

PPP INTERNATIONAL CONFERENCE 2013

BODY OF KNOWLEDGE



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and Prof. Jack Goulding**



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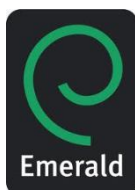
Public Private Partnerships in Transport:



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Forward

Public Private Partnerships (PPPs) are now commonly used to accelerate economic growth, improve development and infrastructure delivery, support better integration of services, strengthen governance and quality levels, and also maximise innovation opportunities. Given the changing economic, social and political environment, coupled with globalisation and budgetary constraints, PPP has now become a desirable mainstream option for many countries worldwide. The need for PPP has been exacerbated by the public sector's recognition of the vital role of modern infrastructure in economic growth, the demand for which is evidenced in this conference through a variety of diverse projects and contexts across different countries.

This conference is jointly organised by CIB TG72, EU COST ActionTU1001 - Public Private Partnerships in Transport: Trends and Theory (P3T3, UCLan Centre for Sustainable Development (CSD) and The University of Hong Centre for Infrastructure and Construction Industry Development (CICID). The conference provides a forum for discussing recent work on policy, governance, operational and implementation issues related to PPP. It is particularly significant, in the sense that it brings delegates together from many countries to present papers of international importance in this field. Topics include issues around PPP infrastructure (transport - roads, water, seaports, highways, social, rail, etc.), education, housing and hospital/health sector developments, value for money, knowledge management, risk, modelling, transaction costs, performance management, finance mechanisms etc. This diversity brings together a rich blend of research and practice-based experience, which uncovers new understanding and insight into such important areas as: innovation, process improvement, trust, teamwork, and new collaborative approaches.

We are very fortunate to have six eminent keynote speakers from academia, practice, government and industry over the three days of the conference. The first two days are devoted to academic papers presentations, and the third day focuses on industry presentations and workshops.

This conference is supported by Emerald Publishing through the Journal of Construction Innovation and Journal of Financial Management of Property and Construction; and best paper awards will be offered in the closing ceremony. In addition, we have had expression of interest from the Journal of Financial Management of Property and Construction to publish a selection of best papers from the conference.

The papers contained in these proceedings went through a two-stage formal academic review process. The first stage involved the review of each abstract by the conference Scientific Committee; and the second stage involved the review of each full paper by the Scientific Committee and external specialist reviewers. This process not only helped authors 'sharpen' their papers, but also helped to strengthen academic rigour.

Finally, we would like to thank all members of the Organising Committee and Scientific Committee, the external referees, keynote speakers, and all contributory partners and sponsors.

Akintola Akintoye

On behalf of the Organising Committee: International PPP Conference 2013- Body of Knowledge

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ENTREPRENEURIAL MODELS OF PUBLIC PRIVATE PARTNERSHIPS IN LOCAL DEVELOPMENT

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Public Private Partnerships have been a motivation tool for the introduction of private sector involvement in the provision of public sector services, especially in the transport sector. Transport services and infrastructure bear multiple positive socio-economic impacts, improve competitiveness and support business development. It is common for the final user of the services to directly (in the case of concessions) or indirectly (availability fees, shadow tolls etc.) repay the investment or cost of services, while the public sector is, simply, substituted by a private provider of equivalent services. The paper identifies alternative (innovative) entrepreneurial models of partnership in effect of improved accessibility, where business developers may be the prime partners of the public sector. This concept implies exploiting the business opportunity that “accessibility” (transport) projects provide. Hence, Business – Public Partnerships or Entrepreneurial Public Partnerships are introduced. Within this context smaller regional projects are expected, aiming at improving secondary transport networks, which are required to vitalize regional business. These PPP models may widen the private sector resources in support of accessibility projects and include in the partnership stakeholders with positive impacts prepared to share mutual risks and benefits. The paper identifies two such potential cases of Entrepreneurial Public Partnerships using the Osterwalder prototype to present the business model and identify the typology of the Business – Public Partnership.

Keywords Public Private Partnerships, Business models, Entrepreneurship

INTRODUCTION

The optimisation of transport systems supports the optimal use of resources, in order to avoid over- or under-utilisation and meet the demands of sustainable development (conclusions of the Gothenburg European Council). Transport policy has been pursuing the achievement of “competitiveness” and “complementarity”. “Competitiveness”, based on improved quality services by experienced customer-focused private (and public) operators, has been the aim of relative forms of deregulation. “Complementarity” is often seen to coincide with the concept of “transport integration” and the elimination of barriers to intermodality or co-modality.

The underlying rationale is that the optimisation of the mode or modes of transport and the optimisation of the organisation of the supply chain “will result in an optimal and sustainable utilisation of resources” (EC, 2006). This is further addressed in the most recent EC Transport White Paper, published in 2011 (EC, 2011), which focuses on longer distance supranational transport and the integration with regional and local networks. In order to achieve integration and to active partnerships between agents, public and private, involved in the transport, a chain need to be developed. This has not always been affected. There is an evidence (The World Bank, 2004; Wang and Yang, 2005; Roumboutsos and Kapros, 2008) that the aspect of “integration” – or rather “avoidance of integration” – on functional and model level is used by operators to restrict or minimize competition. Two fundamental barriers or gaps for improved intermodal can be identified: (1) Low integration between transport services and (2) Inadequate intermodal transfer conditions. The first refers to cases where transport operators operate largely in an isolated way with no or low interaction with each other. The second refers to cases with a poor or inadequate intermodal transfer conditions. These barriers/gaps are more pronounced when connecting/integrating long to short-distance networks, as are the cases presented herewith.

Developing value propositions (a new business opportunity) in order to overcome the barriers to cooperation and provide missing elements to seamless passenger and freight transport constitutes an opportunity for entrepreneurial models of public and private partnerships. In these cases, value is captured by that generated through improved accessibility (ESPON, 2009).

The potential for such cases is presented in this research following a brief description of value proposition development. The key issue is to identify the typology of the new business provider and the business champion. In order to identify the business model, the Osterwalder prototype is used. This theoretical background is presented in section two. Section three is allocated to the presentation of the case studies, discussed further in section four. Conclusions are drawn for the future cases.

BACKGROUND

Integration as a principle in transport policy is frequently advocated, but rarely defined. May et al. (2006) draw a distinction between operational integration, strategic integration with transport policy instruments with land use, with policy instruments in other sectors, and institutional integration within and between local, regional and national governments. This is very much in line with the distinction made by Potter and Skinner (2000), who identify function or model integration, transport and planning integration, social integration and environmental, economic and transport policy integration. Hull (2005) assessed the level of holistic integration by forming a “ladder of integration” with physical and operational integration of transport services as level (1) to integration of policies in all accompanied sectors as level (8). Potter (2010) as illustrated in Figure 1, makes a clear distinction between physical and operational integration.

Barriers are obstacles preventing or limiting the implementation of a given policy instrument.

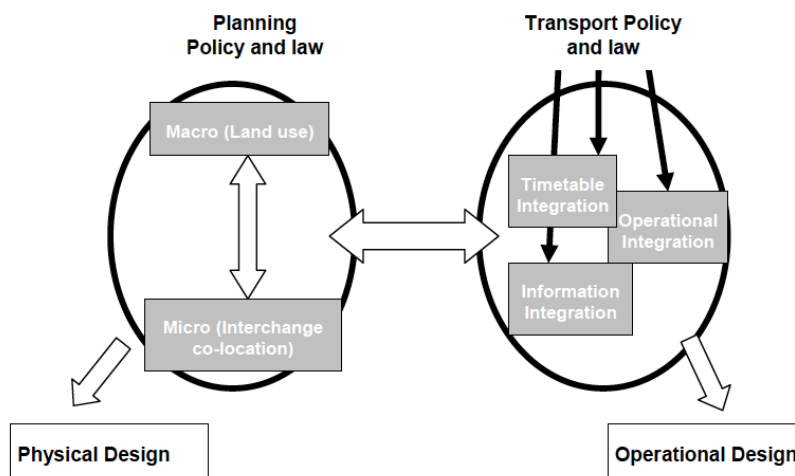


Figure 1: Meaning of Integration (source: Potter, 2010)

As described by Fluhrer, Szimba and Siegele (2011), these barriers may be clustered as five challenges:

- The challenge of improving physical interfaces, referring to barriers, which are related to physical elements of the intermodal transport chain.
- The challenge of cooperation among operators. The corresponding issues comprise integrated planning of services, coordinated schedules, integrated ticketing systems, the exchange and harmonization of information, as well as common operational standards.
- The challenge of passenger information and ticketing integration. This challenge represents barriers for using intermodal transport services from the perspective of passengers.

- The challenge of coordinating different stakeholders, embracing barriers, which are related to the cooperation and integration of the variety of heterogeneous actors, their different interests and responsibilities and the difficulties to coordinate their activities. This also refers to the challenge of coordinating public activities, representing barriers, which are related to public authorities and their influence on the provision and improvement of intermodal transport services. The integration of public planning on different administrative levels and the homogenization of regulations are core aspects.

The above challenges present opportunities to value propositions or business models.

A Business Model is a “buzz word” concept in the business and scientific world with multiple definitions. The term has been referred to as architecture, design, pattern, plan, method, assumption, and statement (Morris et al., 2005). Whereas strategy emphasizes competition, business models build more on the creation of value for customers (Morris et al., 2005) and describe how resources could be combined to generate value for customers and other stakeholders (Magretta, 2002). Business models are also related to value chains, value streams (Davies, 2004), and value constellations (Normann and Ramirez, 1994) among multiple business actors but remains largely unexplored territory (Wikström et al., 2009).

Osterwalder (2004) defines business models as being “the rationale of how an organization creates, delivers, and captures value”. A prototype of business models is a “thinking tool” (Osterwalder, 2010, pp 162) to support and guide the set up by which to deliver value and relationship capital, to generate profitable and sustainable revenue streams (Osterwalder, Pigneur and Tucci, 2005). As such, a prototype does not intend to provide a rough or fixed picture of what the actual business models should be, but simply to guide and present suggestions for the design of superior business mode (Osterwalder, 2004), on the subjects of:

- Value Propositions – it seeks to solve customer problems and satisfy customer needs with value propositions;
- Customer Segment – specifies for whom are the company creating value since an organization serves one or several customer segments;
- Channels – Value propositions are delivered to customers through communication, distribution, and sales channels;
- Customer Relationships – are established and maintained with each customer segment;
- Revenue Streams – result from value propositions successfully offered to customers;
- Cost Structure – reflects the mix of activities performed to achieve the value proposition;
- Key Resources – the assets required to offer and deliver the previously described elements;
- Key Activities – activities, distribution channels, customer relationships and revenue streams that the value proposition requires;
- Key Partnerships – some activities are outsourced and some resources are acquired outside the enterprise;

Business models are commonly used to describe the activity of a given organization or agent. In the case of an intermodal transport service, there are multiple stakeholders with different perspectives and objectives. As such, there is the need to define the perspective from which the prototype is designed.

The objective in this case, is to identify the stakeholder or the typology of the group of stakeholders most suited to promote an Entrepreneurial Public Private Partnership.

ENTREPRENEURIAL PPP CASE POTENTIAL

In this section two case studies are put forward to demonstrate the wider entrepreneurial potential of providing accessibility and involving the private sector in achieving accessibility and economic development goals.

Case Study 1: Extension of the Adriatic – Ionian Corridor from Peloponnese to Crete - Brief Case Description

The case study focusing on filling the long to short transport network gap was developed within the context of the HERMES¹ FP7 project (Kaprois et al, 2011). In its herewith presentation, emphasis is placed on the description of the proposed “value proposition provider”.

Case Study 1 deals with the development of a fully integrated intermodal transport service for passengers between Western/Central Europe through Italy and the Adriatic–Ionian corridor and Crete, avoiding deviation through Piraeus. The entire network configuration of the proposed integrated service is examined, including: (i) the long distance ferry transport between Italy and the port of Patras; (ii) the inland leg connecting the port of Patras to the southern Peloponnese and (iii) the medium distance ferry transport from southern Peloponnese to Crete. Emphasis is placed on the “missing link” described under item (ii) above (see figure 2a). The proposed business model, ultimately, concerns new touristic services. The Service Offering consists of two packages: the “direct transport to Crete” (for Non- Stop Travelers) and the “Transport and Tourism” package. The first service concerns: transportation, luggage handling, e-ticketing. The second combines the transfer from an Italian port to Crete with a two days sightseeing tour in the Peloponnese. This package includes transportation, accommodation and the sightseeing tour.

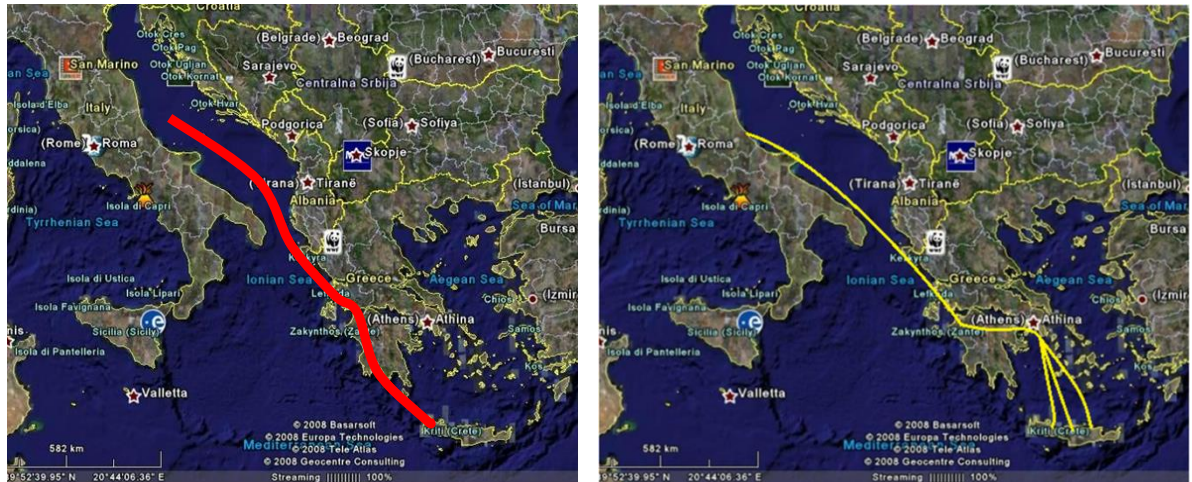
Currently, transportation from the Adriatic to Crete is realized through the Piraeus hub port. Passenger flows coming from the Adriatic corridor and having Crete as final destination, are oriented from the port of Patras to the port of Piraeus through the road transport network (private cars or bus services) and then, use ferry services to Crete (see figure 2b). No integrated service is offered.

The expected added value of the proposed service and business model relates to:

- Service improvement: travel time reduction, transport cost reduction
- Service enlargement and additional benefits for users: integrated package including transport and touristic services (accommodation, cultural activities etc).

In addition, the proposed model is expected to create numerous socio-economic benefits, such as: Reduction of the total vehicle-km produced; Alleviation of congested road corridors and terminals; Promotion of new Short Sea services; as well as environmental friendly solutions; integration of -previously independent- maritime services; synergies between passenger and freight transport; new dynamics for Short Sea Shipping.

¹ HERMES (High Efficient and Reliable ArrangeMEnts for CroSs-Modal Transport), 7th Framework Program, DG Research, Contract Number: TCP8-GA-2009-234082



(a) Value proposition

(b) Current situation

Figure 2: Extension of the Adriatic – Ionian Corridor from Peloponnese to Crete

Case Study 2: Improvement in public transport connections between two regional cities Ljubljana, Trieste - Brief Case Description

This case study is based on the fact that inefficient public transport connections exist between two international regions (Slovenia and Italy) or, more specifically, between two cities: Ljubljana and Trieste, which have been historically connected. More specifically transport networks/services existed since the Roman times. In the more recent era, the Austria-Hungarian monarchy constructed the rail link Vienna-Ljubljana-Trieste in 1857. Today, this rail-link is left to freight transport and fragmented passenger, while more efficiency is achieved through the newly built motorway to connect the cities of Ljubljana and Trieste, their respective airports: Joze Pucnik and Ronchi. More specifically, between this pair of origin-destination there is scarce public transport and minimum private services.

On a European level, the TEN-T programme foresees the development /improvement of the railway connection Barcelona and Kijev, which includes various local connections. These developments (to be put forward in the following years) do not take into account the touristic potential of the region Venice – Trieste – Dalmatic Coast – Ljubljana (especially caves e.g. Postojna cave, Vilenica near Divaca - the oldest tourist cave in Europe, The Skocjan caves - are on UNESCO's list of natural and cultural world heritage, Lipica -Lipizzaner horse, agro-tourism - excellent prsut, wine etc.).

More specifically, the value proposition may take advantage of stimulus triggered by new infrastructure directly targeting needs of passengers, such as dining and lodging facilities, recreation areas, gas stations and car maintenance, shopping-malls, banking and other financial services, tourist information points etc. Facilities for fostering local tourism integrated in the course of inter-regional connections may be an opportunity. This includes an infrastructure of integrated tourist-points, located at service areas may be an idea with their developed ability to provide not just basic information about classical attractions (such as historical and cultural heritage), but also integrate the supply of active short-break and relief packages including sports and recreation, health treatment, adventure possibilities etc., as well as wine experience, as three quarters of the study area is a wine region offering several excellent red wine brands, which may be exploited in commercial and tourism purposes.

As in Case Study 1, Case Study 2 deals with the development of a fully integrated intermodal transport service for passengers between Ljubljana (air arrivals/departures) and Trieste (air arrivals/departures). The proposed business model, ultimately, concerns new touristic services. The Service Offering consists of two packages: the “direct transport between the two cities” (for

Non- Stop Travellers) and the “Transport and Tourism” package. The first service concerns: transportation, luggage handling, e-ticketing. The second combines the transfer from the one airport or city centre to the other with a sightseeing tour in the region. This package includes transportation, accommodation and the sightseeing tour. Given the richness of the region various sightseeing packages may be offered.

The expected added value of the proposed service and business model relates to:

- Service improvement: travel time reduction, transport cost reduction
- Service enlargement and additional benefits for users: integrated package including transport and touristic services (accommodation, cultural activities etc)

In addition, the proposed model is expected to create numerous socio-economic benefits, such as: increasing growth in total factor productivity; higher linking dynamics of regions accessibility (economic integration) promotes competitiveness and growth, reduces general price level, and consequently, increases aggregate welfare; increasing in the relative standard of living among a group of countries, which have strong trading relations etc.

COMPARATIVE BUSINESS MODEL ANALYSIS AND DEVELOPMENT

The analysis follows the Osterwalder (2010) business model. Both cases bear a number of similarities. This originates from their “value proposition”.

Value Proposition

The proposed business model consists in the bundle of new products and transport services that relate to “newness”, “performance” of the transport system, “accessibility”, “cost reduction” and time savings, according to Osterwalder Business model analysis. It is also related to possible new touristic services. More specifically, the service in both cases includes:

- Creation of an integrated intermodal passenger service.
- Improvement of medium distance transport service. This includes a ferry service (Peloponnese-Crete) for Case Study 1 (CS1) and road service for Case Study 2 (CS2).
- Coordination of transport services involved.
- Creation of a “shuttle” inland transport service (either bus or rail) connecting destinations/origins. This is the port of Patras to the port of Kalamata in southern Peloponnese for CS1 and airport/city of Ljubljana to the airport/city of Trieste or the port of Koper for CS2.

Direct access from (air)port to (air)port, one ticket for the whole chain, luggage services and integrated-inter-related schedules of the transport services involved.

Customer Segments

The proposed business models target two customer market segments: (i) Non-Stop Travelers and (ii) Travelers with Stops. These two categories were identified through a respective survey (Kapro et al., 2011) for CS1 and findings are transferred for CS2.

Channels

The 3rd Party Provider (the entity assumed to operate the proposed business model) will have two main channel categories for reaching its customer segments: (i) “direct” -mainly electronic-channel, through the use of the Internet websites of stakeholders directly involved in the proposed business model (Port authorities, shipping lines, transport operators, local and regional authorities, chambers of commerce etc.). This channel covers the need of purchase, delivery and the reception of real- time information. (ii) indirect channels, notably travel agents or tour operators involved as

“intermediary” customers, as well as information desks of local authorities and other interested institutions (e.g. cultural institutions and users associations) which will be members of the partnership.

Customer Relationships

The objective of the new integrated chain proposed is to upgrade the quality of service and automate them as far possible. Services are integrated in the system between different transport modes completed with tourist services.

Revenue Streams

The revenue sources of the proposed integrated transport service are the tickets per destination, the services related to touristic activities (museums, archaeological areas, other touristic sights etc) and provided services at the level of interchange.

Key Resources

Resources to be committed in both cases by the transport operators include and the 3rd party provider are: (i) Physical (vehicles, vessels, customer support centres, terminals) (ii) Human (on-board personnel and office staff including management and helpdesk) (iii) Financial (investment for upgrading rolling stock and infrastructure).

Key Activities

The required Key Activities in the business models can be separated in two sectors. The Key activities realized by a 3rd Party Provider and the ones realized by the transport operators.

Key Partnerships

Generally, the business model of this case study is based on partnerships between the transport operators, the travel agencies, the (air)port authorities, local authorities, Chambers of Commerce etc.. The combined efforts of the parties may provide the service described. However, in this respect there are two basic issues to address:

1. Which of the above entities could initiate the service offer and act as the service promoter?
2. What the structure of the generally described “3rd party provider” should be?

These issues are discussed in the following section.

THE ENTREPRENEURIAL PUBLIC PRIVATE PARTNERSHIP

The key barrier hampering the effective and efficient provision of “accessibility” and transport services in both cases described is the lack of institutional or other interaction between the agents present in the respective corridors.

In the new case offering the potential for new services and potentially new activities /revenues may develop challenges as these agents have no previous collaboration experience. Moreover, since their basic service is the provision of transport services and development (local authorities and chambers) the proposed offering falls outside the core business operation of all agents. This leads to the need to partner in order to out-source the activity and “develop” and new entity dedicated to provide the described service. This approach holds true in both cases analysed for the business models proposed.

As the proposed structure should integrate all the services into a single service bundle, it would initially seem appropriate to create this 3rd party provider-entity, which would be required to operate in a competitive market on private entity terms (tourist offering/services) in collaboration

with private transport operators (shipping/ air lines, bus operators, hoteliers, tour guides etc.) but also in close collaboration with public authorities. These in CS1 would include the port authority of Patra and Kalamata, Prefecture/Municipality of Achaia, Helia, Messenia and Crete, Chambers of Commerce, Archaeological Services & Museums etc. In CS2, respectively, relevant public authorities would include both Municipality of Ljubljana, Postojna, Ilirska Bistrica, Trieste, Monfalcone, Airport of Ljubljana, Ronchi, Port of Koper, Trieste, Ministries of Transport and Environment, Chamber of Commerce. In essence, this 3rd party provider –entity is described as a pure public & private partnership.

The next issue, as presented above, is, who the initiator of this activity might be. Central government bodies dedicated to tourism and regional development or even transport might be on this list. However, as the further away the government institutions are to the offering the more complexity is brought into the issue as more conflicting interests may evolve or the need to pursue the service offering might be less immediate. Containing it at a very local level, i.e. local authorities may be equally unproductive as no prefecture (which is the highest level of local authority) has the overall responsibility of the region. Following this line of thought, the most appropriate authority to lead the effort and set the standards that might be needed or even provide support for initiating efforts would be a Regional Authority.

In the CS1, this is the Regional Authority of Western Greece-Peloponnese & Ionian Islands. This authority has the legal and authorial competence to lead the effort.

In CS2, there is an additional need of coordinating between two cross-border regional authorities and setting up an entity operational under two state regimes.

The Regional Authority may guide and provide the respective power to the “3rd Party provider” to coordinate all the stakeholders involved in the chain of the proposed corridor. Its goal will be the increase of effectiveness, efficiency and continuous improvement of each unit or activity. More specifically this body will undertake:

- Coordination and support of the (air)port authorities – infrastructures related to the new service. The co-ordination and the support concern mainly in the monitoring and evaluation of provided services, the evaluation of infrastructures, the ascertainment of problems as well as the submission of proposals for corrective interventions.
- Signing a Service Level Agreement with the transport operators and Local Authorities defining quality indicators in order to monitor the Quality of the Service Offering.
- Creation of a mechanism for the promotion of the activities that will support the operation - viability of the line.
- To ensure strong and reliable partnerships with ship lines, transport operators and tour agencies in order to achieve the biggest possible precision, the minimization of the waiting line to interchanges, the organization and promotion of the accommodation facilities, the sightseeing tours.
- Clarify the roles of local authorities and transport operators in information provision.
- Continuous monitoring of activities and submission of proposals for corrective actions in case the initial demand estimates are obsolete (i.e. lower or higher real demand than planned).
- Organizing or undertaking information campaigns in Greece and abroad in order to advertise the new services (when these are introduced from the port or ports that will provide them). This tasks aims to increase the travellers’ awareness level and also lead to the use of the services as well.

CONCLUSIONS

Removing barriers to transport network integration and connecting long-distance with national or secondary transport networks creates an opportunity for business development. The option of developing alternative (innovative) entrepreneurial models of partnership in effect of improved accessibility, where business developers may be the prime partners of the public sector was presented and illustrated through the presentation of two potential Case Studies. Osterwalder business model prototype was applied to schematically present the business potential and introduce concept of Business – Public Partnerships or Entrepreneurial Public Partnerships.

In the effort to identify the characteristics of the 3rd party, who potential would provide the service similar barriers as those responsible for inability to implement integration transport policy were identified. This is the lack of institutional or other interaction between the agents present was also identified as an issue in the spontaneous initiative of the 3rd party to realize the business model. It was also identified that a regional public authority of the appropriate level would need to initiate the effort.

