

## MEASURING THE SUCCESS OF PUBLIC-PRIVATE PARTNERSHIP PROJECTS: A CONCEPTUAL FRAMEWORK

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### ABSTRACT

*The increasing reliance on public-private partnerships in the provision of infrastructure and services is well documented. However, despite an increasing reliance on public-private partnerships, the performance measurement of PPP projects is less clear in the normative literature. While assessment of success in traditional procurement approaches is relatively straightforward, PPPs, due to their multifarious nature, require more rigour in establishing the success factors and evaluating the extent of their contribution to the success of PPP projects. Using Structural Equation Modelling (SEM) approach, this paper develops a conceptual framework for assessing the success of PPP projects. The authors contend that the proposed framework should assist PPP stakeholders in evaluating the performance of PPP projects.*

Keywords: Assessment, Success, Public-private partnerships, Conceptual framework.

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### Introduction

The PPP model has become an increasingly important procurement option in both developed and developing countries for delivering public projects such as transport, housing, education, health, water, prisons, and defence (Siemiatycki, 2012). In worldwide practices, however, contradictory stories indicate both successes and failures in the application of PPP (Bult-Spiering & Dewulf, 2006).

With the mixed story, debate on PPPs has currently shifted focus towards establishing the explanatory factors that account for the success and failure of PPP projects. The understanding of such factors is a primary step towards development of an effective PPP framework (Zhang, 2005b; Kwak et al., 2009) and is key to achieving success (Tabish & Jha, 2011). In addition, to maintain effectiveness in the highly competitive markets, the performance of PPP projects need to be properly evaluated (Love & Holt, 2000). Success measurement is necessary to realise the full benefits of PPP and is critical to project success (Gunasekaran & Kobu 2007; Liu et al. 2014).

Although evaluation of performance are crucial components of most PPP policies (Qureshi et al. 2009; European Investment Bank 2012), the outputs and outcomes of many PPP projects have not been objectively evaluated (Hodge & Greve 2009). For instance, despite the maturity and sophistication of their PPP markets, ineffective evaluation is identified as a challenge to PPP projects delivery in Australia and UK (Duffield 2004; Roth 2004). Many of the claims for PPP project success and failure are self-defined by those making the assessments. Despite glaring embarrassing incompetence and large scale corruption, many advocating governments inevitably judged numerous PPP projects as successful. The absence of success evaluation of PPP would trigger a costly loss of competitive value (Jacobson & Choi 2008) and would lead to delivery of products or services below optimum quality (Liu et al. 2013).

This framework paper focuses on developing a conceptual framework for measuring the success of PPP projects. The paper reviews literature on project success and measurement of PPP project success. Based on the indicators identified from the review, the paper developed a conceptual framework using a structural modelling approach. The authors contend that the proposed framework is valuable for evaluating the success of PPP projects.

### PROJECT SUCCESS

Project success is an abstract perception and establishing whether a particular project is successful is highly subjective and very intricate (Chan et al., 2002). Project success remains a complex attribute because the accuracy of such measurement depends largely upon the method adopted by the assessor. Success is one of the most subjective terms used in project management (Bambrick, 2011). For instance, Parfitt & Sanvido (1993) described success as an intangible perceptible feeling whose measuring criteria varied among persons, phases of the project and with management expectations. Determining whether a project is a success or failure is highly complex as project owners, designers, consultants, and contractors have different project objectives

and criteria for measuring success. In fact, even the same person's perception of success may change from one project to another. A client's views concerning success may be different from architects who consider aesthetics or functionality as the main criterion rather than building cost. In general, the definition of project success varies according to project type, size and sophistication, project participants and experience of owners (Chan 2001).

A typical project is regarded as successful or failed by examining its outputs and outcomes which, are the building blocks of performance management systems. While outputs are products and services delivered by a project or program, outcomes relate to conditions that occur outside the program. For this reason, As submitted by Callahan & Kloby (2009) measuring project outcomes allows managers and policymakers to identify how policies and projects can be adjusted to attain their goals.

Various authors adopt different dimensions and criteria for measuring project success. For instance, Shenhar et al. (1984) divided the measurement of project success into four dimensions. The first dimension relates to project 'effectiveness' regarding whether the project is completed on time and within specified budget. The second dimension, which is customer related, regards 'when' the project is delivered to the beneficiaries and whether it meets the functional requirement and technical specifications. The third dimension, related to 'business performance', is regarding whether the project has achieved cycle time, yield and quality and overall improvement of organization performance. The fourth dimension concerns long term and future 'outcomes' of the project.

Liu & Walker (1998) evaluated project success at two levels: project outcome and participant satisfaction. Using a comprehensive approach, Kometa et al. (1995) developed four criteria to assess project success. These criteria include safety, economy, time and flexibility to users. As supported by Songer & Molenaar (1997), a successful project is one that is achieved on a budget, on time, conforms to specifications, users' expectations, quality workmanship and minimize construction exacerbation. Similarly, Khan (2016) used tangible indicators to measure process success. For example, the author considered managing a high number of projects completed on time and within the allocated budget, making sure the project contributes to the global strategy of a company or achieving customer satisfaction as indicators of project success.

