)^{d/2}}\frac{1}{|\boldsymbol{\Sigma}|^{1/2}}\exp\left(-\frac{1}{2}\left(\boldsymbol{\mu}_{l_i}^k - \boldsymbol{\mu}\right)^T \boldsymbol{\Sigma}^{-1}\left(\boldsymbol{\mu}_{l_i}^k - \boldsymbol{\mu}\right)\right) \quad \textbf{(4)}$$

which ignores the constant term. A similar weighting scheme has been widely used in non-parametric kernel methods (Schölkopf and Smola, 2001), neural network based machine learning (Bishop, 1995), and manifold approximation (Belkin and Niyogi, 2005).

Recall that in **(1)**, the weight means that if a data sample is close to the majority of all the four background variables, it is allocated a large weight in computing the final ranking. The final ranking score for factor j is therefore calculated as:

$$r_j = \sum_{i=1}^{N} w_{\mathbf{x}_i} x_{i,j} = w_{\mathbf{x}_1} x_{1,j} + w_{\mathbf{x}_2} x_{2,j} + \ldots + w_{\mathbf{x}_N} x_{N,j} \qquad \textbf{(5)}$$

and the results are shown in the Table 6.

Table 6: Procurement-related factor ranking scores

Procurement-related factors	Ranking score
Experience of the brief writer	3.23
Adequate time for briefing	3.22
Control of process	3.18
Identification of client/owner requirements	3.05
Clear goals and objectives	3.04
Clear and precise briefing documents	3.03
Feedback from completed projects	3.02
Thorough understanding of client/owner requirements	2.99
Clear end user requirements	2.96
Consensus building	2.94
Good record of decisions made	2.93
Flexibility of briefs to cater for changes	2.92
Time for freezing of brief documents	2.87
Development of a framework agreed by the key parties	2.75
Proper priority setting	2.62

This indicates that the experience of the brief writer (=3.23) is considered by the respondents to be the most important procurement-related factor in PPP briefing. “Adequate time for briefing” (=3.22) and “control of process” (=3.18) occupy the second and third positions in the ranking list. The least important factors, on the other hand, are “Time for freezing of brief documents” (=2.87), “development of a framework agreed by the key parties” (=2.75) and “proper priority setting” (=2.62).

In terms of stakeholder-related factors, “open and effective communication” (=3.21) is the most important factor, followed by “skilful guidance and advice from project manager” (=3.17) and “openness and trust” (=3.13) (Table 7). All these three factors provide the opportunity for all stakeholders involved in briefing to have direct access to PPPs with firsthand knowledge of plans and requirements. Related staff can immediately answer questions and provide detailed advice in such a culture and environment.

Table 7: Stakeholder-related factor ranking scores

Stakeholder-related factors	Ranking score
Open and effective communication	3.21
Skilful guidance and advice from project manager	3.17
Openness and trust	3.13
Clarity of roles of stakeholders	3.12
Holding workshops for stakeholders	3.07
Knowledge of statutory and lease control of the project	3.04
Selection of briefing team	3.03
Experience of the client	3.00
Knowledge of client’s responsibility	2.99
Honesty	2.98
Knowledge of consultants	2.96
Clear management structure	2.95
Experience of stakeholder group	2.94
Sufficient consultation with stakeholders	2.93

Team commitment	2.86
Good facilitation	2.82
Balance of the needs/requirements of different stakeholders	2.78
Agreement of brief by all relevant parties	2.67

"Commencement of risk register" (=3.27), "quantification consequences of risks" (=3.25), and "calculation transferable risks and retained risks" (=3.22) are the top three risk-related factors in PPP briefing, reflecting the view that it is never too early to identify risks in PPPs and that risks are properly identified and allocated to the parties who are best able to manage them (Table 8). Some Australian officers explained that the reasons why the three lowest factors were less important in the factor list were that risks, such as those involving the price of materials, change with international markets and so are impossible to evaluate in advance.

Table 8: Risk-related factor ranking scores

Risk-related factors	Ranking score
Commencement of risk register	3.27
Quantification consequences of risks	3.25
Calculation transferable risks and retained risks	3.22
Estimation probabilities of risk	3.21
Special risk assessment	3.17
Possible allocation of responsibilities and risks between the Government and the private sector	3.13
Calculation value of risks	3.12
Identification desired risk allocation	3.03
Well measurement of risk management/mitigation	2.86

Finally, Table 9 shows "practical budget and programme" (=3.41) and "proposed commercial arrangement" (=3.31) to be the most important finance-related factor, with "demonstration how PPP can achieve the best value for money" (=3.01) and "prepared biding for funds through the

resource allocation exercise process" (=2.80) being the least important. In summary, officers in state governments of Australia pay more attention to a reasonable budget and procurement programme than value for money during PPP briefing. 20 government respondents who have been directly involved in briefing stages of PPPs all claimed that market soundings were more worthy of consideration than financial standing of the private partner in a very early stage of PPP projects.