While there is little evidence to support more generalized conclusions, it is estimated that improving integration between and amongst secondary and primary transport networks may form business models able vitalize regional business. These PPP models may widen the private sector resources in support of accessibility projects and include in the partnership stakeholders with positive impacts prepared to share mutual risks and benefits.

REFERENCES

- European Commission (2006) COM(2006) 314 - Keep Europe moving - Sustainable mobility for our continent - Mid-term review of the European Commission's 2001 Transport, White paper
- European Commission (2011) White Paper. Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system . COM(2011) 144. EC, Brussels.
- ESPON (2009) Territorial Observation No.2: Territorial Dynamics in Europe, Trends in Accessibility, www.espon.eu
- Davies, A. (2004) Moving base into high-value integrated solutions: a value stream approach, *Ind. Corp. Change* (13), 727–756.
- Fluhrer, T., Szimba, E., Siegele, J. (2011) Barriers to Intermodality and Interconnectivity of Passenger Transport, Deliverable of WP4, HERMES High Efficient and Reliable ArrangeMEnts for Cross-modal Transport, 7th Framework Program, DG Research.
- Hull, A. (2005) Integrated transport planning in the UK: From concept to reality. *Journal of Transport Geography*, (13), 318-328
- Kapros, S., Kotsaki, A., Polydoropoulou, A., Panou, C. Roumboutsos, A. and Tsirimpa, A. (2011) Case Study 5 – “extension of the Adriatic – Ionian Corridor from Peloponnese to Crete”, HERMES High Efficient and Reliable ArrangeMEnts for Cross-modal Transport, 7th Framework Program, DG Research.
- May, A.D., Kelly, C. and Shepherd, S. (2006) The principles of integration in urban transport strategies. *Transport Policy*, (13), 319–327
- Magretta, J. (2002) Why Business Models Matter, *Harvard Business Review* 80(5), 86-92.
- Mahadevan, B. (2000) Business Models for Internet-based e-Commerce: An anatomy, *California Management Review* 42(4), 55-69.
- Morris, M., Schindehutte, M., & Allen, J. (2005) The entrepreneur's business model: toward a unified perspective, *Journal of Business Research*, 58(6), 726-735.

- Normann, R.; Ramirez, R. (1994) *Designing Interactive Strategy: from Value Chain to Value Constellation*, John Wiley and Sons, Chichester.
- Osterwalder, A. (2004). *The Business Model Ontology A Proposition In A Design Science Approach* – These pour l'obtention du grade de Docteur en Informatique de Gestion. Ecole des Hautes Etudes Commerciales de l'Université de Lausanne.
- Osterwalder, A.; Pigneur, Y.; Lucci, C. (2005) *Clarifying Business Models: Origins, Present, and Future of the Concept*. Communications of the Association for Information Systems.
- Osterwalder, Alexander (2010) *Business Model Generation*. John Wiley & Sons, New Jersey.
- Potter, S. (2010) *Transport Integration – an impossible dream? Universities Transport Study Group Annual Conference*, University of Plymouth.
- Potter, S. and Skinner, M.J. (2000) On transport integration: a contribution to better understanding. *Futures*, 32, 275–287
- Porter, M. E. (1985). How information gives you competitive advantage. *Harvard Business Review* 63(4), 149-160.
- Roumboutsos, A. and Kapros, S. (2008) A game theory approach to urban public transport integration. *Transport Policy*, 15(4), 209-215.
- Wang, J.Y.T. and Yang, H. (2005) A game-theoretic analysis of competition in a deregulated bus market, *Transportation Research Part E*, 41(4), 329–355
- Wikström, K.; Artt, K.; Kujala, J.; Söderlund, J. (2010) Business models in project business. *International Journal of Project Management* 28 (2010) 832–841.
- World Bank (2004) *Cities on the move: a World Bank urban transport strategy review*. Washington, DC

ADOPTION OF PPP MODEL FOR DELIVERY OF URBAN SERVICES: A PERCEPTION ANALYSIS

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Policy makers worldwide have been advocating the public private partnership (PPP) model for improving delivery of urban services. In India, public private partnership (PPP) model has been receiving growing attention to address urban infrastructure bottlenecks faced by the country. Urban local bodies (ULBs) are constitutionally responsible for provision of urban services. The Union and state governments have introduced many initiatives to encourage PPP for efficient delivery of urban services (Urban PPP). However, the full potential of the PPP model remains untapped. Compared to other sectors such as roads, ports and airports, urban PPP projects have been relatively few in India. The adoption of PPP model for urban infrastructure has varied considerably between various states and ULBs in India. In this context, a questionnaire survey was carried out to evaluate the perception of ULB representatives and urban PPP experts, which represents demand and supply side of competency development system respectively, on the aspect of important factors influencing ability of ULBs to adopt PPPs. Based on the analysis of the questionnaire, the five most significant factors identified include administrative commitment at the state and municipal level to urban PPP projects, political commitment at municipal level to urban PPP projects, economic environment prevailing in the city, and competencies in private sector to implement PPP projects.

Keywords: Public private partnerships, Perception analysis, Urban infrastructure, Urban local bodies.

INTRODUCTION

Widespread urbanization is rampant across the globe, and particularly prominent in Asia. In India, there is now an unprecedented wave of urbanization across many states. According to the 74th Constitutional Amendment Act (CAA), 1992 the urban local bodies (ULBs) are responsible for provision of urban services like water supply, sanitation, solid waste management, roads, parks, and street lighting (Niua 2004). This act is a significant step in reforming the urban governance in India, by granting constitutional recognition to a third tier of urban local government. It recognizes the central role of ULBs as a provider of urban services to the citizens, and mechanism for democratic governance.

The demand for these services has been increasing due to rapid urbanization and ULBs are struggling to fulfil this demand. In response to this situation, policy makers have recommended a series of reforms to address the urban infrastructure deficit issue. Delivery of urban services through public private partnership (PPP) is one of the recommendations. The advantage of the PPP model rests in its potential to attract finance and efficiencies from the private sector. The Union and state governments have introduced many initiatives to encourage PPP for efficient delivery of urban services (Urban PPP). However, the full potential of the PPP model remains untapped.

The database on PPP projects in India shows that the urban PPP projects form a small proportion of PPP projects undertaken in India. Also, there are a few states that have pioneered the adoption of PPP model for urban services and even in a particular state, a few urban local bodies have taken lead in using this model (Ministry of Finance 2009). In India, there have been a few novel attempts by ULBs in the area of delivering urban services with PPP model. However, these novel

concepts either lacked wide scale replication or their application in different local settings were far from satisfactory (Baud and Dhanalakshmi 2007).

The response to the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), an ambitious program in the urban sector launched by the Central Government of India in 2005 (Ministry of Urban Development 2005), which encourages private sector participation for urban services, has been diverse across different states and different urban local bodies in a particular state (Mehta and Mehta 2010). These trends indicate that there are a host of factors which influence the ULBs decision to adopt a PPP model for delivery of urban services. It is important to pay attention to these factors since they influence the effective implementation of urban PPP projects and outcome of policy initiatives in different states and ULBs. Also, from the viewpoint of capacity building in ULBs for urban PPPs, these factors are related to the three dimensions of capacity building: human resource development, organizational development and changes to the institutional and legal framework. Therefore, appropriate policy interventions can be designed for addressing the bottlenecks faced at the level of these three dimensions and ensure mainstreaming of urban PPPs.

The whole process of capacity building happens through a capacity building system. It consists of two components: a demand side and a supply side (Peltenburg *et al.* 1996). The demand side consists of ULBs whose competencies need to be developed. The supply side includes the developmental organizations, private advisory firms, and research institutions involved in formulation and implementation of policies pertaining to competency development, for implementing urban PPP projects. Various research studies have highlighted the need for creating an interface between the demand and supply side for effective capacity building and have also underscored the importance of the shift from the supply side to demand-led initiatives for capacity building (Peltenburg *et al.* 1996).

The views of these two sides on key factors influencing ability of ULBs to adopt PPP model could shed light on the priority areas to be considered during the formulation of capacity building interventions. In this context, a research study was carried out with an objective to evaluate the perception of demand and supply side of competency development on the aspect of important factors influencing ability of ULBs to adopt PPPs. This paper describes the outcome of this research study.

RESEARCH METHODOLOGY

The methodology adopted for this research study includes 1) literature review in the area of capacity building for urban PPP projects, 2) unstructured interviews and discussions with urban PPP experts and officials of ULBs, and 3) all India survey among urban PPP experts and ULBs. There are array of economic, political, organizational, and institutional factors that may influence the ability of ULB to enter into PPPs for delivery of urban services. In this context, a two-step process was followed for identification of these factors. In the first step, a literature review covering academic journals, country specific documents and best practices guidelines by developmental organizations was conducted. In the second step the qualitative in-depth semi-structured interviews with urban PPP experts and ULB representatives were carried out.

The interviews were recorded and then transcribed. The transcripts of these interviews were analyzed using Atlas ti software. The interview transcripts were analyzed at two levels, the textual level and the conceptual level (Strauss and Corbin 1998). At the textual level, the open coding of transcripts was carried out to identify the concepts discovered in the transcripts. The process of defining the characteristics of the concepts evolved during the coding process by constantly making comparisons with the empirical evidences reported in literature pertaining to a particular concept. In that sense, the two steps involved in the research methodology were not necessarily sequential.

At the conceptual level, the axial coding was carried out to relate various categories to subcategories. The linking between various categories and in some instances formation of new subcategories resulted into more precise and complete explanations of the concept. Repetitive analysis of transcripts at the textual and conceptual level were carried out in line with the process

of ‘moving between induction and deduction’ (Strauss and Corbin 1998). The outcome of the process of coding, recoding, formation of categories & subcategories and analysis of literature resulted in the formation of list of factors influencing ability of ULB to adopt PPPs. These factors are as follows:

1. Political commitment at central level to PPP in delivery of urban services,
2. Political commitment at state level to PPP in delivery of urban services,
3. Political commitment at municipal level to PPP in delivery of urban services,
4. Commitment of administrative wing of state government to PPP in delivery of urban services,
5. Commitment of administrative wing of urban local body to PPP in delivery of urban services,
6. Economic environment prevailing in the city,
7. Policy framework advocating the adoption of PPPs in delivery of urban services,
8. Legislative framework allowing ULBs to enter into PPPs for delivery of urban services,
9. Regulatory framework for delivery of urban services under PPPs,
10. Power and responsibilities entrusted with ULBs,
11. Competencies in ULBs for implementing PPP projects,
12. Competencies in private sector to implement PPP projects,
13. Willingness of private sector to work with ULBs for delivery of urban services under PPP arrangement,
14. Municipal procedures for implementation of PPP projects,
15. Organizational structure of ULBs, and
16. Financial base of ULBs.

The questionnaire survey approach was adopted in this research study. The respondents to the questionnaire were urban PPP experts and ULB representatives. These two categories of respondents represent the supply and demand side of competency development system respectively. The questionnaire survey has been designed carefully with focus on aspects like scope, content and purpose of the questions, choosing the format for obtaining response from the respondent and wording of the questions to completely tap the issue of interest. The preliminary questionnaire was circulated among urban PPP experts and officials of ULBs in the field, and their suggestions with respect to content, structure, format and sequencing of the questions were incorporated in the final questionnaire.

The urban PPP experts play an important role for implementing urban PPP projects in the capacities of providing advisory services to ULBs, designing PPP policy frameworks and researching in the area of competency development. These urban PPP experts are associated with developmental organizations, private advisory firms and research institutes. A literature review was performed to identify organizations where urban PPP experts have been involved.

There are two facets to urban development: urban governance and delivery of urban services. There is growing realization among policy makers that the delivery of urban services cannot be seen in isolation and reforms in the direction of urban governance and service delivery should go hand in hand (World Bank 2006). In the year 2005, the Central Government has launched a reform linked program named Jawaharlal Nehru National Urban Renewal Mission (JNNURM) (Ministry of Urban Development 2005). This program reflects shift in public policy from funding

asset creation to promoting improved management of assets by accountable service provider agencies. The JNNURM program attempts to adopt three types of triggers that has potential for inducing reforms in urban governance and service delivery, which are using fiscal flows to entice service utilities and urban local bodies to change, supporting process of decentralization for placing accountability more squarely at level where the services are being delivered, and making service providers directly accountable to citizens (Savage and Dasgupta 2006).

The JNNURM program has identified 63 cities across India for showcasing improvement in the provision of urban services. The ULBs that come under JNNURM program (JNNURM ULBs) are the focal points of efforts in the direction of competency development, urban infrastructure financing, urban PPP projects, citizen participation, and administrative reforms. Owing to these developments, responses from representatives of JNNURM ULBs were collected in this research study. The municipal commissioners of these JNNURM ULBs are at the helm of affairs relating to the delivery of urban services. Hence, municipal commissioners of JNNURM ULBs were requested to provide responses to the questionnaire. In case of unavailability of municipal commissioners owing to administrative reasons, responses were sought from ULB officials who can provide a holistic view on competency development for implementation of urban PPP projects.

The survey was administered during the period of January to December 2009. 113 questionnaires were mailed to urban PPP experts and ULB representatives, which included 63 questionnaires to JNNURM ULBs and 50 questionnaires to urban PPP experts. At the end of this exercise, 51 responses were received. Of these, 26 responses were from ULB representatives and 25 were from urban PPP experts. The response rate of 45% percent is considered very good for this kind of mail survey.

DISCUSSION ON THE FINDINGS

Survey respondents were asked to rate the influence of these sixteen factors based on their perception and experience with urban PPP projects. A five point scale from 'Very Low' to 'Very High' was used for rating the influence of these factors. The relative importance index was used for summarizing the influence of each factor. The relative importance index is calculated as follows (Kumaraswamy and Chan 1998):

$$RII = \frac{\sum w}{A \times N}$$

where w = weight as assigned by each respondent in a range from 1 to 5, where 1 implies 'not important' and 5 implies 'most important'; A = the highest weight (5); N = the total number in the sample. These factors within each respondent category are ranked on the basis of relative influence index (RII). T-Test was carried out for analyzing degree of agreement on influence rating among urban PPP experts and ULB representatives at 5% significance level. The results presented in Table 1 show ranking, based on RII, for factors influencing ability of ULBs to enter into PPPs for delivery of urban services.

The perceptions of the two groups, i.e. Urban PPP experts and ULB representatives, as well as the combined perception of all respondents are shown in the table. There is agreement between the two groups (at 5 % significance level) in influence ratings in the case of thirteen of the sixteen factors which influences ability of ULBs to enter into PPPs. The approaches with differing perception include political commitment at municipal level to PPP, powers and responsibilities entrusted with ULBs, and financial base of ULBs. Based on the combined perception of all respondents, the RII ranges from 0.78 to 0.58. The results are discussed based on the combined perception of all respondents. However, where there is a difference in influence rating based on RII values (statistically significant) these are discussed.

Political and administrative commitment paves the ground for using PPP model for provision of urban services

The institutional structure of the ULB makes clear distinction between policy making and policy execution powers. The former is vested with the elected wing of the ULB and it plays an influencing role in the entire lifecycle of urban PPP project - from decision to select PPP model for provision of urban services to actual delivery in the operation phase. The urban PPP experts have rated the political commitment at the municipal level considerably higher in influence as compared to ULB representatives (Rank 1 by PPP experts vs. Rank 8 by ULB representatives). The adoption of PPP model for provision of urban services often faces the local political dynamics and increasing scrutiny of urban citizens, therefore considerable attention needs to be paid to garnering support from the elected wing of ULB. Politicians play a key role in driving message across to urban citizens and carrying out informed debates about the rationale behind embracing the PPP model.

In India, the Alandur sewerage project in Tamil Nadu state, implemented under PPP model, is a classic example showcasing outcome of political commitment. In this project, the chairman of Alandur municipality - an urban local body - played the role of project champion by initiating dialogue in municipal council on using PPP model, facilitation of consultation with Alandur residents, mobilization of financial resources and so on (Baud and Dhanalakshmi 2007). Along these lines, literature has reported case studies of urban PPP projects, wherein political commitment played a major role in adopting the PPP model for provision of urban services and bringing projects into reality (Klijn and Koppenjan 2000, Pallesen 2004).

Even if the political wing rallies behind the concept of delivering urban services with the PPP model, the actual implementation of the policy is in the hands of administrative wing or bureaucracy. The survey respondents have rated commitment from administrative wing of ULB considerably higher in influence (Rank 1). The bureaucratic complexities increase much more in urban infrastructure development due to overlapping of roles and responsibilities of state government and urban local bodies (Savage and Dasgupta 2006). In this context, the support from the administrative wing of ULB is necessary to take the project across the labyrinth of governmental approvals, procurement rules and institutional hierarchy. A harmonious relationship between the administrative and elected wing of ULBs over the issue of use of PPP model is beneficial for meeting policy objectives. Another facet of this relationship is that in many instances the executive wing has influence on the process of policy formulation by providing facts and information on provision of urban services, influencing the thinking of elected members, playing an active role in the initiation and examination of municipal policies and active but informal participation in the deliberations to frame policies (Chopra 2005).

The survey respondents have rated the political and administrative commitment at the state level high (Rank 7 and Rank 2 respectively) among factors influencing ability of the ULBs to enter into urban PPP projects. The collective initiative by the bureaucracy and politicians is not only important at the municipal level but also at the state level for initiation and sustenance of urban PPP projects. It reflects the prevailing operation context of urban local bodies in India, where the functioning of ULBs comes under the purview of state government and even with the current wave of decentralization across India, the state government wields a considerable influence over urban service delivery (Niua 2004, Savage and Dasgupta 2006). Therefore, it is necessary that the policies formulated by the urban local bodies with regard to urban PPP projects fall in line with the vision of state level politicians. In this context, the Pune water supply project highlighted that changed equations between politicians at the state and ULB level was one of the primary reasons behind failure of the concept envisaging delivery of WSS services with PPP model (Zerah and Eaux 2000). The bureaucratic commitment at the state level will set in motion, the wheels for the process of providing governmental resources to implement urban PPP projects in a satisfactory manner.

Even though, the survey respondents are of the opinion that the political commitment both at the state and ULB level is critical, they do not consider a similar commitment at central level a necessary precondition for embracing PPP model for provision of urban services. Therefore it is

observed that the political commitment at central level is rated considerably lower by them. The political economy of infrastructure development in the era of decentralized politics has changed the balance of power between the Central Government and different state governments (Lall and Rastogi 2007). In the past, the Central Government played a key role in providing vision to the development of country's infrastructure with five year plans and various infrastructure development policies. However, presently the state governments and urban local bodies are playing a lead role in urban infrastructure planning and management (Heymann *et al.* 2007).

Table 1 Factors Influencing Ability of ULBs to Enter into PPPs

Factors	Urban PPP Experts		ULB Representatives		Combined		T test	
	RII	R	RII	R	RII	R	T value [@]	Sig.
Political commitment at central level to Urban PPP projects	0.56	15	0.61	14	0.58	16	- 0.582	0.563
Political commitment at state level to Urban PPP projects	0.77	6	0.7	5	0.73	7	1.158	0.253
Political commitment at municipal level to Urban PPP projects	0.83	1	0.69	8	0.76	3	2.089	0.042*
Commitment of administrative wing of state government to Urban PPP projects	0.78	3	0.74	2	0.76	2	0.794	0.431
Commitment of administrative wing of ULBs to Urban PPP projects	0.79	2	0.77	1	0.78	1	0.349	0.728
Economic environment prevailing in the city	0.76	7	0.73	3	0.75	4	0.578	0.566
Policy framework advocating the adoption of PPPs in delivery of urban services	0.71	11	0.65	9	0.68	10	0.899	0.373
Legislative framework allowing ULBs to enter into PPPs for delivery of urban services	0.75	10	0.64	11	0.69	9	1.688	0.098
Regulatory framework for delivery of urban services under PPPs	0.69	13	0.62	13	0.65	12	1.069	0.290
Power and responsibilities entrusted with ULBs	0.76	8	0.55	16	0.65	13	3.536	0.001*
Competencies in ULBs for implementing PPP projects	0.7	12	0.7	6	0.7	8	- 0.063	0.950
Competencies in private sector to implement PPP projects	0.75	9	0.73	4	0.74	5	0.428	0.671
Willingness of private sector to work with ULBs for delivery of urban services under PPP arrangement	0.78	4	0.69	7	0.73	6	1.666	0.102
Municipal procedures for implementation of PPP projects	0.62	14	0.65	10	0.64	14	- 0.440	0.662
Organizational structure of ULBs	0.56	16	0.64	12	0.6	15	- 1.287	0.204
Financial base of ULBs	0.77	5	0.58	15	0.67	11	2.813	0.007*

@ H₀: There is no significant difference in influence rating by different category of respondents

* H₀ Rejected at 5% significance level H₁: Significant difference in influence rating among different category of respondents

RII: Relative Influence Index

R: Rank

Competencies in private sector and their willingness to join hands with ULBs influences the realization of expected benefits of partnerships

The achievement of value for money is the driving force behind using PPP model for provision of infrastructure services (Akintoye *et al.* 2003). The competency of the private sector to deliver public services meeting the specifications and level of competition among private players are prominent factors for realizing promise of value for money (Domberger and Jensen 1997). Compared to the traditional project delivery model, the private sector plays an increasingly important role across lifecycle of urban PPP projects. Therefore the private sector is required to have competencies to handle financial, technical, safety, health, environment, managerial, legal and political dimensions associated with the delivery of urban services. The survey respondents have attached high importance to the factor - *competency in private sector to implement urban PPP projects (Rank 5)*. The PPP in provision of urban services is a nascent phenomenon in India and private players are in the process of gaining experience with PPP model. The shift towards integrated business model for private sector, which transforms many aspects of their business, strategies, value stream, organizational structures, cultures and mindsets, will be gradual (Brady, Davies and Gann 2005). Brady *et al.* (2005) have mentioned that construction firms wanting to move into this arena of PPPs have to go through a learning process and create organisations which can package and deliver effective and efficient solutions to meet growing customer demand. Along similar lines, Transfield *et al.* (2005) have highlighted that cultural change is an emergent phenomenon in construction organizations in UK that are transitioning from prioritizing as asset delivery focus to a service delivery focus adopted by PPP model.

One of the strengths of PPP arrangement is that it allows governments to harness forces of the private marketplace to create incentives for efficiency and performance by private partner and produces cost savings and improved quality of services. Therefore insufficient supply of competent providers affects the tapping of the full potential of the PPP model. The higher importance rating to the factor - *willingness of private sector (Rank 6)* by survey respondents indicates the concerns among ULBs and policy makers on prevailing scenario in India, where many urban PPP projects received lukewarm response from private sector (Jayanth 2007). Some of the reasons behind this are inequitable contractual conditions, higher political risk at ULB level, challenges in interface with urban citizens, financial sustainability and mindset and cultural difference between public and private sector. The survey respondents may be of the opinion that these bottlenecks need to be eased to increase attractiveness of urban PPP projects among private players.

Legal and institutional environment has a significant influence on urban local bodies working within it

Urban PPP experts have rated the factor – power and responsibilities entrusted with ULBs considerably higher in influence (Rank 8, RII 0.76) as compared to ULB representatives (Rank 16, RII 0.55). The 74th Constitutional Amendment Act, 1992 is a significant step in reforming the urban governance in India, by granting constitutional recognition to a third tier of urban local government (Niua 2004). Even after decades of passing of this act, the progress towards implementation of various provisions of this act has been slow. The report by National Institute of Urban Affairs, India has mentioned that despite most of the states passing the laws confirming to this act, the actual empowerment of urban local bodies happens to be extremely uneven across states and cities. The main reason behind this being actual devolution of the functions to urban local bodies has been left to the state governments (Niua 2004). This poor level of decentralization across India adversely influences and constrains policy making at the ULB level and delivery of urban services with PPP model. Savage and Dasgupta (2006) have mentioned that the lack of clarity on urban governance and dominance of state government resulted in institutional roadblocks in delivery of urban services such as overlapping of policy, regulation and operation roles, fragmentation of responsibility of services delivery, and limited influence of ULBs over the parastatal agencies in their jurisdiction.

Financial health of ULBs has bearing on mainstreaming of PPP model for delivery of urban services

The financial resources at the disposal of ULBs are grossly inadequate to meet the backlog and growth needs of infrastructure in the urban areas of the country. This situation is worsened by additional requirements of the funds by the ULBs for carrying out functions envisaged in the 74th Constitutional Amendment Act, 1992 (Mohanty *et al.* 2007). The urban PPP experts have rated the factor - *financial base of ULBs* considerably higher in influence (*Rank 5*) compared to ULB representatives (*Rank 15*). The potential for cost savings and mobilization of financial resources with PPP model along with the increasing pressure from urban citizens to improve quality of urban services might drive ULBs to seek recourse of PPP model.

CONCLUSIONS

This paper focused on the aspect of factors influencing ability of ULBs to adopt PPP model in delivery of urban services. Along these lines, a questionnaire survey was carried out to analyze perception of urban PPP experts and ULB representatives on this aspect. The five most significant factors influencing ability of ULBs to adopt PPP in provision of urban services are administrative commitment at the state and municipal level to urban PPP projects, political commitment at municipal level to urban PPP projects, economic environment prevailing in the city, and competencies in private sector to implement PPP projects.

The adoption of PPP model for provision of urban services often faces the local political dynamics and increasing scrutiny of urban citizens, therefore considerable attention needs to be paid to garnering support from the elected wing of ULB and state government. Also, the elected representatives wield considerable influence during lifecycle of urban PPP projects. Even if the political wing rallies behind the concept of delivering urban services with the PPP model, the actual implementation of the policy is in the hands of administrative wing or bureaucracy. A harmonious relationship between the administrative and elected wing of ULBs over the issue of use of PPP model has to be created for achieving policy objectives. The PPP in provision of urban services is a nascent phenomenon in India and private players are in the process of gaining experience with PPP model. There is a need for proactive steps by policy makers and industrial bodies for assisting private players in the construction industry and related sectors to make transition from asset delivery focus to a service delivery focus adopted by PPP model.