However, while success measurement in traditional delivery approaches is relatively straightforward, PPPs, due to their multifarious nature (OECD 2010), require more rigour in identifying factors and establishing their level of performance in impelling the success of projects. PPPs are quite distinct from traditional delivery strategies due to the complexity of contractual relationships, long concession period, as well as broad range of risks and uncertainties. As observed by Zhang (2004), the concessionaire assumes more responsibilities and the allocation of risks and rewards among participants is more difficult in a PPP project than in a traditional contracting out. The intrinsic problems in PPP evaluation mostly stem from the dynamic nature of PPP process. As mentioned by Grimsey & Lewis (2002), evaluating PPPs is more difficult than traditional procurement due complexity in multiple components and risks involved in PPP. As observed by Hodge and Carsten (2011), many of the claims for PPP project success and failure are self-defined by those making the assessments. The author submitted that despite glaring embarrassing incompetence and large scale corruption, many advocating governments inevitably judged numerous PPP projects as successful.

### **THE SUCCESS OF PPP PROJECTS**

Public-private partnerships is long-term contractual relationships between public and private entities to share risk for the design, construction, and operation of infrastructure or services (Akintoye et al. 2003). It is a collaboration between a variety of public and private sector actors, and third party interest which, may include lenders, equity investors and other interests or non-profit groups (UN-HABITAT 2011). Over the last three decades, public-private partnership has gained popularity with governments for remedying the observed inefficiency in traditional service delivery approach (Siemiatycki 2012). In worldwide practices, however, the experience with PPP has not always been positive (Hodge & Greve 2007). While on the one hand, partnership has been used to deliver great number of development projects, on the other hand, many partnership programs and projects suffered disastrous consequences (Cheung 2009). The observed mixed results and the problems encountered in the application of PPP have prompted many research literature to investigate the success of PPP projects. Many studies employed different methodological approaches to investigate and establish the success of PPP projects.

Success in PPP schemes can be characterized as offering greater value-for-money (VfM) which refers to the optimum combination of whole life cost and quality to meet the user's requirement. The achievement of best value in PPP projects highlights efficiency and performance standards (Akintoye et al. 2003). VfM is seen as the key benchmark of the strategic objective of PPPs (Henjewe et al. 2011). As counselled by Treasury Taskforce (1998), PPPs should be used only if they provide better VfM than traditional procurement. VfM is usually determined and gauged by Public Sector Comparator (PSC). The PSC is a comparison between the cost of proposed PPP projects and the benchmark cost, which is a cost-estimation of the specific service using traditional procurement (Grimsey & Lewis 2005).

However, it has been observed that the performance of some PPPs in infrastructure development may not be exclusively reflected by 'cost', but by other measures such as project completion time and quality (Yong 2010). The over-reliance of the PSC on 'cost' parameters in the assessment of VfM has been criticized because such measure do not reflect the complexity of PPP procurement process (European Commission 2003). To enhance the soundness of performance measurement for PPP projects, Henjewe et al. (2011) suggested that meeting client's requirements should be considered as a core dimension in performance measurement of PPPs. As observed by Ng et al. (2010), a PPP project is successful only if the key interests of all stakeholders are satisfied.

In general, a public-private partnership scheme can be described as successful if it offer greater value-for-money, provide adequate financial return to the private investor (Ng et al. 2010), cost savings (Hambros 1999), reduction in construction time, maintaining a high level of service quality (Akintoye et al. 2003) and satisfying the stakeholders (Leung et al. 2004; Udayangani et al. 2011). Table 1 shows the indicators for assessing the success of PPP projects identified in the reviewed literature.

Table 1: Attributes of PPP project success

<b>Indicator of PPP success</b>	<b>Authors</b>
VALUE FOR MONEY	Hambros 1999; Ng et al. 2010
QUALITY OF PRODUCTS	Akintoye et al. 2003
EFFICIENCY	Akintoye et al. 2003 Zhang 2006
FINANCIAL RETURNS TO THE PRIVATE SECTOR	Ng et al. 2010
STAKEHOLDERS' SATISFACTION	Leung et al. 2004; Henjeweje et al. 2011; Udayangani et al. 2011

### CRITICAL SUCCESS FACTORS (CSFS) OF PPP PROJECTS

Many researchers employed the concept of critical success factors to determine the factors that influence the success of PPP projects. Critical success factors are those few key areas, which if satisfactory, will ensure successful performance of an organization or project (Kwak et al. 2009). They are those factors which, if not taken seriously, might lead to the failure of a project. The CSF approach is, therefore, an attempt to isolate vital areas that are essential for management or projects to achieve success. Although the idea originated from management practice, the approach was applied as a management tool in information systems (Rockart, 1982); and financial services (Boynton & Zmud, 1984; Kahwajian et al., 2014). It was also applied in construction management (Jefferies et al., 2002), manufacturing industry (Asare, 2012; Kahwajian et al., 2014), and infrastructure development (Osei-Kyei & Chan, 2015).

