CRITICAL SUCCESS FACTORS FOR PPP/PFI PROJECTS IN THE UK CONSTRUCTION INDUSTRY: A FACTOR ANALYSIS APPROACH

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Abstract

Public Private Partnerships (PPPs) are increasingly used in the United Kingdom's public facilities and services provision, through the Private Finance Initiative (PFI). Despite some casualties, many successful PPP/PFI projects have been undertaken. Questionnaire survey research examined the relative importance of eighteen critical success factors (CSF) for PPP/PFI in UK construction projects. Factor analysis revealed that appropriate factor groupings for eighteen CSFs in construction PPP/PFI projects are: effective procurement, project implementability, government guarantee, favourable economic conditions and available financial market. These findings should influence policy development towards PPPs and the manner in which partners go about the development of PFI projects.

Keywords: Procurement systems; PPP; PFI; project management; critical success factors; CSF; factor analysis.

1. Introduction

Problems reported with PPP/PFI procurement include issues such as: high costs in tendering, complex negotiation, cost restraints on innovation, and differing or conflicting objectives among the project stakeholders (Akintoye *et al*., 2001a). Despite this, many PPP/PFI projects are regarded as successful. Many studies have developed differing lists of critical success factors (CSF) for PPP/PFI projects, but similarities occur among them. Less information exists about the relative importance of CSFs. The aim of this paper is to report on research that explored the relative importance of CSFs associated with construction PPP/PFI projects in the UK.

2. Critical Success Factors in PPP/PFI

Rockart (1982) defines Critical Success Factors (CSFs) as: "those few key areas of activity in which favourable results are absolutely necessary for a manager to reach his/her goals".

The CSF methodology is a procedure that attempts to make explicit those few key areas that dictate managerial success (Boynton and Zmud, 1984). This method has been used as a management measure since the 1970s in financial services (Boynton and Zmud, 1984); information systems (Rockart, 1982) and manufacturing industry (Mohr and Spekman, 1994). There have been attempts to apply it in construction management (Sanvido *et al.*, 1992; Yeo, 1991). Tiong (1996) explored CSFs for private contractors in competitive tendering and negotiation in BOT projects; while Jefferies *et al*., (2002) looked at how public clients successfully manage BOOT procurement.

Qiao *et al.*, (2001) established eight independent CSFs in BOT projects in China: appropriate project identification; stable political and economic situation; attractive financial package; acceptable toll/tariff levels; reasonable risk allocation; selection of suitable subcontractors; management control; and technology transfer.

For an Australian sports stadium project, Jefferies *et al.* (2002) identified the CSFs as: solid consortium with a wealth of expertise; considerable experience; high profile and a good reputation; an efficient approval process that assisted the stakeholders in a very tight timeframe; and innovation in the financing methods of the consortium.

Among other factors, good governance is identified by Frilet (1997) and Badshah (1998); government support by Zhang *et al*. (1998); a stable macro economic environment by Dailami and Klein (1997); and suitable legal and administrative framework by Boyfield (1992), Stein (1995). Jones *et al*. (1996) and (Finnerty, 1996).

Sound economic policy (European Investment Bank, 2000), including available financing market (McCarthy and Tiong, 1991; Akintoye *et al.*, 2001b); strong and good private consortium (Tiong, 1996; Birnie, 1999); feasibility study/cost-benefit analysis (Brodie, 1995; Hambros, 1999); and effective risk allocation (Grant, 1996; Arthur Andersen and Enterprise LSE; 2000) are all regarded as critical factors for the success of PPP procurement projects. An innovative technical solution (Tiong, 1996; Zantke and Mangels, 1999) is also thought to be important.

"Soft" critical success factors are: social support (Frilet, 1997); commitment (Stonehouse *et al*., 1996; Kanter, 1999); mutual benefit (Grant, 1996). Kopp (1997), Gentry and Fernandez (1997) and Arthur Andersen and Enterprise LSE (2000) have all emphasised the importance of procurement transparency and competitive procurement process.

The factors noted above have been distilled into nineteen CSFs as shown in Table 1. However, one of these – the need to achieve successful technology transfer – is not considered appropriate to PPP/PFI projects in the UK context and has therefore been omitted from the research study.

3. Research survey design and administration

The eighteen CSFs were included in a questionnaire survey instrument that also addressed wider issues involved in PFI/PPP projects in the UK.