The findings of this research study provide key inputs to the policy initiatives for encouraging urban PPPs and contribute to the body of knowledge on enabling environment for urban PPP projects. Researchers can build on insights gained in this research study by analyzing policy environment prevailing at the state level with case studies of urban PPP projects.

REFERENCES

- Akintoye, A, Hardcastle, C, Beck, M, Chinyio, E and Asenova, D (2003) Achieving best value in private finance initiative project procurement. *Construction Management & Economics*, 21(5), 461-70.
- Baud, I and Dhanalakshmi, R (2007) Governance in urban environmental management: Comparing accountability and performance in multi-stakeholder arrangements in south india. *Cities*, 24(2), 133-47.
- Brady, T, Davies, A and Gann, D (2005) Can integrated solutions business models work in construction? *Building Research & Information*, 33(6), 571-9.
- Chopra, S (2005) *Dynamics of municipal administration*. Delhi: Abhijeet Publications.
- Domberger, S and Jensen, P (1997) Contracting out by the public sector: Theory, evidence, prospects. *Oxford Review of Economic Policy*, 13(4), 67-78.

- Heymann, E, Just, T, Löwik, L and Våth, M (2007) *450 bn reasons to invest in india's infrastructure*, Frankfurt: Deutsche Bank.
- Jayanth, V (cited 2010) *Marketing infrastructure projects*. [Available online from <http://www.thehindu.com/2007/09/10/stories/2007091080031500.htm>.]
- Klijn, E H and Koppenjan, J F M (2000) Politicians and interactive decision making: Institutional spoilsports or policymakers. *Public Administration*, 78(2), 364-87.
- Kumaraswamy, M M and Chan, D W M (1998) Contributors to construction delays. *Construction Management & Economics*, 16(1), 17-29.
- Lall, R and Rastogi, A (2007) *The political economy of infrastructure development in post independence india*, Chennai: Infrastructure Development Finance Company Limited.
- Mehta, M and Mehta, D (2010) A glass half full? Urban development (1990s to 2010). *Economic and Political Weekly*, 25(28), 20-3.
- Ministry of Finance (2009) *Note on public private partnership: As on november 15, 2009*, New Delhi: PPP Database, Department of Economic Affairs.
- Ministry of Urban Development (2005) *Overview of jawaharlal nehru national urban renewal mission*, New Delhi: Government of India.
- Mohanty, P K, Misra, B M, Goyal, R and Jeromi, P D (2007) *Municipal finance in india: An assessment*, Mumbai: Reserve Bank of India.
- NIUA (2004) *Urban governance decentralisation in india: A review*, New Delhi: National Institute of Urban Affairs.
- Pallesen, T (2004) A political perspective on contracting out: The politics of good times. Experiences from danish local governments. *Governance*, 17(4), 573-87.
- Peltenburg, M, Forbes, D, Teerlink, H and Wakely, P (1996) *Building capacity for better cities: Concepts and strategies*, Rotterdam: Institute of Housing and Urban Development.
- Savage, D and Dasgupta, S (2006) *India infrastructure report 2006: Urban infrastructure; chapter 3: Governance framework for delivery of urban services*, New Delhi: Oxford University Press.
- Strauss, A and Corbin, J (1998) *Basics of qualitative research: Techniques and procedures for developing grounded theory*. New Delhi: Sage Publications.
- Tranfield, D, Rowe, A, Smart, P K, Levene, R, Deasley, P and Corley, J (2005) Coordinating for service delivery in public private partnership and private finance initiative construction projects: Early findings from an exploratory study. *Institution of Mechanical Engineers: Part B - Journal of Engineering Manufacture*, 219(1), 165-75.
- World Bank (2006) *India - inclusive growth and service delivery: Building on india's success*, Washington, D.C.: World Bank.
- Zerah, M H and Eaux, L d (2000) *The cancellation of the pune water supply and sanitation project - a case study*, New Delhi: Water and Sanitation Programme, World Bank.

ADAPTING GOVERNANCE OF PUBLIC-PRIVATE PARTNERSHIPS TO THE POST-NEW PUBLIC MANAGEMENT FRAMEWORK: CHALLENGES TO BRITISH, CZECH AND SPANISH APPROACHES

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The traditional models of Public-Private Partnerships (PPPs) are in flux. The debate is about a fundamental change of attitude and perhaps of the conception itself. One of the basic questions is how PPPs can be brought in line with an elaborate public governance regime. This research aims to examine and compare public sector structures involved in governance of PPPs in the Czech Republic, Spain and the UK and at the same time to assess the compatibility of the three national models' settings with the post-New Public Management framework shaped by the new paradigms. The spread and use of knowledge and skills capacities and the overall ability of the national institutional models to protect the public interest in an effective and efficient way is assessed together with openness and transparency of PPP. The scale and quality of use of the Web 2.0 tools able to reach and engage citizens in the policy implementation process and procurement of individual schemes play an important role here. Special attention is paid to ways in which the private sector entities on the one side and citizens on the other can approach the public authorities and influence the features of a particular partnership and its results. A series of personal semi-structured and open-ended interviews with the representatives of different levels of the governance structures were carried out to map the systems, their nature and quality and extent of their internal and external interactions. In the next step, designs of the three national networks are compared to demonstrate striking differences in public sector structures' integrity and capabilities that, it is argued, have a direct impact on their overall performance. On the whole, several obstacles to full compatibility with an elaborate public governance structures were identified in the three national approaches. Further research is needed to explore examples of the best practices within the models and ways of combining them to achieve better steered and more democratically accountable PPP programmes.

Keywords: expert systems, Government, Information management, Organizational analysis, Network analysis.

INTRODUCTION

Let us assume that the big thing called a general paradigm shift has occurred in the sphere of Public Policy and Public Administration and Management over the recent years reflecting profound changes not just in the public policy implementation and public service delivery processes but in the society as such. If this assumption is right, it is the New Public Governance (NPG), Digital Era Governance (DEG) or Neo-Weberian State or some combination of all these that has taken over as a new dominant paradigm. It is not unreasonable to ask, then, what happened to various attributes that used to be associated with the New Public Management (NPM) or, indeed, were at the very heart of the previous regime's reform agenda. Can they survive? How are they going to fit into the new framework?

Maturing model of Public-Private Partnerships constitutes an important part of the NPM's legacy. Several problems unfolded with the NPM approach. Some of them manifested themselves in the construction and application of the PPP model. First and foremost the sphere of interactions in a standard PPP as a part of an open system is huge with lots of different actors having or willing to have influence on the deal. The NPM never achieved consistency and coherence of an elaborate

holistic paradigm. (Ochrana 2010, Osborne 2010) Being preoccupied with an individual organisation within the system and its performance, it failed to provide researchers with a sufficient conceptual framework to deal with big and complex issues arising from complicated world of networks. Holistic approach of the new paradigms and conceptions such as the New Public Governance (NPG) (Osborne 2010), Digital Era Governance (DEG) (Dunleavy 2006) or Public-Private-Citizen Collaboration (PC2) (Hayllar, Hui 2010) is needed to reflect the complicated reality of partnerships.

Nevertheless, it is not just the shift in researchers' focus as such that marks the beginning of the post-New Public Management era. The new regimes carry in themselves certain assertions of norms and measures to be applied in the public policy-making process. There are certain demands to be met should PPPs be considered fully compatible with the governance framework. (Greve, Hodge 2010: 156) Many of these demands are based on a critique of the previous regime's most notorious shortcomings.

It is hard to deny that PPPs in most countries have proved to be particularly tricky arrangements from both the management and general governance point of view. Often stretching the managerial capabilities of the existing structures to their limits and beyond, PPPs remain a controversial yet popular tool of governance. With thousands of long-term social and economic infrastructure projects in the pipeline and many of them in procurement all around the world there is a plenty of evidence to be explored not just about the microeconomic and legal aspects of the individual schemes but also about the ability of public managers to cope with their private counterparts' specific interests and often superior skills. At the same time, partnerships' genuineness has been cast in doubt as PPPs still tend to function as rather 'government-business' (Hayllar 2010: 99) than 'public-private' deals. Combination of complex contracts with the policy of non-disclosure of the key 'commercially sensitive' data has a potential to turn PPPs into a particularly inaccessible game run by elites' networks.

There is a sum of issues the reformers want to change about PPPs. If the demands are merged together and transformed into a combination of desirable qualities, a sort of an ideal model of PPPs emerges that can serve as a reference framework enabling both scholars and practitioners to assess the actual policy settings or the impact of a particular reform.

In parallel to theoretical considerations, some governments in Europe have declared their intention to reform the current model and to launch a new generation of schemes. As some reports by the international and national institutions have revealed a significant number of PPPs' failures have been due to virtual absence of basic mechanisms of good governance on the public sector side. Should the appropriate mechanisms be implemented, the structural shortcomings need to be identified and addressed.

To what extent do these problems manifest themselves in various countries and how exactly are they tackled? The aim of this paper is to compare structures and processes active in British, Czech and Spanish PPPs. This comparison of the three countries is asymmetric indeed both in a sense of maturity and the size of PPP markets. Britain and Spain were chosen because they possess the richest PPP experience in Europe while maintaining specific and traditional approaches to the idea of partnerships. While the former could be described as an example of the Anglophone contract-based conception, the latter represents the Continental 'network' based approach. (Norton, Blanco 2009) The Czech Republic represents an interesting example of a rather reluctant country with a slowly developing PPP market and originally fair but slowly eroding institutional framework. It is argued that the distinctive institutional settings and a general distribution of power and competences within the states together with the level of development of the information societies have a direct impact on the PPPs' performance.

To verify this hypothesis a number of authentic interviews with the representatives of various levels of the Czech, Spanish and British civil service were carried out. These serve as a primary source of information about the public sector structures and wider networks involved in the service delivery processes and about the processes as such. Simplified and transparent models of the real structures are drawn for better illustration. Impact of various modes of the management

structures is tested against the ideal model together with the role of IT, accessibility and usability of the data on PPPs.

MATERIALS AND METHODS

Various criticisms have been raised against the PPP model and its functionalities. Building on Greve and Hodge's identification of the main challenges PPPs pose to the traditional forms of public administration, all the relevant points that have been made (both explicitly and implicitly) about the issues that prevent PPPs from being fully compliant with the democratic governance structures have been selected and classified. Each of these categories of arguments stems from or relates to a certain perception of the ideal type, which in itself may imply a way for achieving a more desirable arrangement. Thus, in the next step, a possible way of remedy to each of the problematic categories is inferred and formulated, which results in a creation of the ideal PPP model. The intention of this construction is to serve as a comprehensive reference model for comparative studies. The parameters observed by the model are as follows:

1. Improvements in the public sector organizations' capabilities to protect the public interest (to govern)
 - a) measures fostering and optimising cooperation among the various levels of governance and maximising potential and effectiveness of the institutional framework – optimising support for and position of the front-line project teams while developing and maintaining the whole picture view and shared pool of knowledge and experience
 - b) measures making use of knowledge and skills management strategies in individual public sector organisations (recruitment and management of human resources, advanced project management methods, enhanced software and technological solutions)
2. Implementation of the concept of Public-Private-Citizen Collaboration (PC2) as proposed by Hayllar and Hui (2010) and elements of Citizen Relationship Management
 - a) by this it is meant democratization of PPPs through building communication channels with the general public and communities accompanied by disclosure of all/crucial parts of relevant information
 - b) availability, accessibility and usability of data from the government/NGOs' electronic platforms

To measure the actual extent and degree of PPPs' adaptation, Hall's theory of paradigm shifts is employed. (Hall 2003) Partial and isolated changes of mostly technical character at lower levels of the institutional framework shall be referred to as first-order changes. Changes in the guidelines imposed by the upper level will be understood as second-order changes. Only a profound change in actors' attitudes accompanied by a deep structural transformation with a direct impact on participants' behaviour - effectively meaning a paradigm shift - can be considered a third-order change.

Thanks to the kind support of the Charles University Foundation (GAUK) it was possible to conduct a series of personal (semi-structured, open-ended) interviews with the key senior civil servants in charge of the PPP agenda both on the national and regional level in the Czech Republic, the UK and Spain. All the interviews were based on a questionnaire consisting of 3 streams of questions asking about: A) changing position of the institution in the governance structure, its area of competence and cooperation with other public and private entities B) in-house capacity of the authority to manage the agenda with which it is charged, extent of the knowledge and skills gap to be filled using external help, methods and technology exploited C)

communication of the institution with the public - extent and quality of data and communication channels provided.

CAPACITY AND STEERING CHALLENGES

Both the UK and Spain belong among the countries with the longest and richest PPP experience. Quite understandably each country has developed its own specific approach to PPPs based on different cultural, legal and administrative traditions. The same applies to the Czech Republic, although its model can be described as a combination of ideas from the Spanish, Portuguese and British programmes so far.

We should bear in mind that the Czech and Spanish legal systems are based on the civil law approach (as opposed to the common law in the UK). On the basis of that respective public works contract laws, including special arrangements for PPPs, were passed. This Spanish Law establishes public contracting rules for all government levels in Spain (Central, Regional and Local). It makes PPPs developed across all Spain fairly similar to each other, which quite paradoxically brings the model closer to the unified British approach. The existence of the codified and binding law has, on the other hand, important consequences for Spanish PPP contracts, which as a result of that can be much briefer than the Czech and British ones by simply referring to individual paragraphs of the law. (Interview A 2011) The Czech Law adapts rather British-like approach to the procurement process with the ideas of competitive dialogue and similar contract writing rules embedded.

Nevertheless, problems associated with implementation, democratization and steering of a PPP programme tend to be very similar in all three countries. It enables us to compare the approaches in terms of the structures involved in PPPs and their conformity with the ideal model.

The most striking difference between the three countries is of course the distinctive architecture of their institutional frameworks which is due to the advanced level of devolution in Spanish autonomous communities. As a matter of fact, these communities exert a major influence over the infrastructure developments throughout the country and have effectively taken over the PPP agenda over the recent years, that is to say the most of Spanish PPPs are now governed by the autonomous communities' administrations with no central oversight, coordination or support. (Allard 2006) This is in sharp contrast with the centrist approach of the UK and to some extent of the Czech Republic where the powerful Treasury (Infrastructure UK) resp. the Ministry of Finance have the final say in all aspects of the policy including the procurement of individual projects.

Interestingly though, a large part of the projects in the UK and the Czech Republic are of a regional character with relatively small local authorities and agencies employing even tinier number of civil servants who fulfil minimum requirements to sit in the project teams i.e. to be in charge of the procurement process and negotiations with the private sector. (National Audit Office (NAO) 2009: 32, NAO 2010) The fact partly reflects the administrative division of the countries where big administrative units - like those typical of Spain - are absent. The second group of commissioning bodies in the UK consists of various government agencies including healthcare trusts, constabularies and fire and rescue authorities that usually have a lot of other things to look after than managing PPPs. Such a setup has far-reaching consequences for the British PPP model. As a result, individual project teams have often been faced with tasks for which they were ill-prepared, lacking in commercial and technical skills as confirmed by the latest reports by the NAO (NAO 2010) and Public Accounts Committee (PAC 2011). Similar incapacity can be observed in the case of Czech project teams, though on much larger scale. The reason for that is that the institutional framework originally designed to support the project teams within both central government departments and the local authorities has dissolved in the recent years and there is almost no one to give any advice, let alone assist with the procurement and monitoring of a PPP apart of the private companies. The erosion has reached such a point that there are a very few people with sufficient knowledge and skills to manage a PPP project on the public sector side. It is, therefore, quite risky for any level of the government to launch any new project.

Compared to Spain, the British and Czech models have (at least in theory) the central institutions that should be able to provide all the public sector bodies involved in PPPs with basic guidance, advice and standardized contracts. In the Czech Republic there used to be a high-profile centre of excellence called the PPP Centre which, after its launch, became the envy of many similar organisations in the world. It was staffed with the foremost experts with the experience from abroad and had far-reaching competences both in training, advising and assisting the project teams not just for the management of PPPs. Its gradual erosion had one basic factor behind it. As high representative of the Czech Ministry of Finance and former employee of the PPP Centre admit (Interview I and II 2011) it was the influence of certain private actors who through connections to the political circles were able to diminish the role of the PPP Centre, substantially undermine its position and bring about its end as a functioning unit available to all parts of the government. The absence of the PPP Centre has already impacted several projects on the regional level that ended up relying heavily on the private consultancies and threatens to affect larger national projects in preparation.

Nevertheless, even the British system suffers from serious shortcomings. Although the Infrastructure UK, as the main dedicated central unit, may in itself possess top-class expertise in certain fields, it is unable to make sure the knowledge and skills are properly transferred, spread and applied by the members of project teams in the individual schemes (not to speak about the virtual absence of the technical skills element). Private Finance Units (PFUs) of the major government departments have done excellent job in a number of cases and provided many project teams with crucial assistance in difficult situations – especially in case of DEFRA's PFU. Nevertheless, on the whole, neither the PFUs were able to close the gap between the private and public sector skills and negotiation readiness. The distance between the centre of excellence and the individual project teams make the whole institutional framework vulnerable and to large extent dependant on the external help.

Indeed, private advisors and consultants have exerted major influence over the whole PPP programme in the UK being present at its very formulation and subsequently being involved in all important aspects of policy implementation and realisation, either from the outside or directly from within the government departments where a considerable number of private secondees assumed key posts. (Shaoul, Stafford, Stapleton 2006; PAC 2011) Despite of their vast influence on the decision making process, the consultancies take almost no responsibility for the final outcome, or ongoing service. (NAO 2009: 4) Something like that never happened in the Czech Republic or Spain where such an official diffusion of the public and private entities is not accepted as a standard governance practice. In the Czech Republic the influence of the consultancy companies can be seen as rather indirect.

In contrast to the British and Czech systems, the Spanish institutional framework represents a compact unit that is always within a single administrative body which offer opportunities for creating a horizontal network of departments and units that work together in the long run. The project team may consist of stable full-time PPP staff receiving and providing services from and to other units, or, in a more common occurrence, they may be ad hoc groups of engineers, lawyers and accountants sharing expertise on day-to-day basis in various PPP and non-PPP projects coordinated by a division of capital investments and concessions. Thus, staff continuity is, to a large extent, secured. Such a structure is an example of a single, unitary and flexible knowledge and skills hub showing relatively stronger resilience to the wider environment. There is hardly any such overlap or diffusion between the private and public sectors in the public management of PPPs as observed in the UK.

Moreover, compared to the UK and the Czech Republic this concept has a strong component of technical expertise embedded in its very foundations. (Interview A, B and C 2011) This, in part, enables the Spanish project teams to undertake a substantial amount of preparations and planning on their own prior to approaching the market, thus minimizing the procurement costs as compared to the UK. (Yescombe 2007: 47) This is a fundamental element behind the open procedure used in Spanish PPPs.

In the course of the research several strategies and measures devised by the British project teams to tackle the inherent weaknesses of the institutional framework mentioned above have been identified. Some authorities prefer to keep substantial technical in-house expertise – rather disproportional to their size - to deal with the PPP agenda. The problem has been that many of these units cannot be 100 per cent utilized at all times. In some of these cases a certain kind of partnership has been formed with private companies in the civil engineering sector in order to share and use their combined capacities more efficiently. (Interview 4 2011) Some project teams made use of ICT in the form of modern infrastructure monitoring technologies and software like Scheme Engineer. (Interview 5 2012) This kind of programme enables a member of the project team to project and control all important phases and aspects of a scheme from price indexing and budgeting to setting up and supervising a schedule of the individual works. A significant share of authorities decided that a complete externalisation of the management process was the best option. The effect of this decision is yet to be explored.

GENUINENESS CHALLENGE

Although being prominent in the name of the term, the word ‘public’ so far has not really reflected what the PPP deals have been about. The PC2 framework as envisaged by Hayllar and Hui (2010) remains an unfulfilled ambition. Despite promises made in strategic documents, as for example ‘Plan Avanza’ and ‘Plan Estratégico de Infraestructuras y Transporte’ in Spain (Plan Avanza 2005, PEIT 2005: 38) or ‘Transforming Government Procurement’ in the UK (TGP 2007) a little had been done to involve the public in the decision making on PPPs. Yet there are huge differences in the level of transparency between the two countries that have become even more striking in the recent years.

There have been two main hurdles for the citizens to become equal partners to the government and the private sector - complexity of the deals and commercial confidentiality (Hood, Fraser 2006) both of which have prevented a lot of crucial information from being published.

Nonetheless, in the British case a number of communication channels and platforms for sharing information on PPPs with the public had been established by the Labour government and expanded by the current Coalition in its pursue of open government and big society ideas (Cabinet Office 2011, Cameron 2010). Most importantly, the whole array of e-Government tools has been employed to help with the task.

Not only are the complete lists of PPPs for the whole country, including the estimated capital value and unitary charge payment figures and equity holders’ shares, available in the form of Microsoft Excel sheets from the HM Treasury website, there is also a new demand for the public authorities to publish all tender documentation, contracts and expenses over £500. For the former two an online platform called Contracts Finder was launched in 2010. The expanses are collected on monthly basis and provided via data.gov.uk website.

However, due to the myriad of figures and due to the lack of background information or any kind of clarification or reasoning to the individual items in the list, it is almost impossible for the ordinary citizens to comprehend the labyrinth of data - as even the individual civil servants admit. (Interview 1, 2 and 3 2011). Such a shortcoming may actually hamper the whole government’s effort to open up its books. Luckily, a hope has emerged recently in the form of various voluntary civic initiatives that intend to bridge the gap – to make sense of the existing government’s data, gain new ones and visualise them in an easy-to-digest form. Projects like Wheredoesmymoneygo.com, WhatDoTheyknow.com, or PFIexposed.co.uk seemed to be promising in terms of their mediating role between the government and the general public. However, their full potential in, for example, streaming of the citizen’s action vis-a-vis PPPs is yet to be exploited.

This information system is supplemented by the active role of the National Audit Office in scrutinizing and evaluating the performance of individual PPPs and the programme as a whole.

Again, in a sharp contrast to the British system, Spain and the Czech Republic have failed to develop even basic structure to inform, much less consult its citizens regarding PPPs. In the case of Spain, no central database of PPPs is provided partly due to the devolved nature of the country's government. (Allard 2007) However, neither the autonomous communities are particularly keen to publish any overviews not to mention detailed information on the projects. (Interview B and C 2011) There are just individual yearbooks (hardcopy only) of government's concessions in roads and railways sectors that can be purchased in a specialised government bookshop. The yearbooks give some basic information on performance of infrastructure projects in development.

Central government e-Procurement platform Contratacion del Estado – interestingly not known by some of the interviewees - provides tender documentation as required by the EU legislation and as such is not designed for an interaction with the general public. A similar system is applied in the Czech case where the Ministry of Finance website often fail to display even the documents it is obliged to publish under the EU and Czech rules.

Moreover, Spanish and Czech people should not expect that they will receive more information than is already published in the official sources. In contrast to the UK where the public authority has to give relevant reasons if it decides not to disclose certain piece of information (Interviews 1, 2 and 3 2011), Spanish citizens are asked to state the purpose for which they need the information required and can be refused the access relatively easily. (Interview C 2011) The official reason is that the commercially sensitive data of companies in the Spanish construction sector need to be properly protected – i.e. hidden from the competitors. Another significant feature of the Spanish model is the indifference shown by the audit offices around the country to PPPs. This virtual absence of an independent scrutiny raises concerns about the real performance of Spanish PPPs.

CONCLUSIONS

A number of challenges have been identified regarding compatibility of PPPs with the regimes implying in a way conditions to be met should PPPs be considered an integral part of the new societal and governmental arrangements and structures. Of those challenges the overall ability of the governments and other public authorities to steer the partnerships with the private sector in desirable directions and readiness to implement tools for engaging citizens and communities in the process stood out as the most important subjects for analysis in this study. In respect of the new paradigms' conditions two main compatibility issues have been defined - the architecture of the PPP institutional framework with the distribution of knowledge and skills capacities, and application of PC2 conception - developing appropriate environment and platforms for communication among actors in the course of PPP implementation and realization process.

On the basis of this comparative study it is argued that changes to the PPP in the Czech Republic, United Kingdom and Spain have been insufficient to meet in full the criteria set by the new paradigms. That is to say that no third-order change according to Hall's scale has occurred in the sphere of PPPs since the NPM ceased to be the dominant set of ideas. Nevertheless, interesting structures and strategies have evolved across the various levels of governance capable of fixing some of the major flaws or even preventing them if elaborated in the future. Some of them were in line with the measures envisaged by the ideal model of PPP.

Examples of best practice have been identified in especially two national models with Spain using relatively efficient procurement procedure and accumulating appropriate skills and knowledge at the level of autonomous communities where it can be used for the direct execution of tasks and optimized hands-on management of the projects including lower need for and better control over external advisers and consultancies, and with the UK's obvious progress in providing better access to PPP data by the general public. This gave an important impulse to various public initiatives with the result of more people being able to have their say in debates on PPPs' pros and cons which brings the idea of genuine public-private partnerships closer to reality. In the course of research, various strategies and measures have been identified among the individual British project teams intended to deal with the inherent limitations of the governance structures. They

range from strategic partnerships with the private sector for sharing knowledge and skills capabilities and capacity, making use of cutting-edge technology and software to complete externalisation of the PPP management tasks. In the case of the Czech Republic, it can be stated that the institutional framework and its sphere of interactions with the outer world combine the worst of the two worlds represented by Spain and the UK. Especially the lack of basic expertise on the public sector side is expected to hinder any further development of the Czech PPP market in the near future.