To explain the success of PPP projects, Tam (1999) identified factors influencing the success and failure of Build-Operate-Transfer infrastructure development in Asia, Akintoye et al (2003) identified success factors that contribute to the achievement of best value in PFI projects in UK. Jamali (2004a) identified CSFs for PPP implementation in the telecommunications sector of Lebanon. (Qiao et al. 2001) identified eight independent CSFs for Build, Own and Transfer (BOT) projects in China. Jefferies et al. (2002) identified CSFs from reflection of an Australian sports stadium project. Zhang (2005) identified 47 CSFs for PPP projects in general which, he later classified into five (5) main categories of CSFs.

Examining the factors that influence the success of PPP projects, Kwak et al. (2009) identified four CSFs from the extensive review of research studies from different administrative jurisdictions. Helmy (2011) identifies critical success factors of PPP projects in Kuwait. From an extensive review of literature and interview with experts, Zhao et al. (2011) also identified factors that lead to the success of power projects. El-Sawalhi and Mansour (2014) also explored the critical factors for the success of PPP projects in Palestine.

Given the complementarity among the lists of factors developed in the normative literature, many authors attempted to categorize CSFs into broad categories of major success factors each with a list of success sub-factors. The categorization is to show the relationship between inter-related variables (Kleinbaum et al., 1998; Norusis, 2008). For instance, Hardcastle et al. (2005) conducted a survey of managers and directors of organizations in the UK that were involved in PPP projects to investigate critical success factors for public-private partnerships. The authors used factor analysis method to group the critical success factors into five clusters. Other authors have also developed a similar categorization of CSFs although with some modification. For instance, Li et al. (2005) identified five groups of success factors of PPP/PFI projects in UK construction industry, Zhang (2005) classified CSFs for PPP infrastructure development in general into five groups. Kwak et al. (2009) also identified four CSFs from the extensive literature review of research studies on PPP. In a related study, Chan et al. (2010) identified CSFs influencing PPP infrastructure projects in China which they grouped into seven categories of key success factors. Table 2 gives a summary of critical success factors identified in the reviewed literature.

Table 2: Attributes of PPP project success

CSFs and SSFs	Authors
<b>EFFECTIVE PROCUREMENT PROCESS</b>	
Transparent procurement process	Li et al. (2005), Helmy (2011), Cheung et al. (2012)
Competitive procurement process	Hardcastle et al. (2005), Hemming (2006a)
Good governance	Hayllar (2010), Helmy (2011), Ismail (2013)
Well-organized and committed public agency	Scharle (2002), Hemming (2006b), Li et al. (2005), Cheung, et al. (2012), Aigbavboa et al. (2014)
Trust and openness between parties	Ong and Lenard (2002), Jamali (2004a)
<b>FAVOURABLE INVESTMENT ENVIRONMENT</b>	
Stable political system	Chan et al. (2010), Babatunde et al. (2012)
Favourable economic system	Helmy (2011), Chan et al. (2010), Babatunde et al. (2012)
Fair and efficient legal framework	Li et al. (2005), Abdul-Aziz and Kassim (2011), Babatunde et al. (2012)
Availability of financial market	Hwang et al. (2013), Ismail (2013), Li et al. (2005), Babatunde et al. (2012), Zhang (2005)
Supportive community	Heinke and Wei (2000), Ng et al. (2010)
<b>JUDICIOUS GOVERNMENT CONTROL</b>	
Government guarantee	Hemming (2006a), Jamali (2004b)
Efficient approval process	Jefferies et al. (2002), Abdul-Aziz and Kassim (2011)
Consistent monitoring	Abdul-Aziz and Kassim (2011)
Action against errant developers	Abdul-Aziz and Kassim (2011)
<b>APPROPRIATE RISK ALLOCATION</b>	
Risk allocation in contractual agreement	Thomson et al. (2005), Li et al. (2005)
Risk allocation in operational agreement	Akintoye et al. (2003), Hwang et al. (2012)
Risk allocation in loan agreement	Zhang (2005), Nsasira et al. (2013)
Risk allocation in design/build contract agreement	Zhang (2005), Nsasira et al. (2013)
<b>STRONG PRIVATE SECTOR</b>	
Technical competence	Jefferies et al. (2002), Zhang (2005)
Financial capability	Jefferies et al. (2002), Zhang (2005)
Rich experience in partnering	Li et al. (2005)

## METHODOLOGY

To achieve the objective of the study, the authors reviewed literature on project success and success of PPP projects. From a review of the various approaches employed in measuring the success of PPP projects, the authors identified multiple indicators and measures of PPP project success. The authors used the identified indicators to develop a conceptual framework for measuring the success of PPP projects using a structural equation modelling approach.