The survey was administered in 2001 among UK organisations with involvement in PFI projects. In all, 61 completed questionnaires were returned out of the 500 distributed. Of these, 16 responses came from public sector organisations, and 45 from the private sector. The effective return rate is 12%. This rate is higher than that of an earlier Institute for Public Policy Research (2000) survey dealing with PPP which achieved a response rate of 9.6%. All respondents were either Directors or Managers in their respective organisations and share an average of 21.7 years of cognate experience.

Table 1: Summary of CSFs for PPP projects.

Critical Success Factor	Source
Strong private consortium	Jefferies *et al.* (2002) Tiong (1996) Birnie (1999);
Appropriate risk allocation and risk sharing	Qiao *et al.* (2001) Grant (1996) Arthur Andersen and Enterprise LSE (2000)
Competitive procurement process	Jefferies *et al.* (2002) Kopp (1997) Gentry and Fernandez (1997) Arthur Andersen and Enterprise LSE (2000)
Commitment/responsibility of public/ private sectors	Stonehouse *et al.* (1996) Kanter (1999) NAO (2001b)
Thorough and realistic cost/ benefit assessment	Qiao *et al.* (2001) Brodie (1995) Hambros (1999)
Project technical feasibility	Qiao *et al.* (2001) Tiong (1996) Zantke and Mangels (1999)
Transparency in the procurement process	Jefferies *et al.* (2002) Kopp (1997) Gentry and Fernandez (1997) Arthur Andersen and Enterprise LSE (2000)
Good governance	Qiao *et al.* (2001) Frilet (1997) Badshah (1998)
Favorable legal framework	Bennett (1998) Boyfield (1992) Stein (1995) Jones *et al.* (1996)
Available financial market	Qiao *et al.* (2001) Jefferies *et al.* (2002) McCarthy and Tiong (1991) Akintoye *et al.* (2001b)
Political support	Qiao *et al.* (2001) Zhang *et al.* (1998)
Multi-benefit objectives	Grant (1996)
Government involvement by providing guarantees	Stonehouse *et al.* (1996) Kanter (1999) Qiao *et al.* (2001) Zhang *et al.* (1998)
Sound economic policy	EIB (2000)
Stable macro-economic environment	Qiao *et al.* (2001) Dailami and Klein (1997)
Well organized public agency	Boyfield (1992) Stein (1995) Jones *et al.* (1996) Finnerty (1996)
Shared authority between public and private sectors	Stonehouse *et al.* (1996) Kanter (1999)
Social support	Frilet (1997)
Technology transfer (NB. Not included in this PPP/PFI research)	Qiao *et al.* (2001)

4. Survey data analysis and results

The relative importance of the eighteen CSFs identified from the literature review was explored by means of Likert rating scale questions in the survey instrument. Statistical analyses undertaken included: descriptive analysis, reliability tests using Cronbach's alpha, One-Way Analysis of Variance and Factor Analysis. The Cronbach alpha reliability for the factors is 0.767 suggesting that the data collected for the critical factor analysis are reliable (Norusis, 1992).

5. Factor analysis of CSFs for PPP/PFI projects.

Factor analysis is used to identify a relatively small number of factor groupings that can be used to represent relationships among sets of many inter-related variables (Kleinbaum *et al.*, 1988; Norusis, 1992). This technique was applied to the survey data to explore the groupings that might exist among the CSFs.

Although all the CSFs are nominally considered to be "critical" in the literature, the factor analysis shows that seventeen CSFs can be grouped into five principal factors (Table 2) and be interpreted as follows:

a) Factor Grouping 1 represents *Effective Procurement*.
b) Factor Grouping 2 represents *Project Implementability*.
c) Factor Grouping 3 represents *Government Guarantee*.
d) Factor Grouping 4 represent *Favourable Economic Conditions*.
e) Factor Grouping 5 represents *Available Financial Market*.

5.1 Factor Grouping 1 – Effective Procurement

This factor grouping accounts for 22.5% of the total variances between critical success factors. The CSF components of Effective Procurement are:

- transparency in the procurement process,
- competitive procurement process,
- good governance,
- well-organised and committed public agency,
- social support,
- shared authority between public and private sectors, and
- thorough and realistic assessment of the costs and benefits.