Transparency and in general democratization of the PPP programmes remain a problematic issue in all three countries, though much more in the case of Spain where even the elements of public control over PPPs have never been put in place. There is a need for further research into the working and transformation of the PPP model in all countries that have embraced the general concept and developed it in its many forms and varieties. At the same time, governance structures of the countries that have not launched a proper PPP programme yet (like the Czech Republic), should be assessed and put in contrast with the ideal model, example of which has been presented in this paper.

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REFERENCES

- Allard, G and Trabant, A (2007) „Public Private Partnerships in Spain: Lessons and Opportunities“. Accessible from: WWW: <http://www.sumaq.org/docs/publicaciones/2.pdf> (downloaded 20 April 2010).
- Cabinet Office. „Government ICT Strategy“, Published in March 2011. Available from WWW: <http://www.cabinetoffice.gov.uk/content/government-ict-strategy> (downloaded 2 April 2011).
- Cameron, D. „Letter to Government departments on opening up data“, 31 March 2010. Available from: WWW: <http://www.number10.gov.uk/news/statements-and-articles/2010/05/letter-to-government-departments-on-opening-up-data-51204> (downloaded 21 February 2011).
- Dunleavy, P, Margetts H, Bastow S and Tinkler J et al. (2006) Digital era governance: IT corporations, the state and e-government. Oxford: Oxford University Press.
- Hall, P (2003) „Policy Paradigms, Social Learning and the state. The case of economic policy making in Britain“, *Comparative Politics*, 275-296.
- Hayllar, M R (2010) „Public-Private Partnerships in Hong Kong: Good Governance – The Essential Missing Ingredient?“, *Australian Journal of Public Administration* 69 (S1), 99-119.
- HM Treasury, „Transforming government procurement“. January 2007. Available from WWW: http://www.hm-treasury.gov.uk/d/government_procurement_pu147.pdf (downloaded 13 February 2010).
- Hood J, Fraser, I and McGravey, N (2006) „Transparency of Risk and Reward in U.K. Public-Private Partnerships“, *Public Budgeting and Finance*, Vol 26(4), 40-58.
- Hui, G, Hayllar, M R (2010) „Creating Public Value in E-Government: A Public-Private-Citizen Collaboration Framework in Web 2.0“, *Australian Journal of Public Administration* 69 (S1), 120-131.
- Interview I with a high representative of the PPP Unit of the Czech Ministry of Finance, 20 October 2011.

- Interview II with a high representative of the former Czech PPP Centre, 21 November 2011.
- Interview 1 with the representative of Private Finance Unit, Department for Environment, Food and Rural Affairs, London, 7 November 2010.
- Interview 2 with the representative of Infrastructure UK, HM Treasury, London 8 December 2010.
- Interview 3 with the representative of Private Finance Unit, Department for Transport, 7 December 2011.
- Interview 4 with the representatives of Dorset Highways Agency, Dorchester, 4 October 2011.
- Interview 5 with the Project Director, Highways Maintenance PFI, 3 February 2012.
- Interview A with the main coordinator of PPP policy at the Ministerio Fomento, Madrid, 20 October 2011.
- Interview B with the chief engineer, Subdirecció General de Relacions amb les Empreses Gestores d'Infraestructures Viàries of the Generalitat de Catalunya, Barcelona, 27 October 2011.
- Interview C, Jefe del área de Concesiones - Dirección General de carreteras - Consejería de Transportes e Infraestructuras, Comunidad de Madrid, 7 April 2011.
- Ministerio de Fomento, „Plan Estratégico de Infraestructuras y Transporte“. Madrid, Nov 2005. Accessible from WWW: http://www.fomento.es/mfom/lang_castellano/_especiales/peit/default.htm (downloaded 13 January 2011).
- Ministerio de Fomento, „Plan Extraordinario de Infraestructuras“. Madrid, November 2005. Accessible from WWW: <http://www.fomento.es/NR/rdonlyres/f3f6d384-47f9-4581-a0a5-3329170ee2b5/71117/100407InformePublicoPrivada.pdf> (downloaded 13.1.2011).
- Ministerio de Industria, Turismo y Comercio: Secretaria de Estado de Telecomunicaciones y para la Sociedad de Informacion „Plan Avanza“. 2005. Accessible from WWW: http://www.planavanza.es/InformacionGeneral/PlanAvanza1/Documents/2a392d4f65d9404fb83fc3d2f64eceedplan_avanza_documento_completo.pdf (downloaded 3 March 2011).
- National Audit Office. „Performance of PFI Construction“, The Stationary Office, London 2009.
- National Audit Office. „Central Government's Use of Consultants and Interims“, London, 2010.
- Norton, S D and Blanco, L (2009) „Public-private partnerships: a comparative study of new public management and stakeholder participation in the UK and Spain“, *International Journal of Public Policy*, Vol. 4, 3/4, 214–231.
- Ochrana, F (ed.) (2010) *Strategické řízení ve veřejné správě a přístupy k tvorbě politiky*. Praha: Matfyzpress.
- Osborne, S P (ed.) (2010) *The New Public Governance? Emerging Perspectives on the Theory and Practice of Public Governance*. London: Routledge, London.
- Shaoul, J, Stafford, A and Stapleton, P (2006) „Partnerships and the role of the Big Four accountancy firms: private control over public policy“, study presented at the Greenwich University.
- Yescombe, E (2007) *Public-Private Partnerships: Principles of Policy and Finance*. Oxford: Elsevier.

DEVELOPING A DECISION MODEL FOR PPP IMPLEMENTATION TOWARDS A SUSTAINABLE HIGHWAY DEVELOPMENT AND OPERATION IN NIGERIA

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The traditional Design, Bid Build (DBB) method and direct public funding being used by the Nigerian Federal government to procure, operate and maintain highways appear not to have produced the desired result of timely and cost effective project outcome nor good quality and sustainable road network. The case study research investigates the challenges being experienced in this traditional procurement method, and explores the features of Public Private Partnership (PPP) as an alternative procurement method to achieve a sustainable highway network. Using the outcome of data analysis, the research developed a model to enhance decision making (during project planning and procurement stages) between the DBB and PPP methods. The model provides a holistic view, in a single pictorial display of interconnecting web relationships, the performances of both the DBB and PPP procurement methods, the possible enhancement of DBB method (where PPP option is not feasible) and the implementation procedure of PPP method. The model provides an additional flowchart that facilitates decision making on the appropriate PPP contract/financing model for a particular highway project once PPP route has been chosen. The framework will be of benefits to policy makers, regulators and operators such as PPP Unit of the Federal Ministry of Works as the operators of Nigeria's highways and the Infrastructure Concession Regulatory Commission, the regulators of PPP scheme in the areas of decision making on alternative procurement options for highway projects, as well as enhancing PPP governance.

Keywords: Decision model, Design bid build, Highway sustainability, Procurement method, Public private partnership.

INTRODUCTION

Nigeria is not alone in the infrastructure deficit and sustainability crises it faces. The conventional procurement methods and financing mechanisms are failing leaving an enormous decline in the quantity and quality of public services provision including highways. The challenges of how and the resources to build, maintain and upgrade infrastructure cut across the world (Levy, 1996). The achievement of a sustainable transport system in Nigeria is somewhat elusive despite its crucial role in national economy (Oni 1999). There is no doubt that the developing countries need infrastructure development and upgrade in sectors such as transport, energy, potable water and telecommunication to support their economic activities. However, meeting funding requirement (mostly from government annual fiscal allocation and foreign aid) is a major challenge (Akintoye 2009). The fiscal and other managerial constraints inherent in the traditional procurement method solely funded through public purse have informed the need to explore other financing mechanisms through PPP in order to alleviate these challenges. This research seeks to explore PPP potential as an alternative procurement method to the conventional procurement method for highway development and operation in Nigeria. The research also developed a decision model for the choice between the two methods during highway project planning and execution.

CURRENT PERFORMANCE OF HIGHWAY NETWORK UNDER DBB PROCUREMENT METHOD

The distribution of Nigeria road network is 17%, 16% and 67% for Federal, State and Local governments respectively. Although the Federal roads account for only 17% of the total network size, they carry the heaviest volume of traffic estimated at well over 70% (FERMA 2008). There is an urgent need to resuscitate Nigeria's road infrastructure from decay and underdevelopment. The current state of highway network is deplorable, where great stretches of the roads are overlaid with potholes, gullies, and reduced road width due to eroded road shoulders. This state of the roads is largely responsible for the frequent cases of fatal accidents, delayed travel time and environmental degradation. The condition of the roads, highway projects time and cost overruns signify the failure of the traditional procurement system to cope with current realities (CBN 2003; Abiodun 2012). According to Oni (2002) and CBN (2003), the annual loss due to bad roads is estimated at 80 billion Naira (550 million US Dollars) and an additional 53.8 billion Naira (360 million US Dollars) vehicle operating cost. These figures might be higher currently due to the progressive deterioration of road network, but as at the moment no updated figures are available in the public domain. The Nigeria Federal Roads Maintenance Agency (FERMA), which was set up to ensure good road maintenance culture, admitted that most of the Nigerian road infrastructure built during the oil boom from 1970 to 1982 have completely collapsed by 1995 due to lack of maintenance and upgrade (FERMA 2008). This contention is supported by the Nigeria Senate Ad-hoc Committee on Road Infrastructure Decay Assessment (Daily Trust, October 7, 2009) which noted that 80% of the entire roads in the country were bad. The report stated that "An estimated 27,200 km of road network (referring to federal roads) in Nigeria out of the total 34,000 km is completely out of use".

It is argued in some quarters, that government failure for over three decades to provide sustainable road infrastructure is due to underfunding, inefficient procurement and poor maintenance strategies, weak institutional management and technical capacities, corruption, as well as political interference. The result is a transport system that is incapable of supporting the socio-economic activities it was meant to support, necessitating reform in the sector (CBN 2003; Nelson 2009; Heggie 1995; Udegbumam 2002; Nwosu 2009; Levy 1996; Ajanlekoko 2002; ASIRT 2001; Odeleye 2000; Oni 2002). The demise of the nation's rail system has put additional burden on the highway networks. The overloaded trucks on the highways haul goods that were normally transported by rail, thereby contributing to its further decay (CBN 2003).

PPP PROSPECTS IN ACHIEVING SUSTAINABLE HIGHWAYS IN NIGERIA

Sustainability Context

Sustainability as used in this research is being considered not as direct project objective but as the consequence/effect of the project outcome. It is the effect of project outcome (positive or negative) on sustainability that is being evaluated. The directional flow of relationship between highway sustainability, the project performances and causes is shown in figure 1

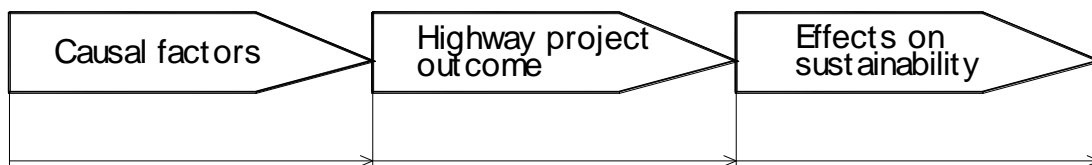


Figure 1: Cause-Effect- Consequence Relationship on Highway Sustainability

Sustainable Construction is the set of processes by which industry delivers built assets that enhance quality of life, offer customer satisfaction, provide the potential to cater for user changes in the future, provide and support desirable natural and social environment, and maximise the

efficient use of resources (Highway Agency 2003). Effective and sustainable road development must satisfy three main requirements (Robinson 2008): Economic and Financial Sustainability - these are measures taken to preserve the asset value of the road infrastructure and ensure the 'continuing capability to support an improved material standard of living'; Environmental and Ecological Sustainability - roads should generate improvement in the general quality of life by minimising the adverse environmental impact; and Social Sustainability, which ensure an acceptable level of safety, for example, reducing physical burden of transport on individuals. (See also Wang 2008). Sustainability features need to be incorporated at different stages of the life – cycle of the highway facilities due to its network of interaction with people and environment (Yang and Lim 2008; Othman and Sirbadhoo 2009). Unfortunately, and sad to note also, that infrastructure sustainability till date has proved elusive to the Nigeria public infrastructure.

PPP Prospect

The failure of the traditional Design Bid Build (DBB) procurement method (where design, construction and operation/maintenance are separate contract responsibilities and sole public funding) to provide adequate and sustainable highway network arguably informed the federal government's consideration of private financing. Finance is a major constraint to achieving sustainable highway infrastructure in Nigeria. The President of the Federal Republic of Nigeria asserts that the annual infrastructure investment of between 6 billion and 9 billion US Dollars required cannot be provided by the government alone except through partnering with the private sector (FERMA 2008). The United Nations (2002, cited by Grimsey and Lewis 2004) also supports the use of private investment in developing countries, more so referring to its critical role as 'strategic necessity rather than policy option.' PPP is playing a significant role in today's global infrastructure provision and maintenance, especially the highways. The widening gap between the current highway requirement and the ability of the government to fund it in an efficient manner through conventional ways may be bridged by the complementary role of private sector participation, as the confidence of the government in delivering efficient public service is on the decline (Geddes 2005; Richards 2005). PPP implementation appears to be dominant in infrastructure development, and it is being recognised in many developing countries as virtually the only avenue to control public borrowing to finance public infrastructure development (Bult-Spiering and Dewulf 2006; Akintoye 2009). Even though, the PPP phenomenon is new in Nigeria, it is widely believed that infrastructure development will benefit from its implementation by providing efficiency, off-balance sheet project finance, political re-engineering for social change against excessive political cost, and strategy for human capital development (Tite 2008; Olowosulu 2005). Interestingly, in all countries where PPP use is well developed and covers broad areas of public goods, the first PPP tests or attempts have always been in transport, and also in the transport category, roads are usually used as a pilot study (OECD 2008; HM Treasury 2010; Yescombe 2007). The potentials of the PPP approach to bridge the financial, managerial and technological gaps inherent in the conventional procurement methods may make it a viable option to address global infrastructure deficit, Nigeria included.

Few Highway PPP Experience

The Federal Highway Administration of the U.S. Department of Transportation International Technology Scan Study of Europe and Australia (FHWA 2009) indicates that quite a significant portion of motorways in Spain, Portugal, United Kingdom and Australia is operated under PPP scheme with impressive success. However, the portion of the motorways operated under PPP in these countries is a small percentage of total national roadways (about 20% in average), but in high mobility road corridors (FHWA 2009). Private Participation in Public service delivery in the developing countries has not witnessed a similar growth to that of the developed countries (Kerf and Izaguirre 2007; Leigland and Butterfield 2006) except in the telecommunication sector. However developing countries of Africa from 1980s are relying on toll financing and private concessions for high performance expressway. Perez, (2004) reported that the first surface transport partnership in South Africa is the 30-year N4 Maputo Corridor Project which was awarded jointly by South Africa and Mozambique on May 5, 1997 to Trans Africa Concessions (Pty) Limited at the value of US \$430 million. The N4 toll way facilitates increased freight to

Maputo port and facilitates greater private foreign investment. There is constant traffic growth of 5-7% for passenger vehicles and 10% per annum for freight (Bhandari 2011; Boylan 2012). Haule (2009) also describes N4 toll PPP as a good example of Highway PPP in Africa. There was an initial protest when Lagos State of Nigeria opened the Lekki-Epe tolled Expressway (Phase 1) in December 2011, partly due to political reasons, toll charges, traffic congestion at toll points, and the delay in provision of alternative route. However, the toll road is now operational and phase 2 is almost completed and about to open to users (Maduegbuna 2012; Thisday 2012).

The ongoing results of PPP implementation in highways are mixed of successes and failures. This kind of mixed results is an attribute of project outcome notwithstanding the delivery method, whether through PPP or the conventional public delivery depending on how the Critical Success Factors (CSFs) of projects are handled. Generally, project deliveries including highways have their challenges and shortcomings irrespective of the mode of delivery, PPP or pure public delivery. Criticisms are directed at both methods of delivery of infrastructure projects (Ragazzi and Rothengatter 2005), although the newer one is more criticised, perhaps for its relatively young experimentations.

PPP CONTRACT MODELS FOR HIGHWAYS

There are several definitions of PPP depending on the form that is adopted. However, for the purpose of this research the definition provided by Hardcastle and Boothroyd (2003) is adopted. PPP is defined as “*a contractual arrangement between a public sector agency and private sector concern, whereby resources and risks are shared for the purpose of delivering a public service, or for developing public infrastructure.*” In highway PPP, the private sector consortium designs, builds, finances, and operates the highways for government to purchase (Availability Payment) or user pay (Toll). Highway PPP is gaining wide acceptance worldwide, with a significant success in time and cost savings compared to the traditional methods (Jenkinson, 2003). Even though PPP use may extend to other social services (Akintoye 2009; Grimsey and Lewis 2004), its implementation in the transport sector precedes and dominates its application in other sectors (OECD 2008; Yescombe 2007).

The three main PPP contract models used internationally for roads and highways based on the rights, obligations and risks assumed by the public and private parties in the partnership (World Bank, 2009; Weber and Alfen 2010; Yescombe 2002) are: *Concession PPP Model, Availability Payment PPP Model and Shadow Toll PPP Model*. Concession PPP is user-financed where stream of revenue accrued from tolls paid by the users. The private party bears the demand risk, the design, finance, construction, and operation risks. In most cases the private party do not have all the luxury to fix toll charge as government still regulates the toll tariff. Also in some cases where revenue stream from toll charges fall short of covering the concessionaire capital, operating and maintenance costs, government provides subsidy so that the fees will not be too high for it to be affordable by the public. In the Availability Payment model the road capital investment, maintenance and operation costs are financed from public budget as the concessionaire receive fixed fee based on the section of road available for use. The shadow toll is similar to the Availability payment model as it is also budget financed but the main difference is that the remuneration is based on traffic shadow toll rather than a fixed fee which makes the traffic risk to be higher than in the Availability model. However this difference is insignificant in the developing countries such as Nigeria where the major problem to be solved through PPP is the transfer of investment away from the lean government purse. Hence, Availability Model and the Shadow Toll Model will mean the same thing in this research.

KEY OBJECTIVES, DATA COLLECTION AND ANALYSIS

Key Objectives

The key objectives of the research are: to investigate the factors that have fuelled the need for PPP as a procurement option for highway infrastructure projects in Nigeria, and also to review the

performance and challenges in the use of DBB; to investigate and document the existing conditions of highway infrastructure in Nigeria and their implications on socio-economic activities and public safety; to explore the potentials of PPP for highways in Nigeria; to develop decision model for PPP procurement planning and implementation towards a sustainable highway infrastructure in Nigeria.

Data Collection and Analysis Method

The study formulated two research questions - to investigate why the traditional method has not produced the desired result; and how the PPP method can play a role in achieving the desired highway performance. The research first conducted literature review to examine the challenges of DBB method in Nigeria, and subsequently explored the concepts of PPP generally and its particular application in highways. The research philosophy is majorly interpretive with minor positivists blend in a methodological pluralism for research methodology enhancement. The research used case study research design where quantitative method was first used to investigate the current highway projects performance in cost and time perspective under the DBB method by way of examining some real life highway projects at Federal Ministry of Works (FMW). The research also used qualitative method to analyse government official documents (FMW contract documents, project reports, Infrastructure Concession Regulatory Commission-ICRC policy documents) and open questionnaires (administered to FMW, ICRC, consultants and contractors) for an in-depth analysis of highway Performance Indicators and their Critical Success Factors under DBB and PPP methods.

SUMMARY OF FINDINGS

The comparative analysis of the research findings showed that the DBB method used for highway development in Nigeria generally results in cost and time overruns, low quality road network. These results are due largely to the lack of adequate public financing, poor road maintenance management system, suboptimal risk sharing and lack of innovative processes, and inefficient procurement process. The findings also showed that PPP by way of its financial models, efficient procurement, operation and maintenance processes, technical and managerial capacities, as well as the bundling of design, construction and maintenance in a single contract package may produce timely, cost effective, good quality and sustainable highway network in Nigeria. The concomitant road sustainability will result in economic benefits of reduction in road and vehicle operating and maintenance costs, improved standard of road and longevity that support other economic activities. The resultant social sustainability benefits include reduction in accident rate, reduced travel hours, improved health and safety of road users. Environmental benefits of road sustainability include protection and enhancement of natural environment by reducing gullies and pollutants being generated from dilapidated roads. The summary of findings is pattern matched in table1.

Table 1: Pattern matching of cause-performance-effect relationship of DBB and PPP methods

Project outcome	Current outcome DBB	Anticipated outcome PPP
Time	Project time overrun: At least 75% of projects overrun their time	Timely project delivery
Cost	Project cost overrun: 75% of projects overrun their costs with average of 26% cost escalation over Initial contract sum	<ul style="list-style-type: none"> - Cost Saving in highway Procurement - Cost effective project delivery
Quality/Performance	85% of highway network in deplorable condition	<ul style="list-style-type: none"> - Improved quality of road and Sustainable Road network - Closing Infrastructure gap will stimulate economic activities
Innovation	<ul style="list-style-type: none"> - Lack of innovation in road management by FMW - Lack of innovative process in project delivery 	<ul style="list-style-type: none"> - Incentives for innovation - Innovation efficiency expertise of private sector
Sustainability effect	<ul style="list-style-type: none"> - Increased travel time - Increased vehicle operating & maintenance cost - Increased road maintenance cost. - Decreased vehicle mobility hampers economic activities - Bad road leads to accident and deaths - Deplorable road leads to insecurity e.g. robbery - Collapsed road depletes the environment by erosion - Accident vehicle litters the road corridors. - Increased foreign debt 	<ul style="list-style-type: none"> - Adequate road maintenance management reduces vehicle operating cost - Reduction in loss/ decay of perishable goods - Additional growth in the non-oil sector - Reduction in the cost of goods and services - To accelerate investment in Infrastructure to satisfactory standard - to ensure value for money - Reduced accident rate - Reduced travel time - Provision of friendly environment for tourism - to protect and enhance the natural environment
Causal factors	Subsisting factors DBB	Potential factors PPP
Road Ownership & Financing model	<ul style="list-style-type: none"> - Fiscal Constraints for road development & maintenance - Road Ownership structure encourages political interference - Road is considered as social asset - Poor economic performance 	<ul style="list-style-type: none"> - Additional financing from private sector - PPP Financing model ensures adequate cash flow
Procurement procedure	<ul style="list-style-type: none"> - Lack of project planning - Non application of Project Management - Defective project team composition - Corruption - Delayed Payments not backed by interest on delayed payment - No project audit & monitoring 	<ul style="list-style-type: none"> - Efficient Procurement Process: - PPP encourages adequate project planning - Project Management - Incentives for incorporating sustainability features at development. stage - Project Monitoring & Audit
Risk allocation	<ul style="list-style-type: none"> - Publicsector bears almost all risks 	<ul style="list-style-type: none"> - Optimal risk allocation between Public and Private sector
Institutional governance & capacity	<ul style="list-style-type: none"> - Poor costing and cost forecast skills - Poor resource management skill - Weak Institutional framework resulting in inconsistent policy implementation - Accountability problem of public officials - Lack of skills & technology for innovation 	<ul style="list-style-type: none"> - PPP Governance / Institution reform. - Management skills & technology for innovation - Synergy of various professional skills - Project managers skills & experience
Maintenance management	<ul style="list-style-type: none"> - Lack of planned maintenance - Incentives for sustainability not incorporated in development process - No Whole life Cost applied - Unbundling of design, construction and maintenance phases 	<ul style="list-style-type: none"> - Efficient Road maintenance. Management. - Whole life cost Planned maintenance - Efficiency in facility management - Bundling of design, construction and maintenance phases

PPP IMPLEMENTATION PROCEDURE IN HIGHWAYS

The four basic questions that should be considered before deciding on whether a project will be delivered under PPP or not are discussed here using findings from data analysis and literature review. Grimsey and Lewis (2004) identify three of such. Firstly, *the core services question*: whether proposed service is the service that only the government can provide to its citizen? Secondly, *the value for money question*: what is the project model that delivers best value for money for the other non-core services and the supporting infrastructure? Thirdly, *the public interest question*: whether the outcomes of value for money question satisfy the public interest? The fourth question (Weber and Alfen 2010) is *the project viability question*: whether the project is affordable and capable of producing the required revenue to cover life cycle costs and also allows for a reasonable margin of profit to the investors.

The research sample projects have been subjected to these tests and the outcome in all is favourable. However, the VfM analysis which could not pass through the conventional PSC method due to the peculiarity of the developing countries where existing situation does not permit PSC comparison. Other Value for Money assessment tools to be considered are transparent and competitive procurement process and adequate cost benefits and risk analysis. This outcome agrees with some authors' position on the implementability of PSC for VfM assessment in developing countries adopting PPP for infrastructure development. In developing countries, particularly in Africa, the lack of public fund for infrastructure development and weak fiscal management of public sector constrain the application of PSC. Also the critical need for private capital to fund highways and other infrastructure without any other alternative option renders VfM consideration in determination of PPP route non critical. Hence, PSC is often not applied, whereas comparison of cost benefits analysis of PPP options and status quo alternative may be done (Leigland and Shugart 2006; Richards 2005; OECD 2008; Merna and Lamb 2009).

Decision Model for Planning and Implementation

The findings from data analysis were further processed to develop a decision making model for highway PPP in Nigeria. The model was validated through questionnaires administered to the stakeholders (respondents in the first stage of questionnaire administration) in highway development and management. The result of the validation showed that the framework is appropriate and applicable in the Nigeria environment. The model provides a holistic view, in a single pictorial display of interconnecting web relationships, the performances of both the DBB and PPP procurement methods, the possible enhancement of DBB method and the implementation procedure of PPP method for a sustainable highway infrastructure in Nigeria.