Table 9: Finance-related factor ranking scores

Finance-related factors	Ranking score
Practical budget and programme	3.41
Proposed commercial arrangement	3.31
Good financial standing of the private partner	3.23
Conduction socio economic studies	3.16
Demonstration how PPP can achieve the best value for money	3.01
Prepared biding for funds through the RAE process	2.80

Conclusion

PPPs have become more and more popular for the delivery of Australian public sector services following its initial official adoption by federal government in 1980s. Of particular importance is the briefing stage of the PPP process, where the parties' requirements are negotiated and policies are formed. During this stage, the public and private sectors share the responsibility for procurement, stakeholder relationships, risk allocation and financial arrangements.

Despite its importance, however, PPP briefing and associated influencing factors has received little scrutiny to date. In rectifying this, four main factor categories are identified - procurement,

stakeholder, risk, and finance. Of the *procurement factors*, the most important are the need for experienced brief writers, adequate time, and process control to ensure the briefing stage passes smoothly. For the *stakeholder factors*, an open and effective communication environment is most important for both public and private sectors in order to adequately understand the stakeholders' requirements rather than depending on relayed information at a later stage. In the case of the *risk factors*, the identification of important risks involved needs to start as early as possible with consideration possible risk transfer, while the most important *finance factors* are concerned with the public sector paying attention to practical budget issues and the proposed commercial arrangements including contract duration and payment mechanisms. The limitation of the research in this study is that the population of the survey comprise public sector bodies, including state governments. However, the identified factors for the PPP briefing stage provide an opportunity for both state governments and industry to develop a more workable model that is better suited to Australian situations to achieve the success of PPP projects. The private sector also could obtain valuable information on public sector needs during the briefing stage in practice. Further research would benefit from the collection views from the private sector relating to these factors.

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References

Akintoye A., Hardcastle C., Beck M., Chinyio E. and Asenova D. (2003). "Achieving best value in private finance initiative project procurement", *Construction Management and Economics*, 21(5), 461-470.

Andreu, I.C. and Oreszczyn, T. (2004). "Architects need environmental feedback", *Building Research & Information*, 32(4), 313–328.

Australian Government Department of Finance and Administration (2005). *Public and Private Partnerships Guideline*, Commonwealth Policy Principles for the Use of Private Financing Risk Management, Commonwealth Government, Canberra, May, p. 56.

Australian Government Department of Finance and Administration (2005). *Public and Private Partnerships Guideline*, Commonwealth Policy Principles for the Use of Private Financing Risk Management, Commonwealth Government, Canberra, May, p. 56.

Belkin M and Niyogi P. (2005). "Towards a Theoretical Foundation for Laplacian-Based Manifold Methods", *Proceedings of COLT*, 486–500.

Bishop, C.M. (2006). "Pattern Recognition and Machine Learning", *Information Science and Statistics*, Springer. New York.

Blyth, A. and Worthington, J. (2001). *Management the Briefing for Better Design*, Spon Press, London and New York.

Briefing (2005), ''Government guidelines for PPPs launched'', *The Building Economist – the Journal of the Australian Institute of Quantity Surveyors*, June, pp. 2-5.

Centennial Consultancy (2005), Parliamentary Inquiry into Public Private Partnership: Submission of NSW Union, available at: http://rtbunsw.asn.au/campaigns/general/upload/Unions%20NSW%20PAC%20Submission%2021Oct05Final%20(2).doc (accessed 16 January 2006).

Chan, A.P.C., Chan, D.W.M., and Ho, K.S.K., (2003). "An empirical study of the benefits of construction partnering in Hong Kong", *Construction Management and Economics*, 21 (5), 523–533.

Commonwealth of Australia (2006) *Australian Government Policy Principles for the use of Public Private Partnerships*, Financial Management Guidance No. 21 Department of Finance and Administration Asset Management Group, Canberra.

Construction Industry Board (CIB) (1997). *Briefing for the team: a guide to better briefing for clients*. Thomas Telford, London.