An effective procurement process must demonstrate transparency and be competitive throughout the whole procurement process. Transparency and a competitive procurement process enhance project value for money.

The other two high loading components are good governance and a well-organised and committed public agency. Effective procurement cannot be separated from the actors (stakeholders). This supports the institutional structure for a PFI/PPP project (Mustafa, 1999) in that policy makers, government departments and their agency are fundamental for successful PPP/PFI implementation.

To conduct PPP/PFI procurement, social support is an important component. Public opinion against PPP/PFI could slow, or even prevent, the project development. Social support therefore helps a PPP/PFI development and procurement process to go smoothly, particularly at the earlier stages, such as during land acquisition.

Shared authority between the public and private sector is another important component related to effective procurement. This suggests that the public and private sector should respect each other when carrying out negotiations during the procurement process. A fairly high loading is associated with a thorough and realistic assessment of the costs and benefits. Before a project is subjected to the procurement process, the public client should ensure that all the potential options that are beneficial to the government and end users are considered as part of the complete project feasibility study.

Table 2: Rotated factor matrix (loading) of critical success factors for PPP/PFI

Factor components	**Component**				
	Factor 1	*Factor 2*	*Factor 3*	*Factor 4*	*Factor 5*
Transparency procurement process	0.7817				
Competitive procurement process	0.7501				
Good governance	0.7362				
Well-organized and committed public agency	0.7121				
Social support	0.7007				
Shared authority between the public and private sector	0.6557				
Thorough and realistic cost/ benefits assessment	0.5448				
Project technical feasibility		0.8181			
Appropriate risk allocation and risk sharing		0.6970			
Commitment/responsibility of public/private sectors		0.6657			
Strong and good private consortium		0.6603			
Favourable legal framework		0.6390			
Government involvement by providing guarantees			0.7046		
Multi-benefit objectives			0.6054		
Political support					
Stable macro-economic conditions				0.9266	
Sound economic policy				0.8231	
Available financial market					0.8685

Note : Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 10 iterations.

5.2 Factor Grouping 2 - Project Implementability

This principal factor is responsible for 17.7% of the total variances of critical success factors. There are five CSF components in the Project Implementability group:

- favourable legal framework,
- project technical feasibility,
- appropriate risk allocation and risk sharing,
- commitment and responsibility of public and private sectors, and
- strong private consortium.

A favourable legal framework allows a PPP/PFI project to be developed without undue legal restriction on the private sector involvement. An appropriate risk framework should guarantee the legal status for project implementation.

Traditionally, technical issues are among the most important considerations in a project feasibility study. When considering PPP/PFI procurement options, it is important to review the associated technical problems. In particular, the private contractor needs to ensure that any engineering uncertainties are resolved.

The third variable in this group is appropriate risk allocation and risk sharing. The commitment and responsibility of the public and private sectors is the fourth important component. The attitude of the actors (or stakeholders) in a PPP/PFI project has an influence on the quality of outputs. Thus “soft” factors such as stakeholder relationships and stakeholder management must also be considered.

A strong private consortium is another high loading component. This relates to project implementability in the sense that where a project has the right actors (stakeholders), with common goals, the project is most likely to be implemented successfully.

5.3 Factor Grouping 3 – Government Guarantee

Government Guarantee is important in the early stage of PPP/PFI evolution. It accounts for 10.8% of the total variances in the factor analysis of CSFs. There are two components in this principal factor: government involvement by providing a guarantee; and multi-benefit objectives.

Higher loading is associated with a government guarantee. In the current UK situation, the private sector does not yet have full confidence in PPP/PFI procurement and is subsequently demanding revenue guarantees or firmly committed policies from government to ensure that investments are protected.

Lower loading is associated with multi-benefit objectives. Apart from the direct objectives in achieving public services, a PPP/PFI project needs to consider the private contractor's business objectives. If necessary, government guarantees can be used to protect the project revenue streams.

5.4 Factor Grouping 4 – Favourable Economic Conditions

Favourable Economic Conditions are very important for PPP/PFI project development both in developed and developing countries. This factor grouping is responsible for 10.4% of the total factor variances in the critical successful factor analysis. There are two CSF components involved: stable macroeconomic conditions and sound economic policy.