Having subjected the conceptual framework to further research processes, incorporating the research findings, a fused PPP model emerged as shown in figure 2. The model is compartmentalized into four quadrants Q1, Q2, Q3 and Q4. Quadrants Q1 and Q3 zones are the *cause-effect relationship field*, while quadrants Q2 and Q4 zones are the *decision field*. Vertically, the cause-effect relationship as to why the traditional DBB procurement method as practiced by FMW failed to deliver sustainable highway network in respect of the first research question is captured in quadrant Q1, and the possible enhancement of the traditional method is highlighted in quadrant Q2. However, the enhancement of DBB traditional method in quadrant Q2 is beyond the scope of this research (this is why it is highlighted in dotted lines –*dummy zone*), but an immediate study is recommended for any possible enhancement of the traditional Design-Bid-Build (DBB) and/or consideration of other methods such as Design and Build (DB) or Management Contracting (MC). Quadrants Q3 and Q4 relate to the second research question which deals with the potentials of PPP procurement method that may address the shortcomings observed in the traditional DBB procurement method and PPP implementation procedure to ensure sustainable highway development and maintenance.

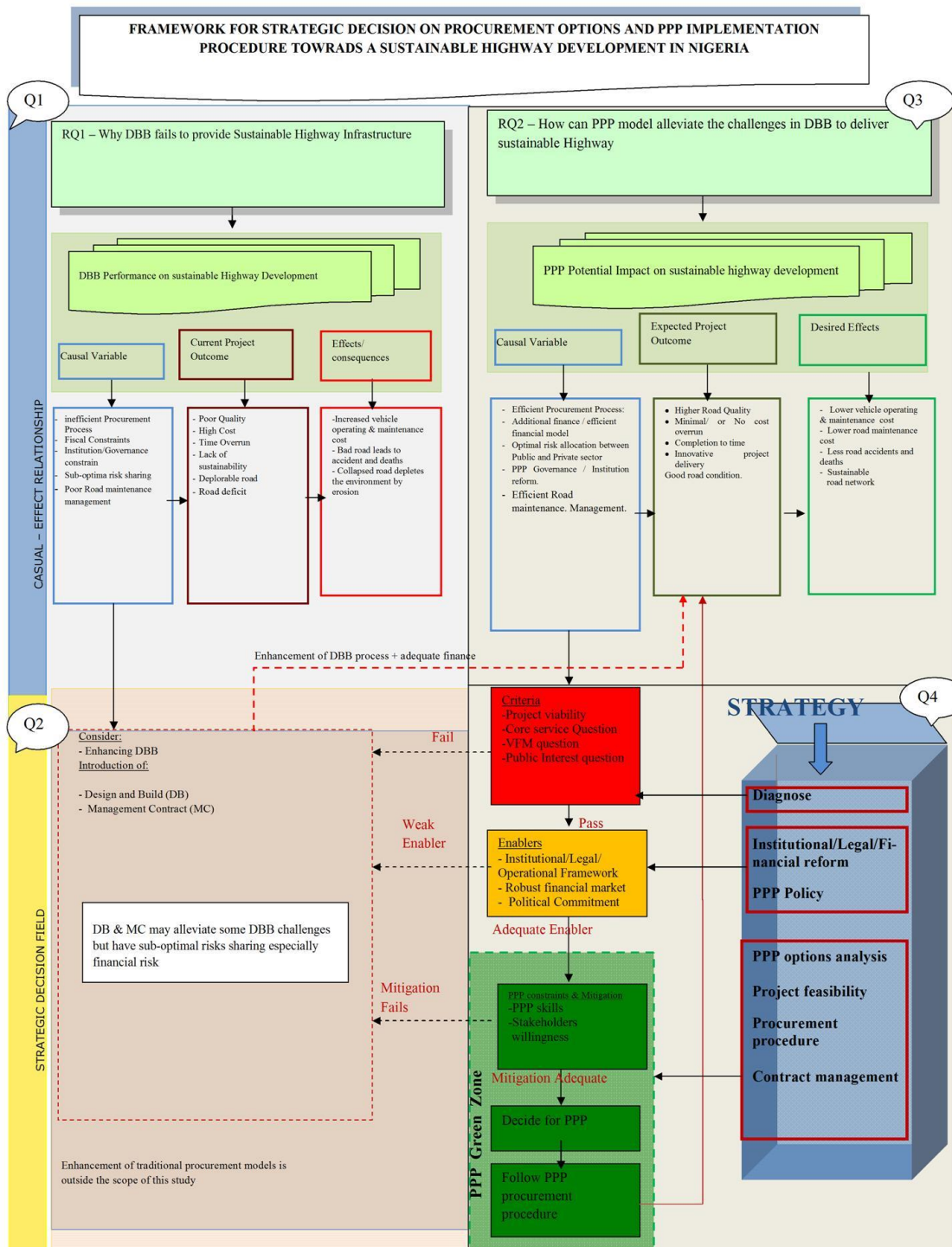


Figure 2: **Decision Model for PPP planning and Implementation for Highway in Nigeria**

Horizontally, quadrants Q1 and Q3 describe the current outcome of the traditional DBB as applied by FMW and the projected outcome of the proposed PPP model respectively. Quadrants Q2 and Q4 describe the consideration for enhancement of the traditional methods and the procedure for implementing a successful PPP model respectively. The blue colored box in Q4 (adapted from PPP Highway Toolkit, PPIAF, 2003) contains necessary strategies or ingredients that should be injected in the PPP process to enhance success. There are three major stages in the PPP implementation procedure in the flow chart in quadrant Q4. The First stage analyses the criteria for choosing PPP as a procurement option for highways. This is red coloured (red alert) because if the project fails the four core tests it will not progress to the next stage, but it returns to DBB method in Q2. If it passed the tests it will proceed to the next stage of enablers. The stage is coloured amber to depict caution but closer to go to the green stage if the enablers are in place,

otherwise it might still go to quadrant Q2. With adequate enablers in place, the project will continue to the green zone, where the project is already comfortable to be implemented through PPP. However, this stage also has three sub-stages. First, the constraints must be adequately mitigated (provide PPP skills, consultations to secure stakeholders willingness) for the project to go to the final decision for PPP contract in the second sub-stage. After the decision is made for PPP, the project now proceeds to procurement stage (third sub-stage). The PPAIF strategies and ingredients in the blue box are also compartmentalised into three sections with each section feeding into the corresponding stage of the three main stages of the model in an orderly link. While this research evaluates the procedure for PPP implementation (Q4), it does not deal with the enhancement of the traditional methods (Q2). However, available evidence from the research suggests that for the enhancement to produce the desired result as in Q3 (See dotted arrow from Q2 to Q3), additional finance is required from public purse, which is not currently available. This further strengthens the immediate need for PPP in the sector to inject additional finance and innovative processes into the system.

Decision for Appropriate PPP Financing/Contract Model

Figure 3 depicts European Organisation for Economic Cooperation and Development-OECD VfM model (Adapted from Berger and Hawkesworth, 2010) where PSC greater than PPP will favour PPP route, otherwise PPP is dispensed with. Conversely, in figure 4 (Developing Country model) whether PSC is greater or less than PPP, PPP route is still feasible if transparency, competition, cost benefits and adequate risk analysis are embedded in the process.

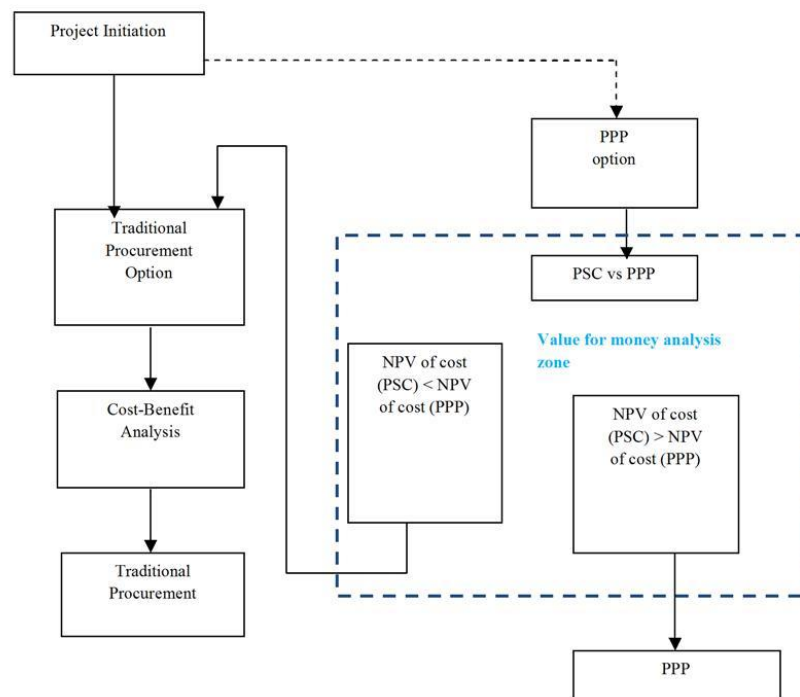


Figure 3: Typical flowchart for Procurement mode selection (Adapted from Berger and Hawkesworth, 2010)

Decision for Appropriate PPP Highway Contract Model

The findings show that the choice of either Toll model or Availability payment model is conditional. Toll payment model will be appropriate for Nigeria because Nigerians are always ready to pay for good quality services - 87% acceptance level for toll road (Abiodun, 2012). Shadow toll (or Availability payment) option may be adopted if the government considers the option to be socially and economically realistic, or where volume of traffic will not generate the level of commercial viability. However, User pay (Toll) model is relevant where it is uncertain to

provide additional fund from public purse (Heggie, 1995), and also toll-able roads are considered where the volume of traffic permits it. The project sample studied shows that there is adequate traffic forecast to generate adequate stream of revenue from toll payment. The findings also reveal that there is no adequate fund to finance road infrastructure in a sustainable manner hence Toll Model will be more appropriate at the moment in Nigeria (see figure 4). However, in some years to come, when PPP use is well developed and matures, and also government has made substantial improvement in her fiscal capacity and discipline, other models of PPP such as Availability Payment model may be used in conjunction with the Toll model.

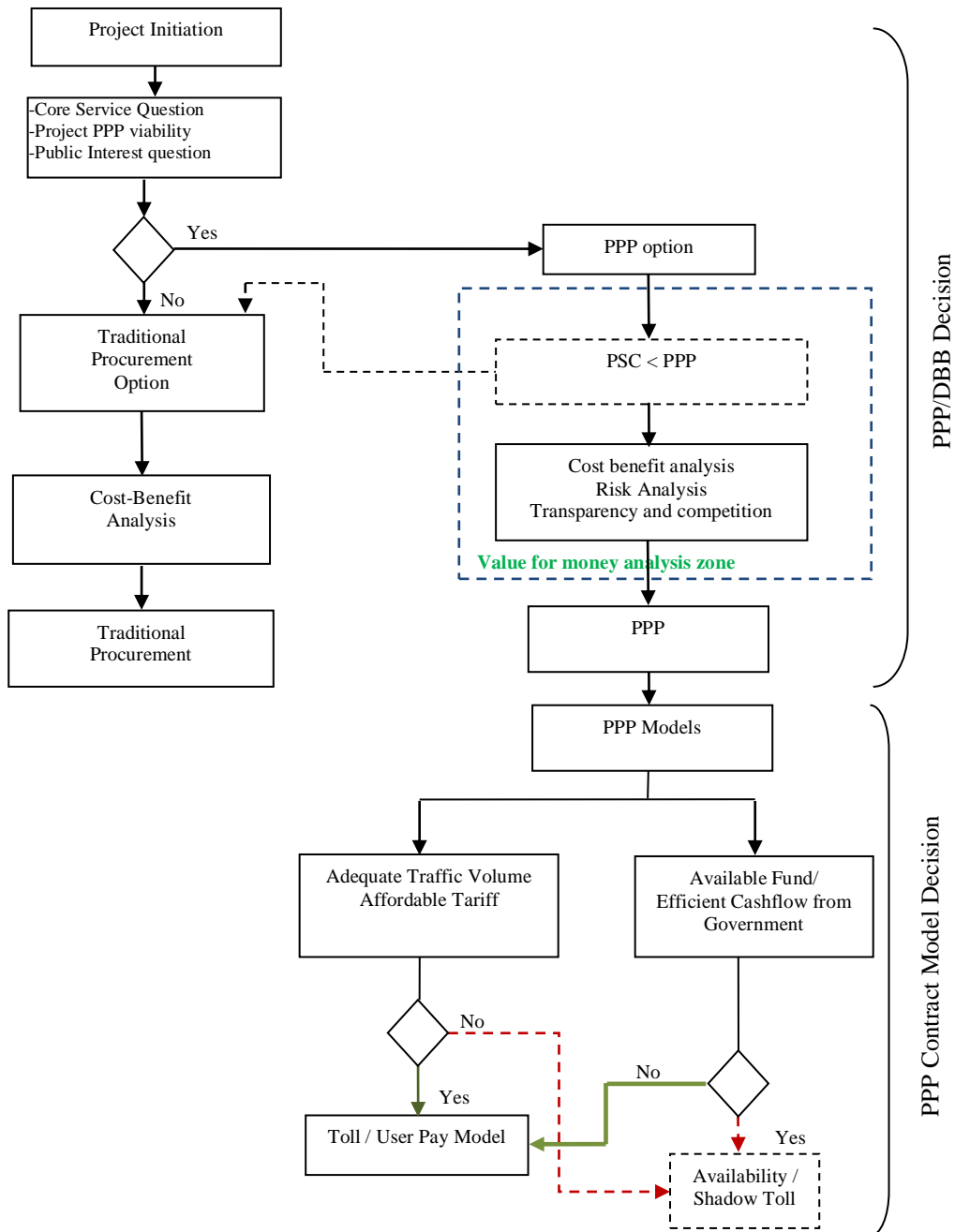


Figure 4: Modified flowchart for Procurement mode and PPP model selection for Nigeria Highways

As seen from the modified flowchart in figure 4, Build Operate and Transfer (BOT) Toll Concession form of PPP is viable as investment model for the Nigeria highway projects. In this case, private consortium will design, build, finance and operate highways and charge toll from road users, and the highway facility returns to government at the expiration of concession period. Figure 4 solves two problems, the issue of PSC and the decision on viable PPP investment model to be adopted.

CONCLUSION

The research developed and validated a PPP decision model for development, operation and maintenance of highways in Nigeria. The framework provides holistic view and appreciation of the performance indicators of DBB method on one hand (quadrant Q1), and the potential performance of PPP (quadrant Q3) on the other hand, including their causal factors. It further shows the inevitable standardisation and enhancement of DBB and other conventional procurement methods (quadrant Q2) to be able to produce the results in quadrant Q3. Quadrant Q4 displays the implementation procedure of PPP method and the associated conditions that will produce the desired results in quadrant Q3. The model incorporates features for decision making between the choice of using conventional methods and PPP models for highway projects during project planning and procurement stages. The model includes flowchart (Figure 4) for decision making between PPP option and the traditional procurement methods for each highway projects when considering VfM. The flowchart also facilitates decision making on the appropriate PPP contract model (Toll or Availability Payment) for a particular highway project. The model will assist FMW and FERMA to adopt appropriate procurement route for a particular highway project, and in the event that a road project is PPP viable, appropriate PPP contract model can be chosen based on the procedure set out in the flowchart. Indeed, the benefits are timely as the Federal government's previous PPP pioneering moves of close to five years on highways have not resulted in any operational PPP highways due to limited knowledge in the application of appropriate PPP policies and frameworks.

REFERENCES

- Abiodun I (2012) The Role of Public Private Partnership in Highway Infrastructure Development and Sustainability in Nigeria, Unpublished PhD Thesis, School of Built Environment University of Salford, UK.
- Ajanlekoko, J.O. (2002) National Development and Challenges of Leadership. Conference Proceedings of the 20th biennial conference of the Nigerian Institute of Quantity Surveyors. "Building the blocks of national development; Challenges, Conflicts and prospects." Benin City, Nigeria.
- Association for Safe International Road Travel-ASIRT (2000) 'Road Travel Report Nigeria' Potomac, Maryland, USA. <http://www.asirt.org/> accessed on 28/11/2009
- Burger, P. and Hawkesworth, I. (2010) How to Attain Value for Money: Comparing PPP and Traditional Infrastructure Public Procurement. Annual OECD-Organisation for Economic Cooperation and Development network meeting of senior PPP officials, Paris 12-13 April
- Bhandari A. S. (2011) Examples of World Bank Group Support in Promoting Public Private Partnerships in Transport Projects in Africa and Lessons Learnt. GCC Transport and Railway Conference, October 18-19, Doha, Qatar.
- Boylan, H. (2012) Public-Private Partnerships in Africa, Part 1 – Infrastructure. Consultancy Africa Intelligence. http://www.consultancyafrica.com/index.php?option=com_content&view=article&id=954:publicprivate-partnerships-in-africa-part-i-infrastructure&catid=82:african-industry-a-business&Itemid=266 (accessed on 26/06/2012)
- Bult-Spiering, M. and Dewulf, G. (2006) Strategic Issues in Public-Private Partnerships: An International Perspectives. Blackwell Publishing, Oxford, UK.
- Akintoye, A. (2009) PPPs for Physical Infrastructure in Developing Countries; In: Akintoye, A., Beck, M., (eds.) Policy Finance and management for Public Private Partnership pp 123-144; Innovations in the Built Environment; RICS Research. Blackwell Publishing, UK
- Central Bank of Nigeria-CBN (2003) Highway Maintenance in Nigeria: Lessons from other Countries; Research Department Occasional Paper N0. 27, Abuja, Nigeria.

- Daily Trust (2009) “80% of Federal Roads have Collapsed”- Senate; Daily Trust Newspaper October 7, 2009, Media Trust Nigeria Limited, Abuja Nigeria.
- Federal Highway Administration , U.S. Department of Transportation (2009) Public Private Partnerships for Highway Infrastructure; Capitalizing on International Experience; international.fhwa.dot.gov/pubs/pl09010/pl09010.pdf ; (Accessed on 16/12/2009)
- Federal Roads Maintenance Agencies- FERMA (2008) Background Information on FERMA Medium Term Strategy ferma.gov.ng/dddr/index.php?...&task=view&id=3&Itemid=6 Accessed 8/12/2009
- Geddes, M. (2005) Making Public Private Partnership Work: Building Relationships and Understanding Cultures. Gover Publishing, England
- Grimsey, D., Lewis, M., K. (2004) Public Private Partnership: The Worldwide Revolution in Infrastructure Provision and Project Finance. Edward Elgar Publishing, UK
- Hardcastle, C., and Boothroyd, K. (2003) Risks overview in public private partnership. In: Akintoye, A., Beck, M. and Hardcastle, C. (eds.) Public Private Partnership: Managing Risks and Opportunities, pp. 31-57, Blackwell, Oxford.
- Haule, J. O. (2009) ‘Project Financing Alternatives in Africa’. East African Community, Arusha International Conference centre 29-30th August
- Heggie I. G. (1995) Management and Financing of Roads: An Agenda for Reform. World Bank Technical Paper Vol. 275 African Technical Services. The World Bank, Washington DC.
- Highway Agency (2003) Building better Roads: Towards Sustainable Construction, http://www.highways.gov.uk/aboutus/documents/better_roads.pdf (accessed 30/1/2011)
- HM Treasury (2010) “PFI Signed Projects List”, February. https://financialsanctions.hm-treasury.gov.uk/d/pfi_signed_projects_list.xls accessed on 21/05/2010
- Jenkinson, T. (2003) ‘Private finance’, Oxford Review of Economic Policy, Vol. 19, No. 2, pp.323-334
- Kerf, M. and Izaguirre, A. K (2007) Revival of Private Participation in Developing Country Infrastructure: A look at recent trends and their policy implications. Public- Private Infrastructure Advising Facility – PPIAF, Gridlines. The World Bank Washington DC, <http://www.globalclearinghouse.org/InfraDev/resources.cfm?id=115> (accessed on 6/02/10)
- Leigland, J. and Butterfield, W. (2006) Reform, Private Capital needed to develop Infrastructure in Africa: Problems and Prospects for Private Participation. Public- Private Infrastructure Advising Facility – PPIAF, Gridlines. The World Bank, Washington DC, <http://www.globalclearinghouse.org/InfraDev/resources.cfm?id=115> (accessed on 6/02/10)
- Leigland, J. and Shugart, C. (2006) Is the public sector comparator right for developing countries? Appraising Public- Private projects in Infrastructure, Gridlines, PPIAF, The World Bank, Washington D.C. <http://www.globalclearinghouse.org/InfraDev/resources.cfm?id=115> (accessed on 6/02/10)
- Levy S. M. (1996) Build Operate and Transfer: Paving Way for Tomorrow Infrastructure. John Wiley & Sons Inc. Canada.
- Maduegbuna, N. E (2012) ‘On Lekki toll road concession project’. (Businessday, Thursday, January 19) <http://businessdayonline.com/NG/index.php/analysis/commentary/31981-on-lekki-toll-road-concession-project> (accessed on 29/6/2012)
- Merna, T. and Lamb, D. (2009) Application of Risk Analysis in Privately Financed Projects: The value for money assessment through the public sector comparator and private finance

- alternatives; In Akintoye, A., Beck, M., Policy Finance and management for Public Private Partnership pp 123-144; Innovations in the Built Environment; RICS Research. Blackwell Publishing, UK
- Nelson, J. D. (2009) Sustainable Transport Technologies for developing environments: Towards appropriate Investment strategies. In Grieco, M., Ndillo, M., Bryceson, D., Porter, G. and McGray, T. (eds). Africa, Transport and the Millennium development goals: Achieving an Internationally set agenda. pg 151-159. Cambridge Scholars Publishing.
- Nwosu, O. O. (2009) Engineering Opportunities During Economic Recession, 42nd Engineering. Conference proceedings of the Nigerian Society of Engineers Heartland, 7th – 11th December.
- Olowosulu, A. T. (2005) A new Approach to Road Maintenance Procurement in Nigeria, Conference Proceedings of The Nigerian Society of Engineers 5th – 9th December, Kano, Nigeria.
- Oni S. I. (1999) Issues in and Future of Urban Transportation and Traffic Management System in Nigeria. Sixth International Conference on Competition and Ownership in Land Passenger Transport, September 1999, Cape Town, South Africa.
www.thredbo.itls.usyd.edu.au/...papers/Thredbo6-theme6-Oni.pdf accessed on 12/03/10
- Oni S. I. (2002) Public-Private Partnership Relationship in Urban Transport in Nigeria. Department of Geography, University of Lagos, Nigeria
<http://www.codatu.org/english/publications/proceeding/conference/codatu11/papers/oni.pdf> Accessed on 28/11/2009
- Organisation for Economic Co-operation and Development – OECD (2008) Public-Private Partnerships: In Pursuit of Risk Sharing and Value for Money. OECD Publishing Lexington. KY, USA
- Perez, B. G. (2004) Achieving Public - Private Partnership in the Transport Sector. Diebold Institute for Public Policy Studies, Inc iUniverse, Inc. Lincoln. USA.
- Ragazzi, G. and Rothengatter, (2005) 'Introduction'. In: Ragazzi, G. and Rothengatter, W. (Eds) Procurement and Financing of Motorways in Europe. Research in Transportation Economics Vol. 15 pg 15-28, Elsevier Ltd.
- Richards, M. (2005) The Role of Private Sector Finance for Roads; Senior Executive Course University of Birmingham.
- Robinson R. (2008) Restructuring Road Institutions, Finance and Management Vol. 1: Concepts and Principles. University of Birmingham, UK.
- Thisday Live (2012) 'The Rush Hour? Hour Gridlock at Lekki Toll Plaza'. Thisday Live, April 15, <http://www.thisdaylive.com/articles/the-rush-hour-gridlock-at-lekki-toll-plaza/113749/> (accessed on 29/6/2012)
- Tite, T.O.S (2008) Public Private Partnership (PPP) Agreements and Negotiation Processes within the Context of Millennium Development Goals (MDG). Quantity Surveyors and the Millenium Development Goals: 23rd Biennial Conference of Nigerian Institute of Quantity Surveyors, Kaduna Nigeria.
- Udegbuma, R.I. (2002) The role of Public Infrastructure in National Development. Conference Proceedings of the 20th biennial conference of the Nigerian Institute of Quantity Surveyors. "Building the blocks of national development; Challenges, Conflicts and prospects:" Benin City, Nigeria.
- Wang, Y. (2008) Sustainability Consideration for Highway Facilities,
<http://ascpro.ascweb.org/chair/paper/CEGT193002008.pdf> (accessed 30/1/2011)
- Weber, B. and Alfen, H.W. (2010) Infrastructure as an asset class: Investment Strategies, Project Finance and PPP. Wiley Finance. John Wiley and sons, Ltd Publication. Chichester, UK.

- World Bank – PPIAF (2003) Toolkit for Public Private Partnership in Highways. The World Bank, Washington DC
- World Bank (2009) Attracting Investors to African Public Private Partnership; A Project Preparation Guide. PPIAF, The World Bank, Washington DC
- Yang J., Lim S. K. (2008) Reality Checks – The identification of Sustainability Perception and Deliverables for Australian Road Infrastructure Projects: Blueprints for Sustainable Infrastructure Conference, December 2008 Auckland NZ
www.nzsses.auckland.ac.nz/conference/2008/papers/Yang-Lim.pdf accessed on 12/03/10
- Yescombe, E. R. (2002), Principles of Project Finance, Academic Press, Elsevier Ltd. Oxford UK.
- Yescombe, E. R. (2007), Public-Private Partnerships, Principles of policy and finance, Elsevier Ltd. Oxford UK.