## STRUCTURAL EQUATION MODELLING

Structural Equation Modelling is a multi-variate analysis tool that can be used to represent, estimate and test a network of relationships among multiple observable and latent variables (Bollen, 1989). It is one of the most important data analysis techniques over the last three decades (Kaplan, 2009) for the analysing survey, non-experimental, and quasi-experimental data (Yuan & Tian, 2015). As described by Hooper et al. (2008), SEM has increasingly become a ‘must’ for scholars in the field of social sciences.

As an improvement over previous univariate and bivariate techniques, the SEM tool provides a better understanding of the subject of investigation (Hair et al., 2006). For instance, SEM can model and estimate random or measurement error of latent variables which is difficult in first-generation methods like the statistical package for social sciences (SPSS). The use of SEM, therefore, offers benefits that are impossible with first-generation statistical methods. Mainly developed from the work of Karl Jöreskog, SEM involves blending of factor analysis and path analysis into one complete statistical package which can present the results graphically in a more comprehensive manner. The structural equation modeling provides potentials for theory formulation and validation.

The method has been widely applied in the domain of communication sciences (Holbert & Stephenson, 2002), Engineering, management and construction management (Ng et al., 2010). It has been used to examine the relationship in inter-organizational collaborations (Sarkar et al., 1998), factors affecting disputes in contracts (Molenaar et al., 2000) and satisfaction of project participants (Leung et al., 2004). Similarly, it has been employed in measuring the effectiveness of project planning (Ozdoganm & Birgonul, 2000), the level of trust in partnering success (Wong & Cheung, 2005), and feasibility evaluation of project success (Ng et al., 2010).

The SEM comprises mainly of the measurement and the structural components (Stephenson et al., 2006). While the measurement model analyses associations among a set of observable variables (collected through measurement instrument) and a set of latent (unobserved) variables. Conversely, the structural model tests a series of relationships recognized between latent variables. There are three basic steps in SEM which include model specification, estimation, and evaluation. Model specification involves identifying and specifying a set of variables and their relationships to be investigated (Stephenson & Holbert, 2003). Estimation in SEM refers to a procedure for obtaining a more efficient parameter estimates (Yuan & Tian, 2015). Model evaluation, on the other hand, is another important component in SEM because models with latent variables are assumed as hypothetical even if they are buttressed by substantive theories in literature (Yuan & Tian, 2015).

## CONCEPTUAL FRAMEWORK FOR MEASURING THE SUCCESS OF PPP PROJECTS

Based on the review of literature, the paper identified the critical success factors for PPP projects and the indicators of PPP project success (Table 3). These indicators are structured into a conceptual model (Figure 1) for measuring the success of PPP projects in general. The model considered each category of success factors as latent constructs (factors) which are indicated by the success sub factors as measurable variables.

Table 3: Attributes of PPP project success

Principal success factors	Success sub-factors
EFFECTIVE PROCESS (EPP)	PROCUREMENT EPP1 - Transparent procurement process EPP2 - Competitive procurement process EPP3 - Good governance EPP4 - Well-organized and committed public agency EPP5 - Trust and openness between parties
FAVOURABLE INVESTMENT ENVIRONMENT (FIE)	FIE1 - Stable political system FIE2 - Favourable economic system FIE3 - Fair and efficient legal framework FIE4 - Availability of financial market FIE5 - Supportive community
JUDICIOUS GOVERNMENT CONTROL (JGC)	JGC1 - Government guarantee JGC2 - Efficient approval process JGC3 - Consistent monitoring JGC4 - Action against errant developers
APPROPRIATE RISK ALLOCATION (ARA)	ARA1 - Equitable risk allocation in contractual agreement ARA2 - Equitable risk allocation in operational agreement ARA3 - Equitable risk allocation in loan agreement ARA4 - Equitable risk allocation in design/build contract agreement

Attributes of PPP project success
SPPP1 - Value for money
SPPP2 – Quality of products and services
SPPP3 - Efficiency
SPPP4 - Financial returns to the private sector
SPPP5 - Stakeholders' satisfaction

The proposed conceptual framework (Figure 2) consists of 2 components models: a measurement model and a structural model. The first component can be used to estimate the contribution of the respective indicators (SSFs) in each category of latent variable (CSFs) through a measurement model. The second component can be used to evaluate the contribution of each category of CSFs in the overall success of PPP projects through structural model.