A high loading is given to stable macroeconomic conditions. For successful PPP/PFI project implementation, governments must ensure that economic conditions are favourable. For example, a lower risk market can increase the opportunities for success.

A high loading is also associated with sound economic policy. Governments should adopt economic policies to maintain a stable and growing economic environment, where the private sector can operate with confidence.

5.5 Factor Grouping 5 – Available Financial Market

This factor accounts for 7.8% of the total variability between critical success factors. There is only one CSF component under this factor grouping: the availability of a suitable and adequate financial market .

6. Conclusions

Many governments believe that PPP procurement can provide a wide variety of net benefits for society, including: enhanced government capacity; innovation in delivering public services; reduction in the cost and time of project implementation; and transfer of major risk to the private sector, in order to secure value for money for taxpayers.

Given that all the factors are nominally seen as critical in the literature, factor analysis was used to determine the principal success factor groupings that underlie project procurement. This revealed five factor groupings (accounting for about 70% of the overall variances between factors) for CSFs for UK construction PPP/PFI projects: effective procurement; project implementability; government guarantee; favourable economic conditions and available financial market. The five factor groupings therefore represent the basic elements of CSFs for PPP/PFI project development, and should always be considered by public sector sponsors in informing and shaping their PPP/PFI policy development, and by private sector concessionaires in managing their projects. The CSF of political support lies outside these principal factor groupings for PP/PFI projects in the UK and like technology transfer, is more relevant to projects undertaken in developing countries.

References

Akintoye, A., Beck, M., Hardcastle, C., Chinyio, E. and Asenova, D. (2001a). *Framework for Risk Assessment and Management of Private Finance Initiative Projects.* Glasgow: Glasgow Caledonian University, ISBN 1 903664 28 5

Akintoye, A., Beck, M., Hardcastle, C.,, Chinyio, E. and Asenova, D. (2001b). The Financial Structure of Private Finance Initiative Projects. *Proceedings:* 17th ARCOM Annual Conference. Salford. Volume 1. pp.361-369.

Arthur Andersen and Enterprise LSE, (2000). *Value for Money Drivers in the Private Financial Initiative*, the Treasury Task Force, http://www treasury-projects-taskforce.gov.uk/series_1/andersen/7tech_contents.html. [Accessed September 2001].

Badshah, A. (1998). *Good Governance for Environmental Sustainability*. UNDP, http://sdnhq.undp.org/pppue. [Accessed April, 2000.]

Bates, M. (1997), *First Review of the Private Finance Initiative by Sir Malcolm Bates*, HMSO, London.

Bates, M. (1999), *Second Review of the Private Finance Initiative by Sir Malcolm Bates*, HMSO, London.

Bennett, E. (1998). *Public-Private Co-operation in the Delivery of Urban Infrastructure Services (Water and Waste)*, PPPUE Background Paper, UNDP/Yale Collaborative Programme, http://www.undp.org/pppue/. [Accessed January 2000].

Birnie, J. (1999). Private Finance Initiative (PFI) – UK Construction Industry Response, *Journal of Construction Procurement.* **5** (1). pp.5-14.

Boyfield, K. (1992). Private Sector Funding of Public Sector Infrastructure, *Public Money & Management*. Oxford. **12** (2). pp.41-46.

Boynton, A.C. and Zmud, R.W. (1984) An Assessment of Critical Success Factors. *Sloan Management Review*. Summer. pp.17-27.

Brodie, M. J. (1995). Public/Private Joint Ventures: The Government as Partner – Bane or Benefit? *Real Estate Issues*. Chicago. **20** (2). pp.33-39.

Brown, C. (1999) United Kingdom: Public Private Partnerships, *International Financial Law Review*. London. July. *(Project Finance)*. pp.25-29.

Dailami, M. and Klein, M. (1997). Government Support to Private Infrastructure Projects in Emerging Markets. *World Bank Latin American and Caribbean Studies Viewpoints: Dealing with Public Risk in Private Infrastructure* (ed. Timothy Irwin). Washington. pp.21-42.

Diekhoff, G. (1992). *Statistics for the Social and Behavioural Sciences: Univariate, Bivariate, Multivariate*. Wm.C.Brown. USA.

European Investment Bank (2000). The European Investment Bank and Public Private Partnerships, *The Newsletter of the International Project Finance Association*. **1**. pp.3-4.