PUBLIC-PRIVATE PARTNERSHIPS IN THE ITALIAN INTEGRATED WATER SERVICE INDUSTRY: A BENCHMARKING ANALYSIS OF OPERATIONAL EFFICIENCY

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Since early 1990s, in Italy the integrated water service industry has undergone a complex and, sometimes, not consistent normative evolution in order to improve productivity and enhance service quality, establishing a new regulatory framework and stimulating competition with the entrance of private actors in the market. However, data show that there is still a scarce relative amount of private equity companies or mixed public-private partnerships, and a certain reluctance to involve private bodies in the provision of water services given the public nature of the water good. Exploring the relationship between performance and typology of contract regulating service supply is thus an interesting field of research. This study uses Data Envelopment Analysis to investigate if there is an association between the operational efficiency, the typology of service providers, and the nature of contractual agreements in the Italian water management industry, focusing attention on the optimal territorial areas (ATO), key actors in the industry restructuring process. Findings show that ATOs in which the integrated water service management contracts are consistent with the new modern legislative framework or the service is supplied by a private owned or by mixed equity companies achieve a higher operational efficiency rate.

Keywords: benchmarking, contracts, Data Envelopment Analysis, efficiency, PPP, water management.

INTRODUCTION

Since time there is a growing concern of policy-makers and scholars for measuring efficiency of service provision and identifying optimal operational and business models in the water supply, sewerage and wastewater treatment industry (Bruggink, 1982).

In Italy, the annual turnover of the water service industry in 2009 was about 6,5 billion €, for about 5,5 billion cubic meter of water distributed. According to some estimates, the water service supply industry in Italy will need about 65 billion euro of investment in the next thirty years, most of which needed to keep the operating infrastructure in efficiency (CONVIRI, 2010; ANEA – UTILITATIS, 2010).

Furthermore, the obsolescence and the scarce infrastructure network recovery works imply that the public administration has to allocate in budget a great amount of financial resources to deal with unplanned maintenance of the water service supply assets. It is clear that, in this context in which the necessary investment is greater than the available public resources, and the regulatory framework is extremely articulated and still evolving, it is important to stimulate and support the entrance into the water service supply industry of private actors, adopting new participative models more oriented to competition and market. The improvement of the efficiency and quality of service provision, investment in technological innovation, the reduction of operational costs, and the availability of resources from the financial markets may be perfectly consistent with the need to preserve the nature of water as a public good. The entrance into the market of private actors might be the most effective (and, probably, the only) way to increase management efficiency and the amount of financial resources available for investment. The survey presented in

a recent Blue Book (ANEA-UTILITATIS, 2008, 2009, and 2010) on the water service in Italy has indeed showed that the amount of investment is lower in those cases in which water service is provided through in-house management as a consequence of the difficult search for financial resources. Vice versa, the Blue Book data show that investment is greater in the case of public-private companies, which – however – adopt a higher tariff regime. Three years after the first financial planning stage, for all “in-house” service management cases it was necessary to modify the investment estimates, largely reducing the average facilities and plants depreciation rate and equity yield, by respectively 63% and 54% in 2009. In both private equity alone and mixed private-public equity companies, the need for making corrections in the financial plans was less demanding, reducing depreciation rate and equity yield by 13% and 20% only. That might be due to a more sound and effective planning activity performed by private and public-private companies. But, in Italy the integrated water service remains still scarcely appealing to private providers for several reasons, i.e. the legal and regulatory uncertainty, the steadiness of the tariff regime, the still unsolved conflict of interest between the in-house providers and the local water authorities, and the unclear risk allocation in which the private providers have not to support demand uncertainty risks. Data show that the number of entirely private equity or mixed public-private equity companies is not growing as it was estimated after the Galli Law that started the restructuring process in the water management industry in Italy in 1994 (CONVIRI, 2010). Furthermore, given the public nature of the water good and the diffused prejudice related to the involvement of private bodies in the provision of public services, several local municipalities are reluctant to let out on contract the urban water and sewage service to non-public providers believing that a private nature of the management of service is associated to increased tariff, high and not justified profit, scarce efficiency, etc.

That of private versus public ownership and/or management and the consequent impact on efficiency levels, as competition increases pressure for cost savings and efficiency has been a major question explored by scholars in the last decade (Abbot and Cohen, 2009; Pérard, 2009; Saal and Parker, 2001; Walter et al., 2009). However, even though there has been a great effort to carry on empirical studies both in developed and less developed countries, a lot of ambiguity relative to the impact of the private actor participation in the water services supply still remains, particularly as to the contribution of the private actor to really improve operational efficiency in the management of service provision.

For this reason, investigating the relationship between efficiency of water provision and the typology of contract regulating service supply is an interesting field of research.

This study implements Data Envelopment Analysis (DEA) to investigate if there is an association between the operational efficiency, the typology of service providers, and the nature of contractual agreements in the present Italian water management industry, focusing attention on the optimal territorial areas (ATO), key actors in the industry restructuring process that occurred since the Galli Law in 1994.

The remainder of this paper is organized as follows. The next section illustrates the study, particularly focusing on the methodological approach implemented to measure efficiency and assess the weight of the contract type on the efficiency rate. Findings of the empirical analysis are reported in the third section. Finally, the last section presents main conclusions, limitations and further developments.

THE STUDY

The study included 3 steps: 1) the selection of the ATOs; 2) the measurement of the ATO operational efficiency; 3) the investigation of the effect that the water service provision contract type has on the ATO operational efficiency rate.

The selection of the ATOs

In order to improve efficiency and service quality, and reduce the local fragmentation of local operators and networks in the Italian water management sector, the Law no. 36/1994 (the Galli

Law) reorganized the water services on the basis of optimal territorial areas (ATO), key actors in the undergoing restructuring process. According to the new regulatory framework, one single company is in charge of the whole water cycle, with the separation between the planning and regulation role assigned to public local authorities from the management and investment role assigned to specialized companies. In particular, every local Authority had to define norms and rules for the respective ATO assuring an effective and proper water management service, responsible to check the status of existing plants and facilities, and the performance and level of service, define the organizational and management model, define the tariff scheme, and the planning of future infrastructure investment, verify that technical and service standards are achieved, and control financial management.

38 ATOs which correspond to 42% of total ATOs were considered for the study. The initial sample included all 91 ATOs established in Italy, but the need to have an accurate and consistent set of data for all input and output variables used in the DEA models required a major refinement, and as a necessary choice, the final sample included 38 units.

The ATOs are almost equally distributed all over Italy, 17 in the North, 10 in the Centre and 11 in the South. On average, the Northern Italy ATOs have a longer infrastructure network (7,515 km) that serves a greater amount of municipalities. Network length is about 6,800 km and 6,600 km in Central and Southern Italy. Vice versa, Central Italy is characterized by a greater fragmentation of the distribution infrastructure, as on average the ATO delivers its services to 47 municipalities. The average number of municipalities is 102 in the North and 73 in the South. Northern ATOs also differ from the rest of sample because water service to final users is provided by a greater number of concessionaires.

The measurement of the ATO efficiency

Since its introduction with the paper by Charnes et al. (1978), Data Envelopment Analysis has been used to measure efficiency in the public utilities, and, more specifically, in the water service industry (see, for instance, Byrnes et al., 2010; Cubbins and Tzanikadis, 1998; Estache and Rossi, 2002; Garcia-Valiñas and Muñiz, 2007; Hernández-Sancho et al., 2012; Lin and Berg, 2008; Kulshrestha and Vishwakarma, 2012; Mahmoudi et al., 2012; Raju and Kumar, 2006; Rodríguez Díaz et al., 2004; Romano and Guerrini, 2011; Shih et al., 2006; Thanassoulis, 2000a and 2000b; Tupper and Resende, 2004). DEA provides efficiency measurements of a unit by estimating an empirical production function frontier from multiple inputs and outputs relative to a sample of homogeneous units implementing a linear programming technique. The production frontier is indeed generated solving a sequence of linear programming problems, one for each unit included in the sample, while the efficiency (Θ) score of a unit is measured by the distance between the actual observation and the frontier obtained from all the units under examination (Cooper et al., 2006). A unit displays total efficiency ($\Theta = 1$) if it produces on the boundary of the production possibility set, i.e. it minimizes inputs with given outputs and a given production technology, otherwise it is considered not efficient ($\Theta < 1$).

The ATO efficiency was measured by implementing an input-oriented DEA model constructing the production function by searching for the maximum possible proportional reduction in input usage, while output levels are held fixed. This choice was largely justified as infrastructure investments in the water service industry need continuous maintenance to keep service quality at given standards and demand remains almost steady, while a major objective of management and administrators is to reduce costs. Efficiency was also calculated by implementing the procedure suggested by Banker et al. (1984) (BCC)¹ that assumes variable returns to scale, as the selected sample includes ATOs with different size. An input-oriented BCC DEA model is defined as:

¹ Here, as common in studies that use DEA, BCC refers to the initials of the names of scholars who developed the specific model. Similarly for CCR and AP.

$$\begin{aligned}
& \text{Maximize} && \sum_{k=1}^p \mu_k y_{k0} - u_0 \\
& \text{subject to} && \sum_{i=1}^m v_i x_{i0} = 1, \\
& && \sum_{k=1}^p \mu_k y_{kj} - \sum_{i=1}^m v_i x_{ij} - u_0 \leq 0, \quad j = 1, \dots, n \\
& && \mu_k \geq \varepsilon, \quad v_i \geq \varepsilon, \quad k = 1, \dots, p \quad i = 1, \dots, m
\end{aligned}$$

In this formulation, it is assumed that there exist n ATOs to be evaluated. Each ATO consumes varying amounts of m different inputs in order to produce p different outputs. In particular, the ATO _{j} consumes amounts x_j of inputs (x_{ij} with $i=1, \dots, m$), while produces amounts y_j of outputs (y_{kj} with $k=1, \dots, p$). $x_0 \equiv (x_{10}, \dots, x_{m0})$ and $y_0 \equiv (y_{10}, \dots, y_{p0})$ indicate amounts of inputs and outputs of the ATO₀ that is under evaluation. X and Y respectively denote the $m \times n$ input and the $p \times n$ output matrices for the n ATOs. Finally, ε is a small positive number and $\mathbf{1} \equiv (1, \dots, 1)$ is a unit vector.

Or, adopting the dual problem formulation:

$$\begin{aligned}
& \text{minimize} && \Theta - \varepsilon (\mathbf{1}^T s_x + \mathbf{1}^T s_y) \\
& \text{subject to} && X\lambda - \Theta x_0 + s_x = 0 \\
& && Y\lambda - y_0 - s_y = 0 \\
& && \mathbf{1}^T \lambda = 1 \\
& && \lambda \geq 0, \quad s_x \geq 0, \quad s_y \geq 0 \\
& && \Theta \in \mathbb{R}, \quad \lambda \in \mathbb{R}^n, \quad s_x \in \mathbb{R}^m, \quad s_y \in \mathbb{R}^p
\end{aligned}$$

Where:

s_x and s_y are slack variables and $\mathbf{1}^T \lambda$ is the convexity constraint added to the CCR dual model problem that assumes constant returns to scale (Charnes et al., 1978).

In addition, because the BCC procedure generates a relative ranking of ATOs which is between 0 and 1, efficiency was recalculated as a super-efficiency measure by implementing the procedure suggested by Andersen and Petersen (1993) that introduces a more discerning and not censored efficiency ranking of units modifying the original CCR model (AP DEA model). This efficiency measurement was used in the following step of the study.

The operational efficiency model includes 5 inputs and 3 outputs. Inputs are: number of employees working in the ATO water service providers (no. of people), loss of water (“amount of water introduced in the network” – “amount of water effectively distributed to consumer premises”) (cubic m), length of aqueduct network (km), length of sewerage network (km), operational costs (€). Outputs are: invoiced amount of water (cubic m), number of municipalities served (no. of units), population of municipalities served (no. of people). In brackets measuring units have been indicated.

The investigation of the effect of contract type the ATO efficiency

The art. 13 of the recent Legislative Decree no. 267/2000 states that water service provision services may be assigned to different types of concessionaires and several contractual schemes may be adopted: 1) to a private equity company selected after a public tendering procedure; 2) to a joint private-public equity company in which the private partner has been selected after a public procedure; 3) to a public equity company owned by municipalities and local administrations that

are located inside the geographical area of the ATO without tendering but adopting an in-house procedure assignment (Conviri, 2010).

The transitory regime created by the evolving legislative framework has still left in use the old contractual schemes allowed by the Law no. 36/1994: 1) the “pre-existing concessions” (concessioni preesistenti, according to the ex art. 10 c. 3, Law no. 36/94). Companies and consortia that had been concessionaires of the service when Law 36/1994 got in force were allowed to provide service till the end of the contract; 2) the “safeguarded management agreements” (gestioni salvaguardate, according to the ex art. 9 c. 4, Law 36/94). With the aim to safeguard the business models and the management capabilities of the old bodies, the municipalities and province administrations were allowed to provide water services by identifying the main actor capable to coordinate service provision by integrating several actors providing a number of different integrated functions associated to service; 3) in-house assignment to purposefully established special public companies, agencies and consortia (aziende speciali, enti and consorzi pubblici, according to the ex art. 10 c. 1, Law 36/94). These bodies were allowed to provide water service till the full organization of the integrated water service according to art. 9 of Law 36/1994; 4) “self-provision” by the municipalities themselves (gestioni in economia) when - either for the small size or the characteristics of the service, establishing a new company or a managing body was not economically viable.

With the aim to investigate the effect of the water service provision contract type on the ATO operational efficiency, further variables were included in the study and for every ATO the relative number of contractual agreements for the provision of the integrated water service belonging to a predetermined typology was measured. Specifically, two classifications have been adopted to identify contract types, the first one being more detailed than the latter. Variables associated to the first classification (letters a, b, and c) and to the second one (letters d and e) are as follows:

- a) in-house. This variable measures the number of contract agreements associated to companies fully owned by the regional or municipal administrations that “in-house” (with no competition at all) provide the integrated water management service in the ATO;
- b) mixed&private. This variable accounts for the number of contracts associated either to public-private equity companies in which the private partner has been chosen by tender or to third party companies selected by a public tendering procedure (even management entrusted to a company later quoted on the Italian Stock Exchange) (concession to a private operator; public-private partnership). In all cases, there is competition either for market or equity shares and the concession of local water management to private or a mixed equity company is done through a competitive bid;
- c) other. This variable is a measure of the number of contracts related to water service provision mostly performed by municipalities themselves, consortia and the so-called special companies.
- d) sii_mgmt. This variable accounts for all contractual agreements in the ATO that are consistent with the new legislative framework for public services provision (Legislative Decree no. 267/2000, and Law no. 290/03);
- e) no_sii_mgmt. This variable measures all old-type contracts associated to water service supply in the ATO that were allowed by the Law no. 36/1994.

The effect of contract type on the calculated ATO super-efficiency rate was measured by performing a stepwise regression procedure as this method allows to identify the variables that account for the higher proportion of explained variance (Darlington, 1990; Stevens, 1996). Adopting the forward stepwise approach, two regression models have been designed, with the ATO super-efficiency score as dependent variable. Model 1 included the “in house”, “mixed&private” and “other” contract types as independent variables, while Model 2 included “sii_mgmt” and “no_sii_mgmt” as independent variables. The number of municipalities served by the ATO was also included in both regression equations as a control variable, using the logarithm of the variable for its great variance.

FINDINGS

Summary statistics of the ATO sample input and output variables used in the 3 DEA models and the calculated efficiency scores are reported in Table 1.

The great sample variance supports the decision to implement a BCC DEA model to benchmark the ATOs when calculating their operational efficiency score. Indeed, the ATOs largely differ as to inputs and outputs measures as it clearly showed by standard deviation and maximum-minimum range measurements. For a number of variables, the standard deviation measure is even larger than mean or very close to it (e.g., loss of water, operational costs, amount of water invoiced, population of municipalities served).

Table 1: Summary statistics of input and output variables, and efficiency scores

variable	mean	st. dev.	maximum	minimum
number of employees in the ATO	379	336.06	1,627	53
water service providers				
loss of water	38,211,719	53,455,164	284,506,690	1,921,071
length of aqueduct network	4,785.81	3,318.39	15,891.00	445.00
length of sewerage network	2,317.14	1,865.73	9,534.00	236.00
operational costs	54,379,699	67,414,788	297,666,667	5,774,884
amount of water invoiced	56,042,966	82,991,178	446,900,000	3,454,803
number of municipalities served	80	70	315	3
population of municipalities served	711,714	910,973	4,069,869	52,172
CCR efficiency score	87.61%	17.46%	100.00%	13.15%
BCC efficiency score	92.62%	14.93%	100.00%	24.16%
AP Super-efficiency score*	115.00%	43.73%	243.51%	24.16%

* outliers were excluded from the analysis

The units included in the sample differ as to their size and the size of their operations (i.e., the amount of water delivered to consumers, the size of population served, the overall length of water and sewerage network, etc.). Indeed, sample includes both ATOs that supply integrated water services only to a very reduced number of small municipalities (only 3) and ATOs that supply water services to more than 300 municipalities.

The number of inefficient ATOs is 22 in the CCR Model, and 15 in the BCC and AP Models. Difference between CCR and BCC mean scores supports the idea that scale effects exist and may be important to determine efficiency in this industry. However, scale and aggregation economies issues are not considered here (see Io Storto, 2011). The CCR average technical efficiency score is 87.61% (standard deviation of 17.46%), while the BCC average technical efficiency is at 92.62% (standard deviation of 14.93%). These efficiency scores measure only relative efficiencies rather than absolute efficiencies, consistently with the DEA method. Consequently, an increase of the efficiency rate of ATO “n” might be consequent either to an increase of the efficiency of the same ATO, or an efficiency reduction of the remaining ATOs in the sample under examination, or, finally, a combination of both.

Table 2: Regression output of Models 1 and 2. Measures at the final step of procedure

Model 1					Model 2				
variable	coeff	prob	effect status	note	coeff	prob	effect status	note	
intercept	1.040	0.083			0.932	0.100			
ln(municipality)			out	pooled			out	pooled	
mixed&private	0.175	0.072							
in-house			out	pooled					
other			out	pooled					
sii_mgmt					0.149	0.058			
no_ sii_mgmt							out	pooled	
r-squared				0.389					0.409
F test				5.873					6.665
Prob.				0.021					0.014

Table 2 displays the output of the stepwise regression analysis performed to measure the effect of the contractual agreement type on the operational efficiency score, using the operational super-efficiency score as dependent variable and the two sets of service concession contracts of Model 1 and Model 2 as independent variables.

Findings clearly show that there is a positive association between the prevailing typology of contractual agreement to supply water services and the operational efficiency of the ATO. In particular, the “mixed&private” and “sii-mgmt” contract types respectively in Model 1 and Model 2 have a positive effect on the efficiency score, even though the variable coefficient is not so strong as the intercept effect.

CONCLUSION

Findings of this study are consistent with the outcome of empirical research reported in the literature, and suggest promising research streams for further research. Indeed, results support the idea that ATOs inefficiencies might be associated not only to the size and scale of operations, but also to the contract typologies and the water service providers nature. Particularly, operational efficiency is higher in those the ATOs where the prevailing amount of concession contractual agreements for the supply of water services fits the schemes of the new modern legislative framework or the service is mostly provided by a private equity owned or by mixed public-private companies.

Of course, there is room for improving and further developing the proposed model and extending it to other countries. One of such stream for improvement might be – for instance – the exploration of the linkage between the efficiency score calculated for the specific contractual agreement “water service provider – infrastructure owner” and the contract type, focusing attention on the relationship as the research unit rather than the ATO. In this study, the calculated efficiency is indeed a sort of “consolidated” measurement of operational efficiency that take into account all service providers active in the ATO. In addition, this study has calculated operational efficiency having in mind only the supply perspective. As Pérard (2009) claims, the bulk of empirical literature on private sector participation in the water supply remains based on the sole supposed difference in terms of efficiency between the private and the public sector. Choosing between public or private water provision is not only a matter of efficiency.

As common in this kind of research, this study is not without limitations. Major limitations are the following: a) the output and input set of variables, and sample size. In particular, the lack of a variable measuring the quality of service (and water provided) in the DEA model is evident. However, here the assumption was done that the incremental level of water quality beyond the minimum acceptable threshold (according to standard defined by law) is not important to increase the efficiency score. When using DEA, both experience and technical literature suggest that the efficiency measurement calculations are critically sensitive to the choice of model, input and output variables, and the size of sample. Anyway, the unavailability of accurate and consistent public databank in Italy did not allow to have a larger sample. As a consequence, the result of the study may be not fully representative of the Italian water service sector; b) the study has privileged a static perspective to model the production function of the Italian integrated water management industry and investigate efficiency, by collecting input and output data adopting as a reference a unique period of time. Thus, the efficiency score and research insights present just a snapshot of the production function of the ATOs belonging to sample.

REFERENCES

- Abbott, M, Cohen, B (2009) Productivity and efficiency in the water industry. *Utilities Policy*, 17 (3-4), 233-244.
- Andersen, P and Petersen, NC (1993) A Procedure for Ranking Efficient Units in Data Envelopment Analysis. *Management Science*, 39, 1261–1264.

- ANEA – UTILITATIS (2008) Blue Book: I dati sul servizio idrico in Italia – Anno 2007.
www.utilitatis.org
- ANEA – UTILITATIS (2009) Blue Book: I dati sul servizio idrico in Italia – Anno 2008.
www.utilitatis.org
- ANEA – UTILITATIS (2010) Blue Book: I dati sul servizio idrico in Italia – Anno 2009.
www.utilitatis.org
- Banker, RD, Charnes, A and Cooper, WW (1984) Some models for estimating technical and scale inefficiencies in data envelopment analysis. *Management Science*, 30, 1078-92.
- Bruggink, TH (1982) Public versus regulated private enterprise in the municipal water industry: a comparison of operating costs. *Quarterly Review of Economics and Business*, 22, 111-125
- Byrnes, J, Crase, L, Dollery, B and Villano, R (2010) The relative economic efficiency of urban water utilities in regional New South Wales and Victoria. *Resource and Energy Economics*, 32, 439–455
- Charnes, A, Cooper, W and Rhodes, E (1978) Measuring the efficiency of decision-making units. *European Journal Operations Research*, 3, 429-444.
- CONVIRI (2010) Relazione annuale al Parlamento sullo stato dei servizi idrici - Anno 2009.
Campobasso: Fipolitografia Fotolampo srl
- Cooper, WW, Seiford LM and Tore K (2006) *Introduction to Data Envelopment Analysis and its Uses*. Springer.
- Cubbin, J and Tzanikadis, G (1998) Regression versus Data Envelopment Analysis for efficiency measurement: An application to the England and Wales regulated water industry. *Utilities Policy*, 7, 75-85.
- Darlington, R (1990) *Regression and Linear Models*. New York: McGraw-Hill
- Estache, A and Rossi, M (2002) How different is the efficiency of public and private water companies in Asia? *The World Bank Economic Review*, 16 (1), 139-148
- Garcia-Valiñas, MA and Muñiz, MA (2007) Is DEA useful in the regulation of water utilities? A dynamic efficiency evaluation. *Applied Economics*, 39, 245-252
- Hernández-Sancho, F, Molinos-Senante, M, Sala-Garrido, R and Del Saz-Salazar, S (2012) Tariffs and efficient performance by water suppliers: an empirical approach. *Water Policy*, 14 (5), 854–864.
- Kulshrestha, M and Vishwakarma, A (2012) Efficiency evaluation of urban water supply services in an Indian state. *Water Policy* (in press).
- Lin, C and Berg SV (2008) Incorporating Service Quality into Yardstick Regulation: An Application to the Peru Water Sector. *Review of Industrial Organizations*, 32, 53-75.
- Io Storto C (2011) Investment efficiency in the Italian water service industry: a benchmarking study using data envelopment analysis (DEA), *Int. J. Engineering Management and Economics*, 2 (4), 293-312.
- Mahmoudi, MJ, Fathi, B, Sajadifar, H and Shahsavari, A (2012) Measuring Efficiency of Water and Wastewater Company: A DEA Approach. *Research Journal of Applied Sciences, Engineering and Technology*, 4(12), 1642-1648.
- Pérard, E (2009) Water supply: Public or private? An approach based on cost of funds, transaction costs, efficiency and political costs. *Policy and Society*, 27, 193-219
- Raju, SK and Kumar, ND (2006). Ranking Irrigation Planning Alternatives Using Data Envelopment Analysis. *Water Resources Management*, 20, 553-566.

- Rodríguez Díaz, JA, Camacho Poyato, E and López Luque, R (2004) Applying Benchmarking and Data Envelopment Analysis (DEA) Techniques to irrigation districts in Spain. *Irrigation and Drainage*, 53, 135-143.
- Romano, G and Guerrini, A (2011) Measuring and comparing the efficiency of water utility companies: a Data Envelopment Analysis approach. *Utilities Policy*, 19, 202-209.
- Saali DS and Parker D (2001) Productivity and price performance in the privatized water and sewerage companies of England and Wales. *Journal of Regulating Economics*, 20, 61-90.
- Shi J, Harrington W, Pizer W and Gillington K (2006) Economies of scale in community systems. *Journal of American Water Works Association*, 98, 100-108.
- Stevens, J (1996) *Applied multivariate statistics for the social sciences*. 3rd ed. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Thanassoulis, E (2000a) The use of data envelopment analysis in the regulation of UK water utilities: water distribution. *European Journal of Operational Research*, 126 (2), 436-453.
- Thanassoulis, E (2000b) DEA and its use in the regulation of water companies. *European Journal of Operational Research*, 127 (1), 1-13.
- Tupper, HC and Resende, M (2004) Efficiency and regulatory issues in the Brazilian water and sewage sector: an empirical study. *Utilities Policy*, 12, 29-40
- Walter, M, Cullmann, A, Hirschhausen, C, Wand, R and Zschille, M (2009) Quo vadis efficiency analysis of water distribution? A comparative literature review. *Utilities Policy*, 17 (3-4), 225-232.