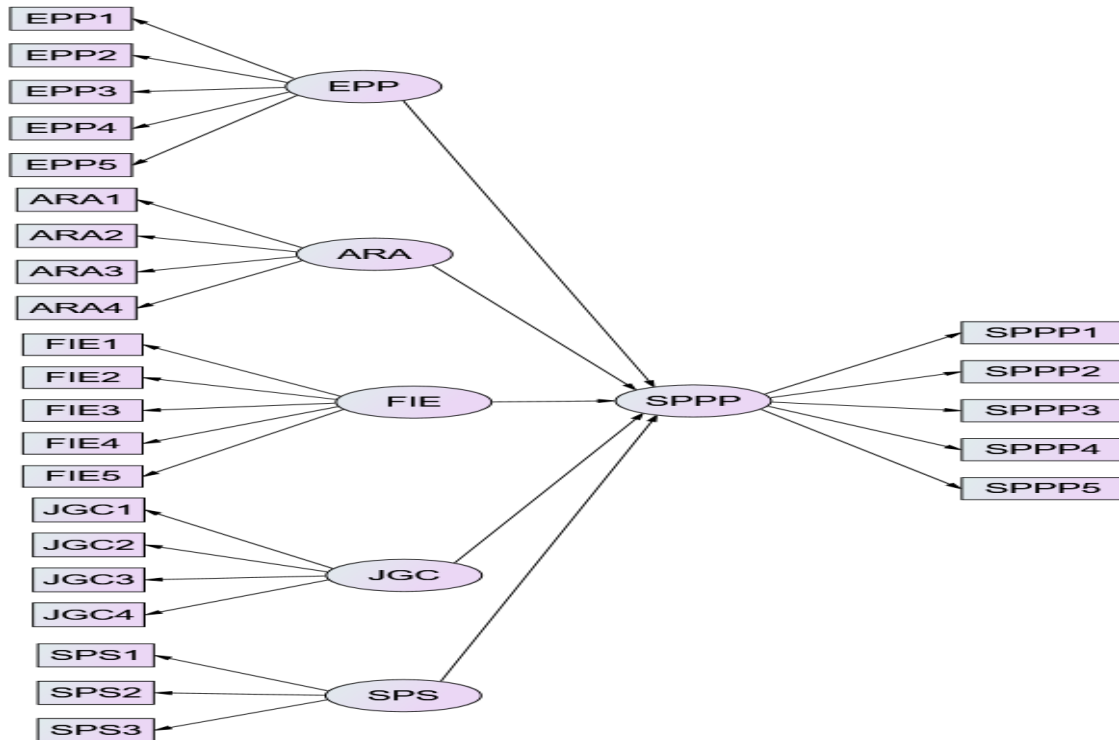


Figure 1: A conceptual framework for measuring the success of PPP projects

## CONCLUSION

This paper reviewed the various methods used in assessing project success and highlighted the strengths and weaknesses of each method. The authors argued that the evaluation of success of PPPs, due to their multifarious nature, requires a systematic approach that involve identification of success factors, success variables, and the various attribute of success. From review of literature, the paper identified critical success factors, their measurement variables, and used a structural equation modelling approach to develop a conceptual framework for assessing the success of PPP projects. The authors contend that the framework should assist PPP policy makers in evaluating the performance of PPP projects.

Using the framework, policy makers can evaluate the success of PPP projects by identifying the level of contribution of the success factors as well as the various indicators of success. The evaluation can help to identify how PPP projects and programs can be adjusted to attain policy goals of the different stakeholders (public sector, private sector, and the general public) in a PPP deal. The findings of the study is useful for promoting private sector investment in urban development sectors such as education, health, housing and transportation particularly in the developing countries like Malaysia with tremendous population growth and high demand for public infrastructure and services. However, as a theoretical construct, the proposed framework is limited in application as no validation has been done to concretise its underlying theory. While the framework is based on theoretical formation, future research agendas may wish to conduct empirical studies to validate the framework and proposed areas of improvement.