Euroweek on-line (1999). UK Capital Markets – March 1999: PFI Capital Market Deals Swell. http://www.euroweek.com/public/supplements/ukmarch99/6.html. [Accessed May 2000].

Fellows, R. and Liu, A. (1997). *Research Methods for Construction*. Blackwell, UK.

Finnerty, J. D. (1996). *Project Financing: Asset-Based Financial Engineering*. John Wiley & Sons, New York.

Frilet, M. (1997). Some Universal Issues in BOT Projects for Public Infrastructure, *The International Construction Law Review*. **14** (4). pp.499-512.

Gentry B. and Fernandez, L. (1997) Evolving Public-Private Partnerships: General Themes and Urban Water Examples. *Globalisation and the Environment: Perspectives from OECD and Dynamic Non-Member Economies*. OECD, Paris. pp.19-25. http://www.undp.org/pppue/. [Accessed January 2000].

Grant, T. (1996). Keys to Successful Public-Private Partnerships. *Canadian Business Review*. Ottawa. **23** (3). pp 27-28.

Hall, P. A. (1986). *Governing the Economy: A Politics of State Intervention in Britain and France*. Oxford University Press, New York.

Hambros, SG. (1999). *Public-Private Partnerships for Highways: Experience, Structure, Financing, Applicability and Comparative Assessment*. Canada.

HM Treasury (1999). Government Construction Procurement Guidelines. HM Treasury, London.

HM Treasury (2000). *Public Private Partnerships – the Government's Approach*. HM Treasury, London. http://www.hm-treasury.gov.uk/docs/2000/ppp.html. [Accessed March 2001].

HM Treasury (2001). *Modern Government Modern Procurement*. HM Treasury. London.

Institute for Public Policy Research (2000). *Summary of responses to call for evidence - Consultation on Public Private Partnerships*. http://www.ippr.org.uk. [Accessed May 2001].

Islamoglu, A. (1998). *Privatisation and the Use of Concession Contracts in Turkey*. Un-published MPhil Dissertation, Department of Civil and Structural Engineering, UMIST.

Jefferies, M., Gameson, R. and Rowlinson, S. (2002). Critical Success Factors of the BOOT Procurement System: Reflection from the Stadium Australia Case Study. *Engineering, Construction and Architectural Management*. **9** (4). pp.352-361.

Jones, I., Zamani, H. and Reehal, R. (1996). *Financing Models for New Transport Infrastructure*. OPEC, Luxembourg.

Kanter, R. M. (1999). From Spare Change to Real Change, *Harvard Business Review*. Boston. **77** (2). pp.122-132.

Keene, W. O. (1998). Reengineering Public-Private Partnerships through Shared –Interest Ventures. *The Financier*. **5** (2&3). pp.55-59.

Kleinbaum, D. G., Kupper, L. L. and Muller, K. E. (1988). *Applied Regression Analysis and Other Multivariable Methods*. PWS-KENT, Boston.

Kopp, J. C. (1997). *Private Capital for Public Works: Designing the Next-Generation Franchise for Public-Private Partnerships in Transportation Infrastructure*. Master Thesis, Department of Civil Engineering, Northwestern University, USA. http://iti.acns.nwu.edu/clear/infr/kopp/index.htm. [Accessed November 2001].

Li, B. (2003). *Risk Management of Construction Public Private Partnership Projects*. Un-published PhD thesis, School of the Built and Natural Environment, Glasgow Caledonian University, UK.

McCarthy, S. C. and Tiong, R. L. K. (1991). Financial and Contractual Aspects of Build-Operate-Transfer Projects. *International Journal of Project Management*. **9** (4). pp.222-227.

Merna, A. and Smith, N. J. (1999). Privately Financed Infrastructure in the 21st Century. *Proceedings of the Institution of Civil Engineers – Civil Engineering*. **132**. pp.166-173.

Mohr, J. and Spekman, R. (1994) Characteristics of Partnership Success: Partnership Attributes, Communication Behaviour, and Conflict Resolution Technique. *Strategic Management Journal*. Chichester, New York. **15**. pp.135-152.

Mountain, P. (1998) Building for the future. *Private Finance Initiative Journal*. Vol.3 (4). September. pp.30-34.