PERFORMANCE MEASUREMENT FRAMEWORK IN PPP PROJECTS

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Public-private partnerships (PPPs) have been a preferred procurement method for infrastructure projects in many countries. Performance measurement/evaluation is an important process in relation to the success of PPP projects and however it has received limited attention under the life-cycle perspective. A conceptual dynamic life-cycle performance measurement framework is proposed for PPP infrastructure projects by using an in-depth literature review. This paper provides public and private sectors with an insight into the effective performance measurement of PPPs.

Keywords: performance measurement, PPPs, infrastructure projects

INTRODUCTION

Over the last twenty years, the delivery of infrastructure services using Public Private Partnerships (PPP) has enabled governments to better provide essential services such as health, education, water supply, transport, and power to communities (Pongsiri, 2002; Yong, 2010). There have been many PPP successes and failures reported in the normative literature (e.g., Hodge, 2004; Regan *et al.*, 2011a; 2011b), though debate about their use has moved beyond ideological arguments about their advantages and disadvantages to focusing how they can be structured to achieve public policy goals (Yong, 2010). To achieve the potential benefits that can be provided by PPPs they ‘must be designed to deliver specific performance improvements within a framework that shares costs and risks appropriately between the public and private sectors’ (Yong, 2010: p.3).

Australia’s PPP market, for example, is considered to be sophisticated and mature (Hodge, 2004). Yet despite its maturity with implementing PPPs, ineffective performance measurement has been identified as a factor that has contributed to the problems associated with the delivery of the Sydney’s Harbour Tunnel, Queensland’s CLEM 7 Tunnel and Victoria’s Desalination Plant (Regan *et al.*, 2011b). According to Yuan *et al.* (2009), the absence of effective performance measurement in PPPs acts as a trigger for producing unsatisfied service quality of infrastructure. However, many PPP projects have not undergone a comprehensive form of *ex-post* evaluation in terms of what has been delivered (Kwak *et al.*, 2009; Regan *et al.*, 2011b). There is widespread consensus that performance measurement plays a decisive role in business success, particularly at the project level (Kagioglou *et al.*, 2001). Against this contextual backdrop this paper conceptualises a life-cycle performance measurement framework (PMF) for PPP projects.

PERFORMANCE MEASUREMENT IN CONSTRUCTION

Performance measurement is a process or a set of metrics used to quantify and report the effectiveness and efficiency of the action performed towards organisations’ objectives (Neely *et al.*, 2005). Strategic objectives form the foundations of performance measurement (Solomon and Young, 2007). PPP infrastructure projects have a common strategic objective: the achievement of best value, which emphasises efficiency, V/M and performance standards (Akintoye *et al.*, 2003). This strategic objective covers the issues in relation to ‘public client’s overall strategic plan and mission objectives, private sector’s long-term development and payoff strategy, the general

public's requirements of quality public facilities and services' (Yuan *et al.*, 2009: p.257). VfM is a key component of 'best value'; however, it has been viewed as the principal benchmark of the strategic objective of PPPs (Akintoye *et al.*, 2003; Henjeweale *et al.*, 2011). The Treasury Taskforce (TTF) (1997) of UK stated that PPPs should be used only if they provide better VfM than traditional procurement. The Office of Government Commerce of UK (2002: p.6) defined VfM as 'the optimum combination of whole life cost and quality to meet the user's requirement'. VfM focuses on overall outcomes achieved, covering a wide range of issues within qualitative and quantitative contexts such as lifecycle cost, service quality, maintainability, social benefits, and sustainability (DoTF, 2007).

The performance evaluation associated with VfM in a PPP project is a complicated process, and the uses of absolute time and cost measurements do not reflect the complexity relating to PPP delivery (European Commission, 2003). Henjeweale *et al.* (2011) has proffered that consideration for meeting client's requirement should be considered to be a core dimension for PPP project evaluation. In addition, Henjeweale *et al.* (2011) suggested that the assessment of VfM should be made on the basis of each phase of project's lifecycle, and thus a comprehensive evaluation for PPPs is required. Given the potential problems of evaluating PPPs, Yuan *et al.* (2009) proposed a comprehensive PPP performance measurement framework using goal-setting theory. Yuan *et al.* (2009) performance indicators system consists of five measurement aspects: (1) project's physical characteristics; (2) financial and marketing indicators; (3) innovation and learning indicators; (4) stakeholders' indicators; and (5) process indicators. Despite the comprehensiveness of Yuan *et al.* (2009) proposed framework, issues associated with performance measurement have been negated.

Designing a performance measurement framework to measure business and project-related processes is a complex and challenging task. While the literature is replete with studies on performance measurement, there has been limited research undertaken in construction, particularly in the context of projects. The concept of performance measurement has received a considerable amount attention as it is a critical activity that organisations must perform to achieve their strategic goals (Neely *et al.*, 2005), particularly for those operating in the construction industry where both organisational and project goals need to be met (Love and Holt, 2000). Performance measurement in construction has been focused at three levels: (1) industry; (2) corporate; and (3) project (Elyamany *et al.*, 2007), with emphasis being placed on key performance indicators (KPIs) and performance measurement systems (PMSs) (Haponava and Al-Jibouri, 2012).

'KPIs are measures that are indicative of performance of associated process' (Beatham *et al.*, 2004: p.106). KPIs have become the most popular performance measurement metric in the construction sector (Luu *et al.*, 2008; Haponava and Al-Jibouri, 2012). Most construction organisations measure performance on the basis of traditional methods such as financial reports and at a project level using time, cost, quality and safety. Although KPIs have been widely used in the performance measurement in construction, their use has received a great deal of criticism. For instance, Bassioni *et al.* (2004) contend that the use of KPIs for internal decision-making process is limited as they provide no insight for performance improvement. Moreover, KPIs are lag indicators and they cannot assist to improve the work when the project is being undertaken (Kagioglou *et al.*, 2001; Hopanava and Al-Jibouri, 2012).

Apart from KPIs, PMSs have also been considered in construction (e.g., Alarcon and Ashley 1996; Kagioglou *et al.*, 2001; Luu *et al.*, 2008). A PMS 'is a structure where strategic, tactical and operational actions are linked to process to provide the information required to improve the program or service on a systematic basis' (which is akin to the Balanced Scorecard (BSC) proposed by Kaplan and Norton (1996)) (del-Rey-Chamorro *et al.*, 2003: p.47). Despite their widespread application in construction, PMSs have generally been applied at the industry and company level with only limited number of studies examining the project level (Bassioni *et al.*, 2005). For example, Alarcon and Ashley (1996) who developed a general performance model (GPM) and Kagioglou *et al.* (2001) who developed a BSC that encompassed the 'project perspective' for the purpose of systematically measuring the construction project performance.

Performance measurement in construction has solely focused on product-oriented measures. In other words, the existing KPIs and PMSs designed for construction project evaluation are established after project completion, which are therefore not able to provide a dynamic insight into the performance of a process (Haponava and Al-Jibouri, 2012). For example, the PMS developed by Yuan *et al.* (2009) for the lifecycle of a PPP is product-orientated in nature. The endogenous and exogenous factors that can significantly affect projects' success change dynamically over projects' life (Doloi, 2008). According to Yuan *et al.* (2009) and Haponava and Al-Jibouri (2012), the lack of a life-cycle perspective to performance measurement juxtaposed with dynamic measures can contribute to inefficient and ineffective decision-making. Yet, despite the importance of dynamic life-cycle performance measurement it remains an area that has received limited attention at the project level in construction.

PROPAGATION OF A PPP DYNAMIC LIFE-CYCLE PMF

Evaluating PPP projects is more difficult than that of traditional projects as there are many components (e.g., documentation, financing, taxation, technical details, and sub-agreements) and risks (e.g., market risks and project risks) that arise from the complexity of the long-term contractual arrangement, which can change dynamically over the projects' lifecycle (Grimsey and Lewis, 2002). The traditional development process of a PPP infrastructure project contains eight stages (e.g., project selection and definition, PPP option assessment, getting organised, pre-tendering work, bidding process, contract and financial close, contract management, and *ex post* evaluation) with the project being subjected to evaluation in the final phase (EIB, 2012). This kind of evaluation, as noted above, is a product-oriented measurement where the measure for project performance is simply a review (Haponava and Al-Jibouri, 2012).

The eight stages of the development process of PPP infrastructure project are able to be summarised to three major interrelated phases: (1) Planning and Design; (2) Procurement; and (3) Partnership (Construction, Operation & Maintenance), which are referred to as the PPP project lifecycle (EIB, 2012). As a PPP project is a dynamic and constantly evolving process (Akintoye and Beck, 2009), the product-oriented evaluation approach cannot effectively assist project managers to control and improve the work while the target asset is being constructed. With this in mind, it suggests that a dynamic life-cycle perspective needs to be used to evaluate PPP performance. Thus, a phase-based PMF illustrated as Figure 1 has been established for PPP projects.

As illustrated by Figure 1, 'learning processes' have been embedded into the interfaces of the phases of PPP project's lifecycle. Fundamentally, there are two kinds of evaluation, one is *ex-ante* evaluation and the other is *ex-post* evaluation. At project level, *ex-ante* evaluation is a pre-project study used to offer assistance in investment decision making on the basis of the calculations of feasibility and cost, while *ex-post* evaluation is a comparison between expected outcomes and actual achievements and it provides insight into the future work (Irani *et al.*, 2001; Irani *et al.*, 2005). The rationale of the 'learning processes' is to provide project managers with the feedback generated from the phase-based evaluation, and help them perform well in investment decision making and identify how well resources have been utilised in previous phase and what should be improved and controlled in next project phase.

The core issue of the development of PMF is the identification of measurement aspects, and the prerequisite of this work is the understanding of the nature of organisations' key stakeholders (Neely *et al.*, 2002; 2005). PPP stakeholders include the client, concession contractor, financier, consultants and end-user. Normally, PPPs are undertaken by a Special Purpose Vehicle (SPV) that is a consortium responsible for developing, building, operating and maintaining an asset procured over concession period (Zheng *et al.*, 2008).

An SPV exhibits a dual character, implying that SPV is operating in the context where goals at company and project levels must be met. Thus, its evaluation and measurement should focus on the outputs at both company and project levels. Accordingly, the PMS integrated with the project-related issue is deemed to be more suitable for PPP evaluation than the use of KPIs as KPIs

concentrate on project rather than company performance (Kagioglou *et al.*, 2001). Corporate-related issues (i.e., strategies) cannot be addressed in the KPI framework. Several PMSs have been adapted to measure project performance in construction (e.g., Alarcon and Ashley, 1996; Kagioglou *et al.*, 2001; Yuan *et al.*, 2009), however, most of the developed systems have originated from the BSC (e.g., Kagioglou *et al.*, 2001; Yuan *et al.*, 2009). Neely *et al.* (2001) has suggested that the BSC is not able to keep pace with the increasingly dynamic and changing nature of today's business.

An alternative to the BSC is the *Performance Prism* (Neely *et al.*, 2001). The Performance Prism is a holistic framework structured to shed light on the complexity derived from multiple stakeholders and assist with directing and guiding performance measurement design for long-term success within a particular business environment (Neely *et al.*, 2001). The Performance Prism consists of *five* main interrelated measurement facets (Neely *et al.*, 2001: pp.6-7).

1. Stakeholder satisfaction: who are our stakeholders and what do they want?
2. Strategies: what strategies do we need to satisfy these sets of wants and needs?
3. Processes: what processes do we need to allow our strategies to be delivered?
4. Capabilities: what capabilities do we need to operate our processes?
5. Stakeholder contribution: what do we want and need from our stakeholders?

Considering the concepts above, the Performance Prism is an ideal management philosophy to underpin the development of dynamic life-cycle PMF of PPPs, especially as they are complex and require the long-term integration of multiple stakeholders.

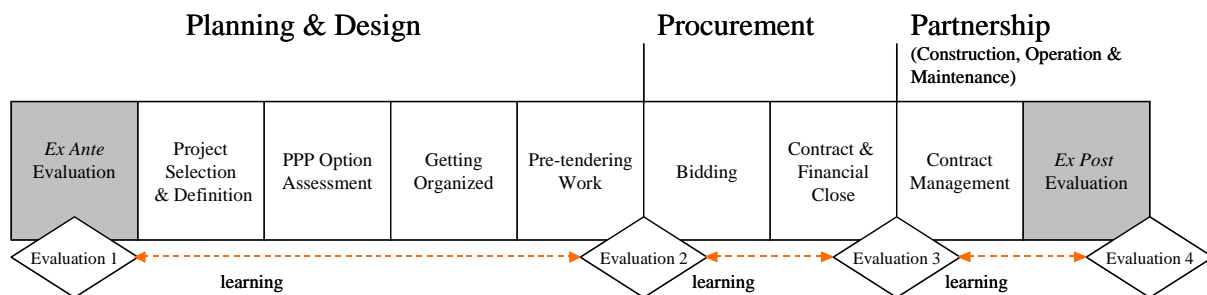


Figure 1: Dynamic life-cycle performance measurement framework of PPPs

Stakeholder Satisfaction (F1)

Stakeholder satisfaction is highly important for performance measurement, particularly in the context of multiple stakeholders. The Performance Prism commences with the facet of stakeholder satisfaction as satisfying stakeholders' wants and needs is the baseline of the existence of organisation (Neely *et al.*, 2001; 2002).

Throughout a PPP's lifecycle, the SPV exists to satisfy a public client's requirements, which focus on providing a service to the public using private sector investment (Pongsiri, 2002; Akintoye and Beck, 2009). The public sector is actively involved in each of the project's phases (Kwak *et al.*, 2009). Thus, the satisfaction of public client must be addressed over PPP project's life, and the user satisfaction needs to be raised when conducting the performance measurement after the infrastructure is operational. Furthermore, general concessionaire is involved with PPP projects from the Procurement phase, during which the finance structuring of PPPs is completed. A number of financial mechanisms can be used to fund PPP projects, such as equity and bank debts, loans and bonds (Akintoye and Beck, 2009; Regan *et al.*, 2011a). Accordingly, general contractor, shareholders and creditors (e.g., banks, insurance corporations, and multilateral agencies) can be deemed as the essential stakeholders of PPPs in the Partnership phase.

After the appointment of a general concession contractor, subcontractors and suppliers will be gradually engaged to participate in the construction of the asset. General contractors should maintain a good relationship with all stakeholders so as to ensure satisfactory progress throughout the project's life (NAO, 2001). Kumaraswamy and Anvuur (2008) have proffered that the relationship between general contractors and subcontractors as well as suppliers plays a more important role in the construction of PPPs than that of traditional projects. Therefore, the contractor's ability to maintain relationships with subcontractor and suppliers to ensure their satisfaction is a vital determinant of PPP performance (Davis and Love, 2011).

Employees have been acknowledged by management researchers as organisations' essential stakeholders (Bourne *et al.*, 2003). In PPP projects, many employees, such as advisors and consultants, must be hired to deal with the problems associated with tax, accounting, legal and environment (Yong, 2010). Their satisfaction for many issues (e.g., salary, safety and working environment) can significantly affect project performance. Hence, employees' satisfaction is a critical measurement aspect over a PPP project's life.

Strategies (F2)

Strategy, in any organisation, is not only the foundation of internal business processes, but also stakeholders' behavioural goal (Neely *et al.*, 2001; 2002). Without an effective strategy, it is impossible for internal business processes to effectively deliver appropriate services or products to customers, and employees will confuse in what matters and how they should behave to achieve success (Neely *et al.*, 2002). A common strategy of PPP projects is the achievement of VfM (Akintoye *et al.*, 2003; Yuan *et al.*, 2009). The VfM has been acknowledged as the fundamental management philosophy that penetrates through the whole lifecycle of PPPs (Grimsey and Lewis, 2005; Henjewe *et al.*, 2011).

Processes (F3)

To achieve VfM, it is necessary for public sector and the SPV to launch appropriate internal business processes throughout the lifecycle of PPP project. Within the framework of the Performance Prism, the measure of processes is designed to identify what internal business processes should be improved to increase the effectiveness of the whole workflow (Neely *et al.*, 2002).

In the Planning and Design phase of PPPs, a series of tasks that cascade from environment analysis (e.g., political, economic, social, and legal) to the establishment of commercial and technical structure are identified. Thus, the evaluation for the Planning and Design phase under the processes construct of the Performance Prism should focus on the comprehensiveness of the environment analysis, appropriateness of the definition of service needs and desired outputs, effectiveness of risk management (e.g., identification, analysis and allocation), and appropriateness of financing option and project structure. A detailed explanation on the significances of such work can be found in Akintoye and Beck (2009), Yong (2010) and EIB (2012). Noteworthy, the measure relating to the feasibility study should not be neglected in PPP planning and design as it has been identified as a critical success factor for PPPs (Zhang, 2006). Furthermore, it is essential to set up the evaluation regarding concession issues (e.g., selection criteria of concessionaire and concession period). There is a widespread consensus that an appropriate concession contractor and a reasonable concession period are critical to PPP success. Zhang (2004) supported this argument and identified the importance of appropriate concessionaire and concession period in the viability of PPP projects.

Tendering is a critical process during the Procurement phase, in which PPP contract needs to be finalised under the 'final negotiation' framework (EIB, 2012). This framework is critical and should typically include such issues as negotiation timetable and how to define and record the remaining problems and matters already agreed or settled (EIB, 2012). Thus, measurement for the comprehensiveness of final negotiation framework is necessary. Additionally, the financial close of PPPs occurs in the Procurement phase and it enables the funds (e.g., equity, loans, and debts) to start flowing to support the project implementation (Akintoye and Beck, 2009). The SPV and public sector need to 'carry out a considerable amount of detailed work to reach financial close'

(EIB, 2012). The work organised to achieve financial close must be effective and efficient, otherwise, the progress of PPPs could be delayed. Hence, the process evaluation for the Procurement phase ought to be concerned with the effectiveness and efficiency of financial close.

After the award of PPP contract and financial close, PPPs enter the Partnership phase, which consists of construction, operation and maintenance. The construction of the asset can last for several years, during which the issues selected for evaluating traditionally procured projects can be used, such as time, cost, quality and material management, health, safety, and environmental impact (Haponava and Al-Jibouri, 2012). Besides, the final phase of PPPs entails operating and maintaining the infrastructure to deliver service under a certain legal and contracted regulatory framework. Thus, the compliance of legal and regulatory framework, profit and profitability, and effectiveness of facility management are the attractive points in process evaluation of PPPs (Yuan *et al.*, 2009). PPPs are being run within the context of multiple stakeholders, and therefore effectiveness of dispute resolution and effectiveness of interface management are the critical evaluation indicators relating to the Partnership phase (Yuan *et al.*, 2009).

It is proffered that the evaluation for interface management (IM) should penetrate the whole lifecycle of PPPs. IM is defined as ‘the management of communication, coordination, and responsibility across a common boundary between two organisations, phases, or physical entities which are interdependent’ (Chan *et al.*, 2005: p.646). Chan *et al.* (2005) and Yuan *et al.* (2009) claimed that IM, particularly between organisations, the phases of project’s lifecycle, and physical entities, are essential for PPP projects.

Capabilities (F4)

The operation of business processes in organisations must be supported by certain skills, practical procedures, physical infrastructures and technologies, which are normally referred to as organisational capabilities (Neely *et al.*, 2002). In the Performance Prism, the facet of capabilities is the least widely understood and it is established to assess whether the fundamental building blocks of organisation’s competitiveness are strong enough (Neely *et al.*, 2001). The capabilities required to complete a PPP vary by the phases of the project’s lifecycle. This is because of the project complexity of PPPs and the phase-based nature of the necessary detailed work designed for PPP development.

Employees are one of the most important components in any organisation. Therefore, skilled employees (i.e., advisors, consultants and PPP experts) are of a basic capability of the SPV throughout the project’s lifecycle. In addition, today’s business environment changes dramatically. To maintain competitiveness, how to enhance organisation’s learning ability has been an attractive topic in management research (Denton, 1998). For a PPP project, the operating environment is more complicated than that of traditional projects, and therefore an effective and efficient training and learning system responsible to develop the appropriate training programmes on the basis of different phases of PPPs is undoubtedly required during the whole project. The training and learning system is considered to be a necessary supporting infrastructure in PPPs (Yuan *et al.*, 2009).

Organisation’s capability in innovation is important and it relates to project’s performance in strategic planning, design, financing, procurement and construction (Shen *et al.*, 2004). In short, innovation plays a vital role over project’s lifecycle. In PPP projects, financing is completed in the Procurement phase and then construction commences. Accordingly, the measure for the capabilities of the SPV in the post-transaction (construction, operation & maintenance) should cover finance infrastructure, advanced technologies and equipments, and technology transfer ability. The research by Carrillo *et al.* (2006) suggested that technology transfer is essential for the SPV to perform well in construction. Additionally, the evaluation for governance needs to be placed in both Procurement and Partnership phases. The PPP contract includes a range of governance arrangements, such as the practices for monitoring, procedures for decision makings and problem solutions (NAO, 2001). Badshah (1998) had demonstrated the significances of governance in PPP construction, operation and maintenance.

Stakeholder Contribution (F5)

The stakeholder contribution, as opposed to ‘stakeholder satisfaction’, is a measure facet for learning the ‘dynamic tension’ between stakeholders and the organisation (Neely *et al.*, 2001). The ‘Stakeholder Satisfaction’ is applied to understand what stakeholders’ want and need from the organisation, while the ‘Stakeholder Contribution’ is used to identify what the organisation wants and needs from its stakeholders. Take employees, for example. Employees want from the organisation a satisfied salary, job security, safe work environment, and recognition. In return, organisations want their employees to provide positive and valuable suggestions, work efficiently and maintain loyalty (Neely *et al.*, 2001). Accordingly, the evaluation for stakeholder contribution should concentrate on employees’ creativity, productivity and loyalty.

In addition to the issues of employee, stakeholders’ contributions in PPP infrastructure projects incorporate the devotions from public client, general contractor, subcontractors, suppliers, shareholders and creditors (Akintoye and Beck, 2009). Kwak *et al.* (2009) summarised that public client’s contributions in PPPs encompass the establishment of favourable investment environment and legal framework in project planning and design stage, selection of suitable concessionaire in the transaction, and active involvement to monitoring and evaluation after the completion of transaction. Therefore, it is rational to evaluate the public sector’s performance in establishing the investment environment and legal framework (Planning and Design), concessionaire selection (Procurement), and their active willingness to be involved with contract management (Partnership). After PPPs turn into the Partnership phase, the performance of subcontractors and suppliers emerges to be a critical determinant of project success (Akintoye and Beck, 2009). The lack of the evaluation for subcontractors’ and suppliers’ contributions in the Partnership can act as a trigger of the ineffectiveness of evaluation.

Under the stakeholder contribution facet, the evaluation for the willingness of private contractors, shareholders, creditors and users to PPP participation must be highlighted in the Procurement and Partnership phases. Neely *et al.* (2001) argued that the measurement for stakeholder contribution should involve stakeholders’ willingness to participate in the business, such as customers’ willingness to repeat business. During PPPs, a major task in project procurement is to attract private investors (i.e., banks, facility management organisations, and constructors) to join in infrastructure development. Thus, their willingness to participation is undeniably a factor that can determine whether the public client can select an appropriate concessionaire and set up a robust finance structure. More important, the final objective of PPPs is to provide potential users with good public service and therefore users’ willingness to the use of the asset is also essential.

CONCLUSION

Performance evaluation of PPPs has received limited attention, particularly from a ‘dynamic life-cycle perspective’. With this in mind, a dynamic life-cycle performance measurement framework of PPPs has been conceptualised using the Performance Prism as a conceptual underpinning that emphasises the measures for stakeholder satisfaction, strategies, processes, capabilities and stakeholder contribution. Owing to the phase-based nature, the proposed PMF is able to capture the dynamic nature of PPP infrastructure projects. On the basis of the outcome of this research, public sector and private investors that will embark on PPP infrastructure projects are provided with an insight into the comprehensive and effective evaluation of PPPs. The developed conceptual model is a practical tool for PPP project managers and evaluation practitioners to monitor and improve the project performance while the project is still being undertaken. In essence, the PMF that has been developed provides the impetus for ‘real-time’ performance control, and the improved service quality.

REFERENCES

- Akintoye, A and Beck, M (2009) Policy, finance and management for public-private partnerships, Oxford: Wiley-Blackwell.