## REFERENCES

- Abdul-Aziz, A.R. & Kassim, P.S.J., 2011. Objectives, success and failure factors of housing public-private partnerships in Malaysia. *Habitat International*, 35(1), pp.150–157.
- Aigbavboa, C.O., Liphadzi, M. & Thwala, W.D., 2014. An exploration of public private partnership in infrastructure development in South Africa. In S. Laryea & E. (Eds) Ithem, eds. *Proceedings of the 8th Construction Industry Development Board (CIDB) Postgraduate Conference*, University of the Witwatersrand, Johannesburg, South Africa. Johannesburg, South Africa, pp. 101–109.
- Akintoye, A. et al., 2003. Achieving best value in private finance initiative project procurement. *Construction Management and Economics*, 21(5), pp.461–470.
- Alhomadi, A., 2012. *Public-Private Partnership Implementations in Saudi Arabia Infrastructure*. University of Calgary, Alberta.
- Asare, I.T., 2012. Critical Success Factors for the revival of the Textile Sector in Ghana. *International Journal of Business and Social Science*, 3(2), pp.307–310.
- Babatunde, S.O., Opowole, A. & Akinsiku, O.E., 2012. Critical success factors in public-private partnership (PPP) on infrastructure delivery in Nigeria. , 10(3), pp.212–225.
- Bambrick, S., 2011. *A Critical Review of the Methods used to Measure Project Success and the identification of key Success Factors*, Manchester.
- Bollen, K.A., 1989. A New Incremental Fit Index for General Structural Equation Models. *Sociological Methods & Research*, 17(3), pp.303–316.
- Boynton, A.C. & Zmud, R.W., 1984. An Assessment of Critical Success Factors. *Sloan Management Review*, 25(4), p.11.
- Bult-Spiering, M. & Dewulf, G., 2006. *Strategic Issues in Public-Private Partnerships: An International Perspective*, Blackwell Publishing Ltd.
- Callahan, K. & Kloby, K., 2009. *Moving Toward Outcome-Oriented Performance Measurement Systems*,
- Chan, A., Scott, D. & Lam, E., 2002. Framework of success criteria for design/ build projects. *Journal of Management in Engineering*, 18(3), pp.120–8.
- Chan, A.P.C. et al., 2010. Critical Success Factors for PPPs in Infrastructure Developments: Chinese Perspective. *Journal of Construction Engineering and Management*, 136(5), pp.484–494.
- Chan, A.P.C., 2001. *Framework for Measuring Success of Construction Projects*,
- Cheung, E., 2009. *Developing a best practice framework for implementing public private partnerships (PPP) in Hong Kong*. Queensland University of Science and Technology.
- Cheung, E., Chan, A.P.C. & Kajewski, S., 2012. Factors contributing to successful public private partnership projects: Comparing Hong Kong with Australia and the United Kingdom. *Journal of Facilities Management*, 10(1), pp.45–58.
- Dulaimi, M.F. et al., 2010. The execution of public – private partnership projects in the UAE The execution of public – private partnership projects in the UAE. *Construction Management and Economics*, 28(4), pp.393–402.
- European Commission, 2003. *Guidelines for successful public-private partnerships*. , (March), p.100.
- European Investment Bank, 2012. *The Guide to Guidance How to Prepare, Procure and Deliver PPP Projects*. , p.74.
- Grimsey, D. & Lewis, M.K., 2005. Are Public Private Partnerships value for money? *Accounting Forum*, 29(4), pp.345–378.
- Grimsey, D. & Lewis, M.K., 2002. Evaluating the risks of public private partnerships for infrastructure projects. *International Journal of Project Management*, 20(2), pp.107–118.
- Gunasekaran, A. & Kobu, B., 2007. Performance measures and metrics in logistics and supply chain management: a review of recent literature (1995–2004) for research and applications. *International Journal of Production Research*, 45(12), pp.2819–2840.
- Hair, J.F. et al., 2006. *Multivariate Data Analysis Sixth.*, Upper Saddle River, N.J.: Pearson Prentice Hall.
- Hambros, S.G., 1999. *Public-Private Partnerships for Highways: Experience, Structure, Financing, Applicability and Comparative Assessment*, Canada.
- Hardcastle, C. et al., 2005. Critical Success Factors for PPP / PFI Projects in the UK Construction Industry: A Factor Analysis Approach. *Construction Management and Economics*, 23(5), pp.1–9.
- Hayllar, M.R., 2010. Public-private partnerships in Hong Kong: Good governance the essential missing ingredient? *Australian Journal of Public Administration*, 69.
- Heinke, G.W. & Wei, J.K.C., 2000. *Consultancy to Examine and Disseminate Innovative Approaches to Financing of Initiatives such as Sustainable Infrastructure and Building, Planning, Design, Construction and Operation for Asia Pacific Economic Co-operation (APEC)*,
- Helmy, M.A., 2011. *Investigating the Critical Success Factors for PPP Projects in Kuwait*. Royal Institute of Technology, Stockholm.
- Hemming, R., 2006a. *Public-Private Partnerships. In Realizing the Potential for Profitable Investment in Africa*. Tunis, Tunisia: Organized by the IMF Institute and the Joint Africa Institute, p. 15.
- Hemming, R., 2006b. *Public-Private Partnerships, Government Guarantees, and Fiscal Risk*, Washington; DC.
- Henjewe, C., Sun, M. & Fewings, P., 2011. Critical parameters influencing value for money variations in PFI projects in the healthcare and transport sectors. *Construction Management and Economics*, 29(8), pp.825–839. Available at: <http://eprints.uwe.ac.uk/15830/>.
- Hodge, G., 2004. The risky business of public – private partnerships. *Australian Journal of Public Administration*, 63(4), pp.37–49.
- Hodge, G. & Greve, C., 2009. PPPs : The passage of time permits a sober reflection. *Economic Affairs*, 29(1), pp.33–39.
- Holbert, R.L. & Stephenson, M.T., 2002. Structural Equation Modeling in the Communication Sciences, 1995–2000. *Human Communication Research*, 28(4), pp.531–551.
- Hooper, D., Coughlan, J. & Mullen, M., 2008. Structural Equation Modelling : Guidelines for Determining Model Fit. *Electronic Journal of Business Research Methods*, 6(1), pp.53–60.