Curnow, W., Jefferies, M.C. and Chen, S.E. (2005), "Unsustainable biddings costs: a critical issue for public private partnerships", in Ng, T.S. (Ed.), *Public Private Partnerships: Opportunities and Challenges*, Centre for Infrastructure and Construction Industry Development, University of Hong Kong, Hong Kong, pp. 35-43.

Davies, A. and Moore, M. (2005). ''No way out of tunnel torture'', *Sydney Morning Herald*, 21 October.

Duda, R.O., Hart, P.E. and Stork, D.H. (2000). *Pattern Classification* (2nd ed.). Wiley Interscience.

Duffield, C.F. (2001). “An evaluation framework for privately funded infrastructure projects in Australia”, PhD thesis, Department of Civil and Environmental Engineering, University of Melbourne, Melbourne.

Duffield, C.F. (2005). “PPPs in Australia”, in Ng, T.S. (Ed.), Public Private Partnerships: Opportunities and Challenges, Centre for Infrastructure and Construction Industry Development, University of Hong Kong, Hong Kong, pp. 5-14.

Grimsey, D. and Lewis, M.K. (2002). ‘‘Evaluating the risks of public private partnerships for infrastructure projects’’, *International Journal of Project Management*, 20(2), 107-118.

Hansen, K.L. and Vanegas, J.A. (2003). “Improving design quality through briefing automation”, *Building Research & Information*, 31(5), 379–386.

Hastie, T., Tibshirani, R. and Friedman, J. (2008). *The Elements of Statistical Learning: Data Mining, Inference, and Prediction* 2nd Ed., Springer. New York.

Infrastructure Australia (2008). “National Public Private Partnership Policy and Guidelines” Section 1.1, http://www.infrastructureaustralia.gov.au/public_private_partnership_policy_guidelines.aspx , accessed on Dec. 20, 2010

Jefferies, M. (2006). “Critical success factors of public private sector partnerships: a case study of the Sydney SuperDome”, *Engineering, Construction and Architectural Management*, 13(5), 451-462.

Jefferies, M. and Chen, S.E. (2004). “Identifying risk factors of BOOT procurement: a case study of Stadium Australia”, *The Australian Journal of Construction Economics and Building*, 4 (1), 1445-2634.

Jefferies, M., Gameson, R. and Rowlinson, S. (2002). “Critical success factors of the BOOT procurement system: reflections from the Stadium Australia case study.” *Engineering Construction and Architectural Management*, 9(4), 352-361.

Jin, X.H. and Doloi, H. (2008). “Interpreting risk allocation mechanism in public-private partnership projects: an empirical study in a transaction cost economics perspective”, *Construction Management and Economics*, 26(7), 707-721.

Kelly, J. and Duerk, D. (2002) *Construction Project Briefing/Architectural Programming-Best Value in construction*, Kelly, J., Morledge, R. and Wilkinson, S. (eds.) Blackwell Science Ltd, 38-58.

Kumaraswamy, M.M., Ling, F.Y.Y., Anvuur, A.M., and Rahman, M.M. (2007). “Targeting relationally integrated teams for sustainable PPPs.” *Engineering, Construction and Architectural Management*, 14(6), 581-596.

Leung, M.Y., Chen, D.Y. and Yu, J.Y. (2008). “Demystifying Moderate Variables of the Interrelationships among Affective Commitment, Job Performance, and Job Satisfaction of Construction Professionals.” *Journal of Construction Engineering and Management*, 134(12), 963-971.

London, K., Chen, J. and Bavinton, N. (2005). “Adopting reflexive capability in international briefing.” *Facilities*, 23(7/8), 295-318.

Love, P.E.D., Davis, P.R. and Baccarini, D. (2010). “Dismantling the public sector bastion: evaluating capital works.” *International Journal of Public Sector Management*, 23(3), 188-202.

Love, P.E.D., Davis, P.R., Edwards, D.J., and Baccarini, D. (2008). “Uncertainty avoidance: public sector clients and procurement selection.” *International Journal of Public Sector Management*, 21(7), 753-776.

Mallesons, S.J. (2005), Public Private Partnerships – Australia: Recent Matters, available at: www.mallesons.com/expertise/public_private_partnerships/714207w-03.htm (accessed 29 September 2005).

New South Wales Treasury (2006), *Working with Government – Guidelines for Privately Financed Projects*, New South Wales Government, Sydney, Australia.

Newman, C. (2005). ‘‘TransApex vision for a transformed city’’, *Queensland University of Technology Research Week*, July.

Regan, M., Smith, J. and Love, P.E.D. (2010). “Impact of the capital market collapse on public-private partnership infrastructure projects.” *Journal of Construction Engineering and Management*, 137(1), 6-16.