Mustafa, A. (1999). Public-Private Partnership: An Alternative Institutional Model for Implementing the Private Financial Initiative in the Provision of Transport Infrastructure. *The Journal of Project Finance*. Summer. pp.64-79.

National Audit Office (1999). *Examining the Value for Money of Deals under the Private Finance Initiative*. National Audit Office, London.

National Audit Office (2001a). *Innovation in PFI Financing : The Treasury Building Project*. National Audit Office, London. HC328.

National Audit Office (2001b). *Managing the Relationship to Secure a Successful Partnership in PFI Projects*. National Audit Office, London. HC375.

National Health Service (1999). *Public Private Partnerships in National Health Service: The Private Financial Service: Good Practice*. The Stationery Office, London.

Norusis, M.J. (1992). *SPSS for Windows, Profession Statistics, Release 5*. SPSS INC., Chicago.

Owen, G. and Merna, A. (1997). The Private Finance Initiative. *Engineering, Construction and Architectural Management*. **4** (3). pp.163-177.

Payne, H. (1997). Key Legal Issues in Projects Procured under the Private Finance Initiative. *Engineering, Construction and Architectural Management*. **4** (3). pp.195-202.

Qiao, L., Wang, S.Q., Tiong, R.L.K. and Chan, T.S. (2001). Framework for Critical Success Factors of BOT Projects in China. *The Journal of Project Finance*. **7** (1). pp.53-61.

Robinson, P. Hawksworth, J., Boardbent, J. Laughlin, R. and Haslam, C. (2002). *The Private Finance Initiative: Saviour, Villain or Irrelevance?* Institute of Public Policy Research. http://www.ippr.org.uk. [Accessed September, 2002].

Rockart, J.F, (1982) The Changing Role of the Information Systems Executive: a Critical Success Factors Perspective. *Sloan Management Review*. **24** (1). 3-13.

Sanvido, V., Grobler, F., Parfitt, K., Guvenis, M. and Goyle, M. (1992) Critical Success Factors for Construction Projects. ASCE *Journal of Construction Engineering and Management*, USA. **118** (1). pp.94-111.

Savitch, H. V. (1998). The Ecology of Public-Private Partnerships: Europe. *Partnerships in Urban Governance: European and American Experience* (ed. Jon Pierre), MacMillan, London. pp.175-186.

Stein, S. W. (1995). Construction Financing and BOT projects, *International Business Lawyer*. International Bar Association. **23** (4). pp.173-180.

Stonehouse, J. H., Hudson, A. R. and O'Keefe, M. J. (1996). Private-Public Partnerships: The Toronto Hospital Experience. *Canadian Business Review*. Ottawa. **23** (2). pp.17-20.

Szymanski, S. (1996). The Impact of Compulsory Competitive Tendering on Refuse Collection Services. *Fiscal Studies*. **17** (3). pp.1-19.

Tiong, R. L. K. (1996) CSFs in Competitive Tendering and Negotiation Model for BOT Projects. ASCE *Journal of Construction Engineering and Management*, USA. **122** (3). pp.205-211.

Treasury Task Force (2000). http://www.treasury-projects-taskforce.gov.uk/series_other/library/dcmf/dcmf_01.htm. [Accessed October 2000].

Wang, S. Q., Tiong, R. L. K., Ting, S. K. and Ashley, D. (1999). Risk Management Framework for BOT Power Projects in China. *Journal of Project Finance*. New York. **4** (4). pp.56-67.

Wright, P. (1999). Innovative Solutions to Resolving Disputes in Public Private Partnerships in the United Kingdom: The Channel Tunnel Rail Link – A Case Study of "Re-Engineering". *The International Construction Law Review*. **16** (4). pp.505-532.

Yeo, K. T. (1991) Forging New Project Value Chain – Paradigm Shift. *Journal of Management in Engineering*. ASCE, New York. **7** (2). pp.203-211.

Zantke, G. and Mangels, B. (1999). Public Sector Client – Private Sector Project: Transferring the State Construction Administration into Private Hand. *Engineering, Construction and Architectural Management*. **6** (1). pp.78-87.

Zhang, W. R., Wang, S. Q., Tiong, R. L. K., Ting, S. K. and Ashley, D. (1998). Risk Management of Shanghai's Privately Financed Yan'an Donglu Tunnels. *Engineering, Construction and Architectural Management*. **5** (4). pp.399-409.