- Hwang, B.-G., Zhao, X. & Gay, M.J.S., 2013. Public private partnership projects in Singapore: Factors, critical risks and preferred risk allocation from the perspective of contractors. *International Journal of Project Management*, 31(3), pp.424–433.
- Ismail, S., 2013. Critical success factors of public private partnership (PPP) implementation in Malaysia. *Asia-Pacific Journal of Business Administration*, 5(1), pp.6–19.
- Jacobson, C. & Choi, S., 2008. Success factors: public works and public-private partnerships. *International Journal of Public Sector Management*, 21(6), pp.637–657.
- Jamali, D., 2004a. A Public-Private Partnership in the Lebanese Telecommunications Industry: Critical Success Factors and Policy Lessons. *Public Works Management & Policy*, 9(2), pp.103–119.
- Jamali, D., 2004b. Success and failure mechanisms of public private partnerships (PPPs) in developing countries. *The International Journal of Public Sector Management*, 17(5), pp.414–430.
- Jefferies, M., Gameson, R.O.D. & 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), pp.352–361.
- Jooste, S.F. & Scott, W.R., 2011. The Public-Private Partnership Enabling Field: Evidence From Three Cases. *Administration & Society*, 44(2), pp.149–182.
- Kahwajian, A. et al., 2014. Identification of Critical Success Factors ( CSFs ) for Public Private Partnership ( PPP ) Construction Projects in Syria. *Jordan Journal of Civil Engineering*, 8(4), pp.393–405.
- Kaplan, D., 2009. *Structural Equation Modeling: Foundations and Extensions (Advanced Quantitative Techniques in the Social Sciences) Second.*, SAGE Publications, Inc.
- Khan, B., 2016. Project performance: How to measure or define success in project management? Available at: <http://www.nqicorp.com/> [Accessed March 22, 2017].
- Kleinbaum, D.G., Kupper, L.L. & Muller, K.E., 1998. *Applied Regression Analysis and Other Multivariable Methods*, Boston, Mass.: PWS-Kent Pub. Co., c1988.
- Kometa, S.T., Olomolaiye, P.O. & Harris, F.C., 1995. An evaluation of clients' needs and responsibilities in the construction process. *Engineering, Construction and Architectural Management*, pp.57–76. Available at: <http://www.emeraldinsight.com.oxfordbrookes.idm.oclc.org/doi/pdfplus/10.1108/eb021003>.
- Kwak, Y.H., Chih, Y. & Ibbs, C.W., 2009. Towards a comprehensive understanding of public private partnerships for infrastructure development. *California Management Review*, 51(2), pp.51–78.
- Leung, M.Y., Ng, S.T. & Cheung, S., 2004. Measuring construction project participant satisfaction. *Construction Management and Economics*, 22, pp.319–331.
- Leung, M.Y., Ng, S.T. & Cheung, S.O., 2004. Measuring construction project participant satisfaction. *Construction Management and Economics*, 22(3), pp.319–331.
- Li, B. et al., 2005. Critical success factors for PPP/PFI projects in the UK construction industry. *Construction Management and Economics*, 23(5), pp.459–471.
- Liu, A.M.M. & Walker, A., 1998. Evaluation of project outcomes. *Construction Management and Economics*, 16(2), pp.209–219.
- Liu, J. et al., 2013. Performance measurement framework in PPP projects. In J. Akintoye, A., Liyanage, C. and Goulding, ed. *P3Book Proceedings of International Conference on PPP Body of Knowledge in Preston, UK*, University of Central Lancashire. Lancashire, pp. 55–64.
- Liu, J. et al., 2014. Public-Private Partnerships: a review of theory and practice of performance measurement. *International Journal of Productivity and Performance Management*, 63(4), pp.499–512.
- Love, P.E.D. & Holt, G.D., 2000. Construction business performance measurement: the SPM alternative. *Business Process Management Journal*, 6(5), pp.408–416.
- Molenaar, K., Washington, S. & Diekmann, J., 2000. Structural Equation Model of Construction Contract Dispute Potential. *Journal of Construction Engineering and Management*, 126(4), pp.268–277.
- Ng, S.T., Wong, Y.M.W. & Wong, J.M.W., 2010. A Structural Equation Model of Feasibility Evaluation and Project Success for Public–Private Partnerships in Hong Kong. *IEEE Transactions on Engineering Management*, 57(2), pp.310–322.
- Norusis, M., 2008. *SPSS 16.0 Advanced Statistical Procedures Companion*, Prentice Hall Press. Available at: <http://dl.acm.org/citation.cfm?id=1628706> [Accessed December 6, 2014].
- Nsasira, R., Basheka, B.C. & Oluka, P.N., 2013. Public Private Partnerships (PPPs) and Enhanced Service Delivery in Uganda: Implications from the Energy Sector. *International Journal of Business Administration*, 4(3), pp.48–60.
- OECD, 2010. *Dedicated Public-Private Partnership Units A Survey of Institutional and Governance Structures*, Organisation for Economic Co-operation and Development.
- Osei-Kyei, R. & Chan, A.P.C., 2015. Review of studies on the Critical Success Factors for Public–Private Partnership (PPP) projects from 1990 to 2013. *International Journal of Project Management*, 33(6), pp.1335–1346.
- Ozdoganm, I.D. & Birgonul, M.T., 2000. A decision support framework for project sponsors in the planning stage of build-operate-transfer (BOT) projects. *Construction Management and Economics*, 18(3), pp.343–353.
- Parfitt, M.K. & Sanvido, V.E., 1993. Checklist of Critical Success Factors for Building Projects. *Journal of Management in Engineering*, 9(3), pp.243–249.
- Qiao, L. et al., 2001. Framework for Critical Success Factors of BOT Projects in China. *The Journal of Project Finance*, 7(1), pp.53–61.
- Qureshi, T.M., Warraich, A.S. & Hijazi, S.T., 2009. Significance of project management performance assessment (PMPA) model. *International Journal of Project Management*, 27(4), pp.378–388.
- Rockart, J.F., 1982. The Changing Role of Information Systems Executive: A Critical Success Factors Perspective, Available at: <http://scholar.google.com/>, [Accessed October 20, 2014].
- Roth, L., 2004. *Privatisation of Prisons*, Sydney.