Salman, A.F.M., Skibniewski, M.J., and Basha, I. (2007). “BOT viability model for large-scale infrastructure projects.” *Journal of Construction Engineering and Management*, 133(1), 50-63.

Schölkopf, B and Smola, A. J. (2001). “Learning with Kernels: Support Vector Machines.” *Regularization, Optimization, and Beyond (Adaptive Computation and Machine Learning*, The MIT Press.

Seo, S., Aramaki, T., Hwang, Y. and Hanaki, K. (2004). “Fuzzy decision-making tool for environmental sustainable buildings”. *Journal of Construction Engineering and Management*, 130(3), 415–423.

Thomas, A.V., Kalidindi, S.N. and Ananthanarayanan, K. (2003). “Risk perception analysis of BOT road project participants in India.” *Construction Management and Economics*, 21(4), 393-407.

Victorian Government (2001), *Partnerships Victoria: Guidance Material*, Department of Treasury and Finance, Melbourne.

Yang, Y.Q., Wang, S.Q., Dulaimi, M. and Low, S.P. (2003). “A fuzzy quality function deployment system for buildable design decision-makings”. *Automation in Construction*, 12(4), 381–393.

Yu, A.T.W. (2006). “A value management framework for systematic identification and precise representation of client/owner requirements in the briefing process.” Ph.D. thesis, The Hong Kong Polytechnic University, Hong Kong.

Yu, A.T.W., Shen, Q.P., Kelly, J. and Hunter, K. (2008). “Comparative study of the variables in construction project briefing/architectural programming.” *Journal of Construction Engineering and Management*, 134(2), 122-138.

Appendix: Results of homogeneity tests

Type of PPPs, stakeholder-related factors

Factors	Sig. (2-tailed)	Average mean	Mean of infrastructure projects	Mean of building projects
Open and effective communication	.043	4.94	4.89 (0.05)	5.00 (0.06)
Skilful guidance and advice from project manager	.001	4.91	5.00 (0.09)	4.79 (0.12)
Clarity of roles of stakeholders	.001	4.86	4.75 (0.11)	5.00 (0.14)
Holding workshops for stakeholders	.031	4.76	4.89 (0.13)	4.59 (0.17)
Knowledge of statutory and lease control of the project	.000	4.73	4.52 (0.21)	5.00 (0.27)
Knowledge of clients business	.013	4.64	4.52 (0.12)	4.79 (0.15)
Honesty	.013	4.64	4.52 (0.12)	4.79 (0.15)
Clear management structure	.000	4.58	4.41 (0.17)	4.79 (0.21)
Sufficient consultation with stakeholders	.000	4.53	4.16 (0.37)	5.00 (0.47)
Experience of stakeholder group	.000	4.46	4.73 (0.27)	4.12 (0.34)
Good facilitation	.000	4.37	4.05 (0.32)	4.79 (0.42)
Agreement of brief by all relevant parties	.000	4.12	4.43 (0.31)	3.71 (0.41)
Experience of the client	.334			
Selection of briefing team	.133			
Balance of the needs requirements of different stakeholders	.062			
Knowledge of consultants	.028			
Team commitment	.050			
Openness and trust	.269			

The type of PPPs, risk-related factors

Factors	Sig. (2-tailed)	Average mean	Mean of infrastructure projects	Mean of building projects
Quantification consequences of risks	.043	4.94	4.89 (0.05)	5.00 (0.06)
Calculation transferable risks and retained risks	.043	4.87	4.77 (0.10)	5.00 (0.13)
Special risk assessment	.001	4.86	4.75 (0.11)	5.00 (0.14)
Identification desired risk allocation	.000	4.60	4.30 (0.30)	5.00 (0.40)
Well measurement of risk management mitigation	.000	4.37	4.05 (0.32)	4.79 (0.42)
Commencement of risk register	.174			
Estimation probabilities of risk	.895			
Calculation value of risks	.310			
Possible allocation of responsibilities and risks	.668			

The type of PPPs, finance-related factors

Factors	Sig. (2-tailed)	Average mean	Mean of infrastructure projects	Mean of building projects
Conduction socio-economic studies	.000	4.60	4.30 (0.30)	5.00 (0.40)
Demonstration how PPP can achieve the best value for money	.000	4.46	4.05 (0.41)	5.00 (0.54)
Prepared biding for funds through the RAE process	.000	4.12	3.80 (0.32)	4.53 (0.41)
Practical budget and programme	.360			
Proposed commercial arrangement	.269			
Good financial standing of the private partner	.652			