- Sarkar, M.B., Aulakh, P.S. & Cavusgil, S.T., 1998. The strategic role of relational bonding in interorganizational collaborations. *Journal of International Management*, 4(2), pp.85–107.
- Scharle, P., 2002. Public-Private Partnership (PPP) as a Social Game. *Innovation: The European Journal of Social Science Research*, 15(3), pp.227–252.
- Shenhar, A.J., Levy, O. & Dvir, D., 1984. Mapping the Dimensions of Project Success. *Project Management Journal*, 28(2), p.v.
- Siemiatycki, M., 2012. The Global Experience with Infrastructure Public—Private Partnerships. *Planning & Environmental Law*, 64(9), pp.6–11.
- Songer, A.D. & Molenaar, K.R., 1997. Project Characteristics for Successful Public-Sector Design-Build. *Journal of Construction Engineering and Management*, 123(1), pp.34–40.
- Stephenson, M.T. & Holbert, R.L., 2003. A Monte Carlo Simulation of Observable Versus Latent Variable Structural Equation Modeling Techniques. *Communication Research*, 30(3), pp.332–354.
- Stephenson, M.T., Holbert, R.L. & Zimmerman, R.S., 2006. On the Use of Structural Equation Modeling in Health Communication Research. *Health Communication*, 20(2), pp.159–167.
- Tabish, S.Z.S. & Jha, K.N., 2011. Identification and evaluation of success factors for public construction projects. *Construction Management and Economics*, 29(8), pp.809–823.
- Tam, C.M., 1999. Build-operate-transfer model for infrastructure developments in Asia: Reasons for successes and failures. *International Journal of Project Management*, 17, pp.377–382.
- Treasury Taskforce, 1998. *Partnerships for Prosperity – The Private Finance Initiative*, London.
- Udayangani, K., Dilanthi, A. & Richard, H., 2011. Structured approach to measure performance in construction research and development. *International Journal of Productivity and Performance Management*, 60(3), pp.289–310.
- UN-HABITAT, 2011. *Public-private partnerships in housing and urban development*, Nairobi: UN-HABITAT.
- Wong, P.S.P. & Cheung, S.O., 2005. Structural equation model of trust and partnering success. *Journal of Management in Engineering*, 21(2), pp.70–80.
- Yong, H.K., 2010. *Public-private Partnerships Policy and Practice: A Reference Guide*, London: Commonwealth Secretariat.
- Yuan, K. & Tian, Y., 2015. Structural Equation Modeling as a Statistical Method : An Overview. *JSM Math Stat*, 2(1), p.7.
- Zhang, X., 2005. Critical Success Factors for Public–Private Partnerships in Infrastructure Development. *Journal of Construction Engineering and Management*, 131(1), pp.3–14.
- Zhang, X., 2004. Improving Concessionaire Selection Protocols in Public/Private Partnered Infrastructure Projects. *Journal of Construction Engineering and Management*, 130(5), pp.670–679.
- Zhang, X. & Asce, M., 2006. Public Clients’ Best Value Perspectives of Public Private Partnerships in Infrastructure Development. *Journal of Construction Engineering and Management*, (February), pp.107–115.