The role of PPPs, procurement-related factors

Factors	Sig. (2-tailed)	Average mean	Mean of contractors	Mean of clients
Control of process	0.002	4.90	4.60 (0.30)	5.00 (0.10)
Clear goal and objectives	0.000	4.73	5.00 (0.27)	4.55 (0.18)
Identification of client/owner requirements	0.000	4.73	5.00 (0.27)	4.55 (0.18)
Clear and precise briefing documents	0.000	4.73	5.00 (0.27)	4.55 (0.18)
Feedback from completed projects	0.011	4.67	4.75 (0.08)	4.55 (0.12)
Clear end user requirements	0.000	4.59	5.00 (0.41)	4.55 (0.04)
Good record of decisions made	0.000	4.59	5.00 (0.41)	4.32 (0.27)
Flexibility of briefs to cater for changes	0.016	4.56	4.75 (0.19)	4.38 (0.18)
Consensus building	0.000	4.51	4.20 (0.31)	4.77 (0.26)
Time for freezing of brief documents	0.000	4.46	4.50 (0.04)	4.32 (0.14)
Development of a framework agreed by the key parties	0.001	4.31	4.50 (0.19)	4.06 (0.25)
Proper priority setting	0.001	4.01	3.65 (0.36)	4.17 (0.16)
Experience of the brief writer	0.104			
Thorough understanding of client/owner requirements	0.061			
Adequate time for briefing	0.104			

The role of PPPs, stakeholder-related factors

Factors	Sig. (2-tailed)	Average mean	Mean of contractors	Mean of clients
Open and effective communication	0.000	4.94	4.75 (0.19)	5.00 (0.06)
Clarity of roles of stakeholders	0.014	4.86	5.00 (0.14)	4.77 (0.09)
Knowledge of statutory and lease control of the project	0.000	4.73	5.00 (0.27)	4.55 (0.18)
Selection of briefing team	0.037	4.71	4.75 (0.04)	4.62 (0.09)
Knowledge of clients business	0.000	4.64	5.00 (0.36)	4.40 (0.24)
Honesty	0.000	4.64	5.00 (0.36)	4.40 (0.24)
Knowledge of consultants	0.000	4.63	5.00 (0.37)	4.38 (0.25)
Experience of the client	0.000	4.58	4.25 (0.33)	4.85 (0.27)
Clear management structure	0.000	4.58	4.75 (0.17)	4.40 (0.18)
Sufficient consultation with stakeholders	0.048	4.53	4.25 (0.28)	4.53 (0.00)
Experience of stakeholder group	0.000	4.46	3.80 (0.66)	4.85 (0.39)
Team commitment	0.002	4.42	4.50 (0.08)	4.26 (0.16)
Good facilitation	0.000	4.37	4.50 (0.13)	4.17 (0.20)
Balance of the needs requirements of different stakeholders	0.000	4.36	5.00 (0.64)	3.94 (0.42)
Skilful guidance and advice from project manager	0.080			
Holding workshops for stakeholders	0.346			
Openness and trust	0.185			
Agreement of brief by all relevant parties	0.221			

The role of PPPs, risk-related factors

Factors	Sig. (2-tailed)	Average mean	Mean of contractors	Mean of clients
Quantification consequences of risks	0.000	4.94	4.75 (0.19)	5.00 (0.06)
Calculation transferable risks and retained risks	0.000	4.87	4.50 (0.37)	5.00 (0.13)
Special risk assessment	0.014	4.86	5.00 (0.14)	4.77 (0.09)
Estimation probabilities of risk	0.000	4.86	4.45 (0.41)	5.00 (0.14)
Possible allocation of responsibilities and risks	0.000	4.73	4.50 (0.23)	5.00 (0.27)
Calculation value of risks	0.000	4.72	4.25 (0.47)	4.85 (0.13)
Well measurement of risk management mitigation	0.000	4.37	4.50 (0.13)	4.17 (0.20)
Commencement of risk register	0.399			
Identification desired risk allocation	0.061			

The role of PPPs, finance-related factors

Factors	Sig. (2-tailed)	Average mean	Mean of contractors	Mean of clients
Good financial standing of the private partner	0.000	4.77	5.00 (0.23)	4.62 (0.15)
Demonstration how PPP can achieve the best value for money	0.000	4.46	5.00 (0.54)	4.11 (0.35)
Prepared bidding for funds through the RAE process	0.001	4.12	4.00 (0.12)	3.96 (0.16)
Practical budget and programme	0.207			
Conduction socio-economic studies	0.061			
Proposed commercial arrangement	0.185			