- 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), 461-70.
- Alarcon, L F and Ashley, D B (1996) Modelling project performance for decision making, *Journal of Construction Engineering and Management*, 122(3), 265-73.
- Badshah, A (1998) *Good governance for environmental sustainability*, Pubic Private Partnerships for the Urban Environment Programme, New York, USA.
- Bassioni, H A, Price, A D F and Hassan, T M (2004) Performance measurement in construction, *Journal of Management in Engineering*, 20(2), 42-50.
- Bassioni, H A, Price, A D F and Hassan, T M (2005) Building a conceptual framework for measuring business performance in construction: an empirical study, *Construction Management and Economics*, 23(5), 495-507.
- Beatham, S, Anumba, C, Thorpe, T and Hedges, I (2004) KPIs: a critical appraisal of their use in construction, *Benchmarking: An International Journal*, 11(1), 93-117.
- Bourne, M, Franco, M and Wilkes, J (2003) Corporate performance management, *Measuring Business Excellence*, 7(3), 15-21.
- Carrillo, P M, Robinson, H S, Anumba, C J and Bouchlaghem, N M (2006) A knowledge transfer framework: the PFI context, *Construction Management and Economics*, 24(10), 1045-56.
- Chan, W T, Chen, C, Messner, J I and Chua, D K H (2005) Interface management for China's build-operate-transfer projects, *Journal of Construction Engineering and Management*, 131(6), 645-55.
- Davis, P R and Love, P E D (2011) Alliance contracting: adding value through relationship development, *Engineering, Construction and Architectural Management*, 18(5), 444-61.
- del-Rey-Chamorro, F M, Roy, R, Wegen, B V and Steele, A (2003) A framework to create key performance indicators for knowledge management solutions, *Journal of Knowledge Management*, 7(2), 46-62.
- Denton, J (1998) *Organisational learning and effectiveness*, London: Routledge.
- Doloi, H (2008) *Life cycle project management: a systems based approach to managing complex projects*, VDM Verlag.
- DoTF (Department of Treasury and Finance) (2007) *Facts and fictions about public private partnerships*, available at: <http://www.partnerships.vic.gov.au> (accessed 23 Oct. 2012).
- EIB (2012) *The guide to guidance: how to prepare, procure and deliver PPP projects*, EU.
- Elyamany, A, Basha, I and Zayed, T (2007) Performance evaluation model for construction companies, *Journal of Construction Engineering and Management*, 133(8), 574-81.
- European Commission (2003) *Guidelines for successful public-private partnerships*, Brussels.
- Grimsey, D and Lewis, M K (2002) Evaluating the risks of public private partnerships for infrastructure projects, *International Journal of Project Management*, 20(2), 107-18.
- Grimsey, D and Lewis, M K (2005) Are public private partnership value for money, *Accounting Forum*, 29(4), 345-48.
- Henjewe, C, Sun, M and 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), 825-39.
- Hodge, G A (2004) The risky business of public-private partnerships, *Australian Journal of Public Administration*, 63(4), 37-49.

- Haponava, T and Al-Jibouri, S (2012) Proposed system for measuring project performance using process-based key performance indicators, *Journal of Management in Engineering*, 28(2), 140-49.
- Irani, Z, Sharif, A and Love, P E D (2001) Transforming failure into success through organizational learning: an analysis of a manufacturing information system, *European Journal of Information System*, 10(1), 55-66.
- Irani, Z, Sharif, A and Love P E D (2005) Linking knowledge transformation to information systems evaluation, *European Journal of Information Systems*, 14(3), 213-18.
- Kagioglou, M, Cooper, R and Aouad, G (2001) Performance management in construction: a conceptual model, *Construction Management and Economics*, 19(1), 85-95.
- Kaplan, R S and Norton, D P (1996) *The Balanced Scorecard: translating strategy into action*, Boston: Harvard Business School Press.
- Kummaraswamy, M M and Anvuur, A M (2008) Selecting sustainable teams for PPP projects, *Building and Environment*, 43(6), 999-1009.
- Kwak, Y H, Chih, Y Y and Ibbs, C W (2009) Towards a comprehensive understanding of public private partnerships for infrastructure development, *California Management Review*, 51(2), 52-78.
- Love, P E D and Holt, G (2000) Construction business performance measurement: the SPM alternative, *Business Process Management Journal*, 6(5), 408-16.
- Luu, V T, Kim, S Y and Huynh, T A (2008) Improving project management performance of large contractors using benchmarking approach, *International Journal of Project Management*, 26(7), 758-69.
- NAO (2001) Managing the relationship to secure a successful partnership in PFI projects, UK.
- Neely, A, Adams, C and Crowe, P (2001) The performance prism in practice, *Measuring Business Excellence*, 5(2), 6-12.
- Neely, A, Adams, C and Kennerley, M (2002) *The performance prism: the scorecard for measuring and managing business success*, London: Prentice Hall Financial Times.
- Neely, A, Gregory, M and Platts, K (2005) Performance measurement system design: a literature review and research agenda, *International Journal of Operations and Production Management*, 25(12), 1228-63.
- Office of Government Commerce (2002) *Green public private partnerships*, Norwich, UK.
- Pongsiri, N (2002) Regulations and public-private partnerships, *International Journal of Public Sector Management*, 15(6), 487-95.
- Regan, M, Smith, J and Love, P E D (2011a) Impact of the capital market collapse on public-private partnership infrastructure projects, *Journal of Construction Engineering and Management*, 137(6), 6-16.
- Regan, M, Smith, J and Love, P E D (2011b) Infrastructure procurement: learning from private-public experiences 'down under', *Environment and Planning C: Government and Policy*, 29(2), 363-78.
- Shen, L Y, Li, Q M, Drew, D and Shen, Q P (2004) Awarding construction contracts on multicriteria basis in China, *Journal of Construction Engineering and Management*, 130(3), 385-93.
- Solomon, P J and Young, R R (2007) *Performance-based earned value*, NY: John Wiley and Sons.
- Treasury Taskforce (1997) Treasury Taskforce guidance, partnerships for prosperity, HMSO, UK.
- Yong, H K (2010) Public-private partnerships policy and practice, London: C. Secretariat.

- Yuan, J, Zeng, A Y, Skibniewski, M J and Li, Q (2009) Selection of performance objectives and key performance indicators in public-private partnership projects to achieve value for money, *Construction Management and Economics*, 27(3), 253-70.
- Zhang, X Q (2004) Concessionaire selection: methods and criteria, *Journal of Construction Engineering and Management*, 130(2), 235-44.
- Zhang, X Q (2006) Public clients' best value perspectives of public private partnerships in infrastructure development, *Journal of Construction Engineering and Management*, 132(2), 107-14.
- Zheng, J, Roehrich, J K and Lewis, M A (2008) The dynamics of contractual and relational governance: evidence from long-term public-private procurement arrangements, *Journal of Purchasing and Supply Management*, 14(1), 43-54.

PUBLIC-PRIVATE PARTNERSHIP PROJECTS IMPLEMENTATION: THREE CASE STUDIES OF SEAPORT PROJECTS IN INDIA

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Public-Private Partnership (PPP) offers many potential advantages for the government in providing infrastructure facilities. However, the implementation of PPP projects has not been easy. This article aims to study the implementation of PPP seaport projects in India. On the basis of cross-case analyses with three units of analysis: 1) Management of PPP project process; 2) financial viability analysis; and 3) value for money analysis. Four patterns are identified from three case projects. The first pattern shows that independent regulators (e.g. the Tariff Authority for Major Ports) played an important role in protecting lenders' interest by scrutinising the capital expenditure of port terminals for the purpose of tariff setting. The second is that unrealistic traffic projections result in cancellation of tendering and create tariff setting issues in the subsequent operation phase. The third pattern shows that poor project preparation at the pre-bid stage leads to prolonged negotiations and delays in financial closure. And the fourth pattern shows that three cases have successfully demonstrated the ability to deliver value for money in terms of time efficiency, cost overrun anticipation, traffic performance, attractive interest rates and tenor of debt. On the basis of these findings, the authors offer a number of suggestions to improve the quality and effectiveness of the evaluation procedure for PPP seaport projects.

Keywords: Case Studies, Public-private partnership, Procurement, Project Evaluation Procedure, Stakeholders.

INTRODUCTION

Government has the responsibility for providing public services including infrastructure facilities. Various types of infrastructure constitute essential public services, for instance: transportation, energy, telecommunications, water, waste disposal, hospital, school, and housing facilities. Public-Private Partnership (PPP) offers many potential advantages for the government in providing infrastructure facilities (Askar and Gab-Allah, 2002). Although Cheung and Chan (2009) remarked that PPP is not always the best option to procure infrastructure projects, 12 of 63 developing countries under International Development Association (IDA) reached financial or contractual closure for 24 transportation, energy, and water projects with private investment commitments of US\$7.5 billion in 2010 (Perard, 2011).

In the context of the transportation sector, Kakimoto and Seneviratne (2000), Bichou and Gray (2005), and Kulkarni and Prusty (2007) have meticulously described the role of port infrastructure as economic catalysts for promoting seaborne trade activity and generating benefits and socio-economic wealth in developing countries. India, being one of the fastest growing among developing countries, has attractive policies in favour of private participation in infrastructure provision with varying degrees of success. The first guidelines for private sector participation in major ports were announced by the government of India in October 1996. Since then PPPs have been promoted for implementation of infrastructure projects in India (DEA, 2012).

Recently in 2010, the Department of Economic Affairs Infrastructure under the Ministry of Finance, Government of India has been heavily involved in PPP research. The government of India has an innovative program called PPP capacity building programme, which developed a PPP toolkit to assist decision-making for infrastructure PPPs in India and to improve the quality of on-going PPP projects. The toolkit was developed under a non-lending technical assistance co-financed by the World Bank, AusAID South Asia Region Infrastructure for Growth Initiative and the Public Private Infrastructure Advisory Facility (PPIAF). The PPP Toolkit was designed with a focus on helping decision-making by Project Officers across India at the Central, State and Municipal levels through four phases comprising: Project identification, Full feasibility, PPP procurement, and PPP contract management and monitoring.

Nevertheless, there are constraints being faced by the Government of India in promoting PPP, such as: insufficient instruments to undertake long-term equity and financial liability required by infrastructure projects, much hindrance in enabling a regulatory framework, inability of the private sector to fit into the risk of investing in diversified projects, lack of credibility of bankable infrastructure projects used for financing the private sector, and inadequate support to enable greater acceptance of PPPs by the stakeholders (DEA, 2012). These constraints are influenced by the ability of the main stakeholders in managing the risks involved in PPP projects.

Therefore, this paper aims to study the implementation of PPP seaport projects in India with the view of offering suggestions for the improvement of the PPP process – especially the evaluation of such projects. The aim of this paper was satisfied by conducting an in-depth analysis of three case projects via published materials such as newspapers, magazine articles, websites, journal papers, government releases, etc. A large range of materials were first collected. Then materials that were believed to show a true reflection of the situation on the three selected projects were retrieved and analysed through cross case analysis. The findings and conclusions from the analysis of the case studies are presented and discussed in the paper.

BACKGROUND OF PUBLIC PRIVATE PARTNERSHIPS THE SEAPORT SECTOR IN INDIA

The Indian port sector has been plagued by several problems due to inadequate capacity and operational inefficiencies. The 12 major ports in India had capacity over-utilization, which handled about 179.02 million tonnes of traffic in 1993-94 compared to total cargo handling capacity of 172.59 million tonnes at major ports, as illustrated in Figure 1 (TRW, 2010).

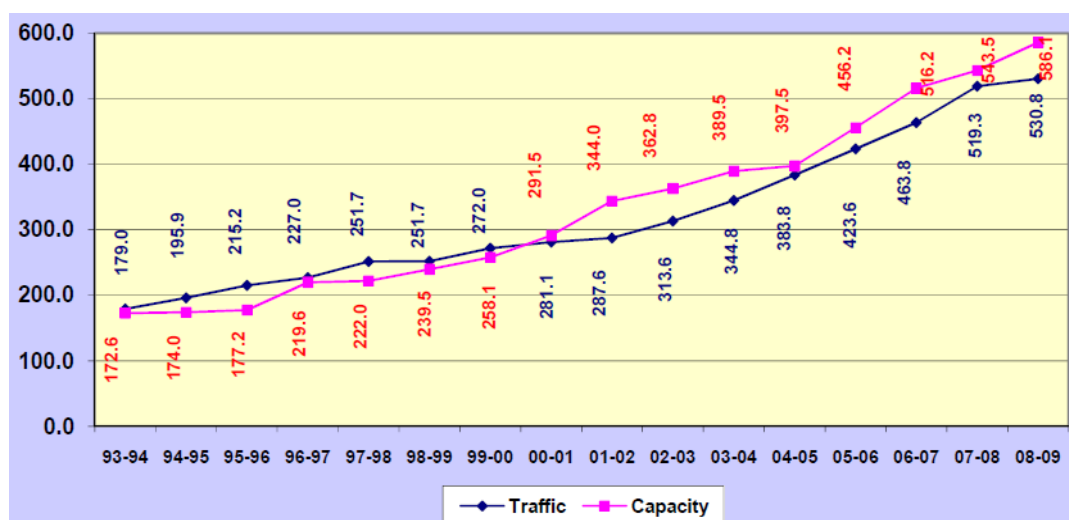


Figure 1: Indian Major Seaports Capacity and Traffic (In Million Tonnes)
Source: Transport Research Wing (TRW, 2010)

As a consequence of the capacity inadequacy, Indian seaport operations lagged behind foreign counterparts (Ray, 2005). The operational inefficiency of Indian seaports resulted in higher through-put and sea transport costs, which means that cargo shipped from Indian seaports were 45%-50% costlier than the norm, thus becoming non-competitive in the international market (World Bank, 1995). In order to overcome the above problems, coupled with need for provision of cost-efficient service to customers, especially for the public sector ownership of ports that created the usual problems of accountability and inefficiency, the Government of India decided to encourage private sector participation. The first guidelines for private sector participation in major seaports were announced by the Ministry of Surface Transport in October 1996 (MoST, 1996). Since then PPPs have been promoted for implementation of infrastructure projects in India (DEA, 2012). The following sections will discuss the detailed procedure for evaluating PPP seaport projects in India.

PROCEDURE FOR EVALUATING PPP SEAPORT PROJECTS IN INDIA

The government of India has an innovative program called PPP capacity building programme, which develops a PPP toolkit to assist decision-making for infrastructure PPPs in India and to improve the quality of on-going PPP projects. The program was developed by the Department of Economic Affairs (DEA), Ministry of Finance, Government of India, with funding support from the World Bank, AusAID South Asia Region Infrastructure for Growth Initiative and the Public Private Infrastructure Advisory Facility (PPIAF). The next section will briefly discuss the procedure for PPP financial model utilisation in the Indian PPP toolkit.

MAJOR ACTIVITIES IN THE PPP PROCESS

The procedure for evaluating PPP seaport projects in India is best presented based on the major activities of PPP process and also limited to the utilisation of the PPP toolkit. The Indian PPP toolkit is a set of tools designed to assist the analysis and decision making of potential PPPs. The PPP toolkit comprises six tools as follows:

- PPP Family Indicator Tool: A starting indication tool for selecting the right PPP mode for the particular project in the sector.
- PPP Model Validation Tool: A risk allocation analysis tool for choosing the best PPP model for the project.
- The PPP Suitability Filter: A PPP suitability test tool that is used in Phase 1 for the selected project.
- PPP Financial Viability Indicator Model: A financial analysis tool which examines the key questions of financial viability and the “what-if” scenarios used in Phase 1, Phase 2, and Phase 3.
- VFM Indicator Tool: A value-for-money (VFM) analysis tool in an extended analysis from the outcome of PPP Financial Viability Indicator Model for highlighting the uncertainty by using a range of VFM values. This means the indicator can incorporate uncertainty into the result and give a better indication of how likely the PPP is to deliver VFM.
- Readiness Filter: A checklist that is used in all phases for all the important steps that should be followed.

Amongst the above 6 components of the PPP toolkit, this research focuses only on two financial related tools namely PPP Financial Viability Indicator Model and VFM Indicator tool. Since the PPP toolkit was first introduced in 2010, the two financial related tools were not available in the three case studies. Nevertheless, the investigation of three PPP projects will aid the understanding of the background of PPP toolkit development and help to propose a number of suggestions for improving the quality and effectiveness of the evaluation procedure for PPP seaport projects.

Project stakeholders or PPP practitioners can use the PPP toolkit at four phases in the PPP process as illustrated in Figure 2.

- Phase 1: PPP identification, covering strategic planning, project pre-feasibility analysis, PPP suitability checks, and internal clearance to proceed with PPP development
- Phase 2: Full feasibility, PPP preparation and project clearance, covering project appraisal including a full feasibility study, PPP preparation including draft documents, and in-principle clearance
- Phase 3: PPP procurement, covering procurement, final drafts of bidding documents, final approval and project award
- Phase 4: PPP contract management and monitoring, covering project implementation and monitoring over the life of the PPP

The main goal of Phase 1 is to identify the project's quality for development and the project's suitability for PPP. At Phase 1, the Sponsoring Authority (e.g. ministry(s) for Central-level projects, sponsoring department(s), Urban Local Body, or other statutory or public sector corporate entity as appropriate to the case) will be responsible for identifying and testing projects.

Since the process at Phase 2 requires more resources in the form of people, time and money, projects must pass Phase 1 checks before they can enter Phase 2. The heart of Phase 2 is a full feasibility study. Preparation for the procurement process also begins in this phase, including selection of the best procurement method and first drafts of the bidding documents. The Sponsoring Authority (e.g. ministry(s) (Central-level projects), sponsoring department(s), or statutory or public sector corporate entity, as appropriate to the case) will be responsible for conducting full feasibility study with support from dedicated PPP agencies, such as a PPP Cell or Project Development Agency. The final step in phase 2 is an application for In-principle Clearance by the Appraisal/Clearance Authority.

Projects that are granted In-principle Clearance can move to the Procurement Phase (Phase 3). The Sponsoring Authority (e.g. ministry(s) for Central-level projects, sponsoring department(s), Urban Local Body, or other statutory or public sector corporate entities as appropriate to the case) will be responsible for selecting the best qualified private sector partner for the PPP and concluding the concession agreement. At the completion of this phase the project will have completed its development as a PPP and will be ready to enter the contract management and monitoring phase (Phase 4) that continues throughout the life of the PPP.

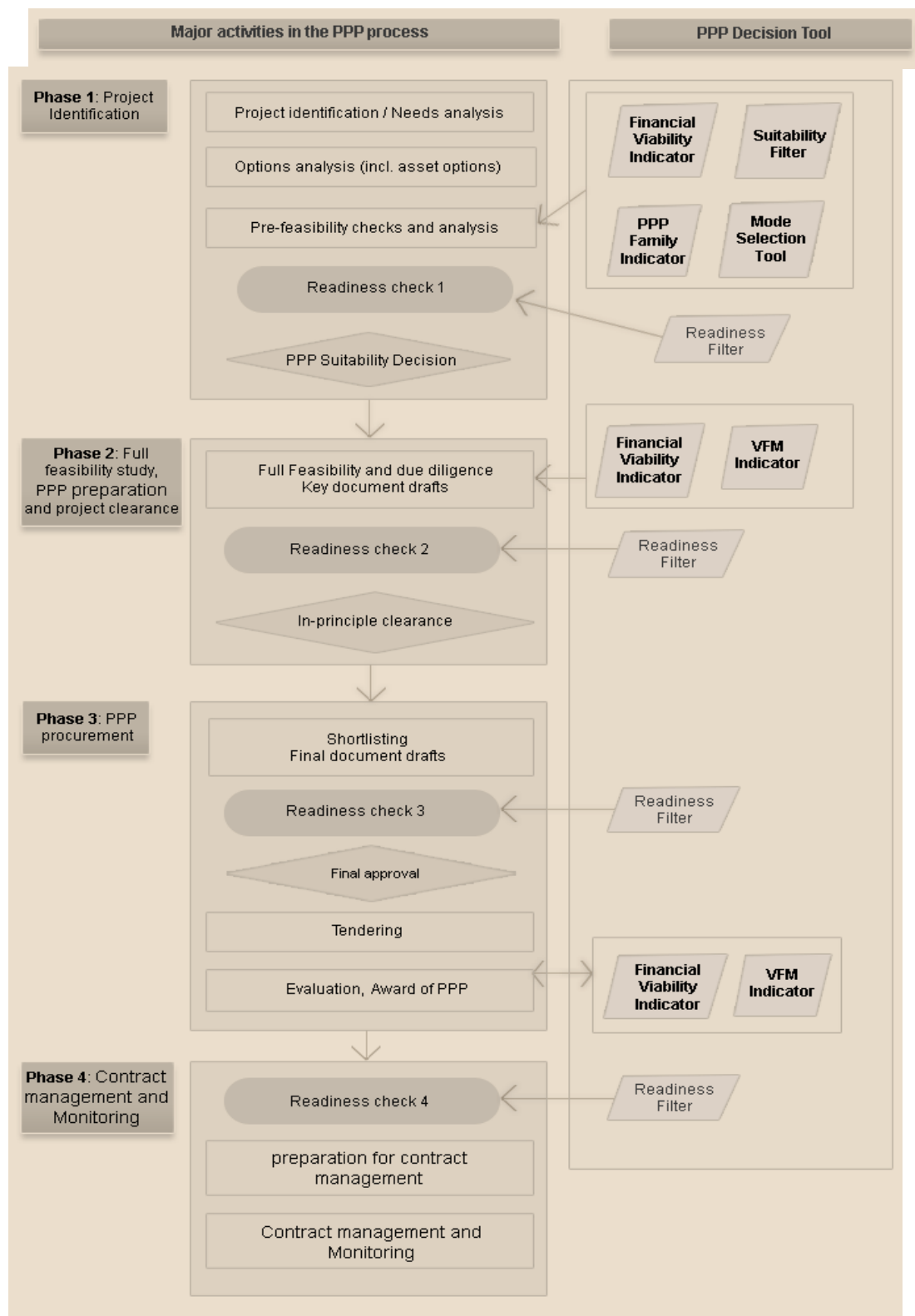


Figure 2: **The PPP Process and Decision Tools**
Source: Department of Economic Affairs (DEA, 2012)

The main stakeholders' roles in managing risk

A successful PPP project is also determined by the ability of main stakeholders in managing the involved risks in PPP projects. The major seaport reforms in India involve long-term partnership between the public and private sectors. This partnership is a complex set of relationships that require effective coordination among all participants in a PPP project. Cheng (2010) illustrated

the structural relationships of the most important participants into three major actors' triangle in a PPP project (see Figure 3).

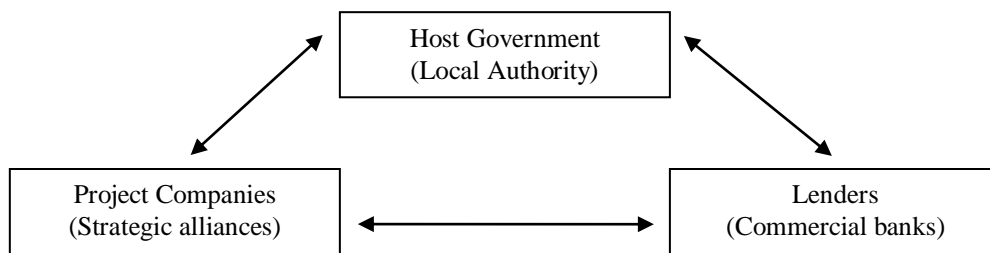


Figure 3: **The Triangle of Major Actors in a PPP Project (Cheng, 2010)**

Theoretically, three major actors (Authority, Concessionaire, and Lender) are trying to achieve consensus on the combinations of tariff schemes, concession periods, and rate of returns of a PPP project (Ngee *et al.*, 1997; and Liou and Huang, 2008). In the Indian context, there is an additional actor (the independent regulator) that also plays an important role in the process of implementing a PPP project. For a further discussion, the next section will address how the main stakeholders influence the PPP project process management of the selected three cases.

CASE STUDIES

In this section, three PPP seaport projects in India are selected to investigate a contemporary phenomenon of typical procedures used for evaluating PPP projects (Table 1). The reason is that multiple case studies facilitate a deep investigation of a real-life contemporary phenomenon in its natural context by using replication logic (Yin, 2003).

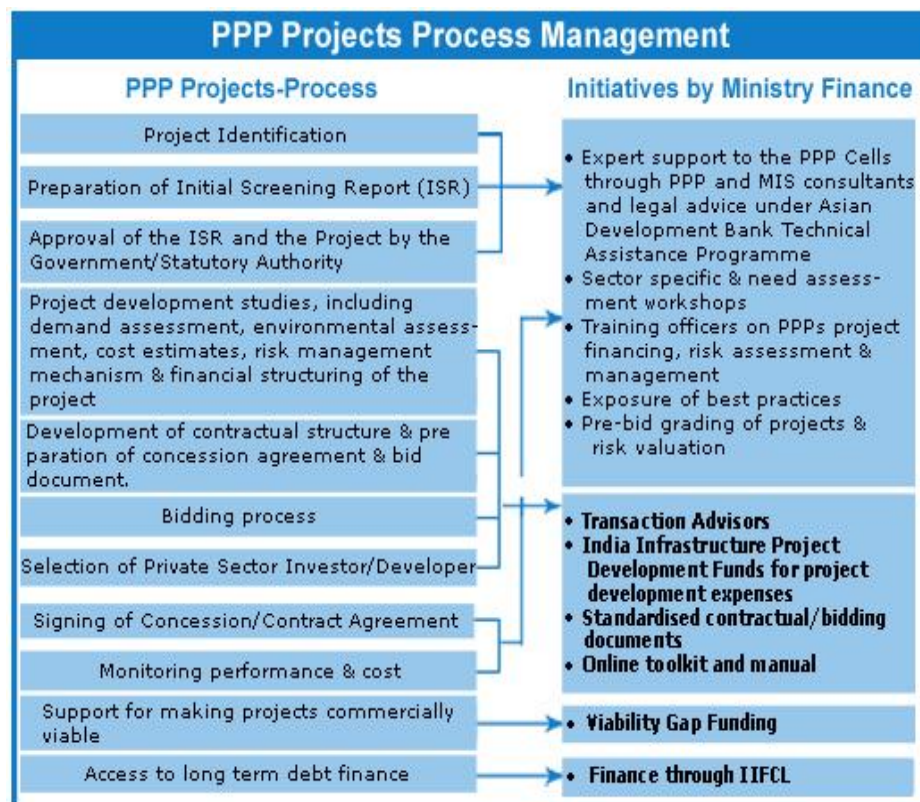


Figure 4: **PPP Projects Process Management in India**
Source: Department of Economic Affairs (DEA, 2012)

Figure 4 shows the PPP project process and initiatives by the Ministry of Finance, which may help to identify the involvement of the most influential actors when evaluating PPP projects. Hence, the evaluation procedure of PPP process will be presented in the form of chronological structure. Figure 5 illustrates important milestones in the three PPP seaport projects in India, which also demonstrates five PPP project stages.

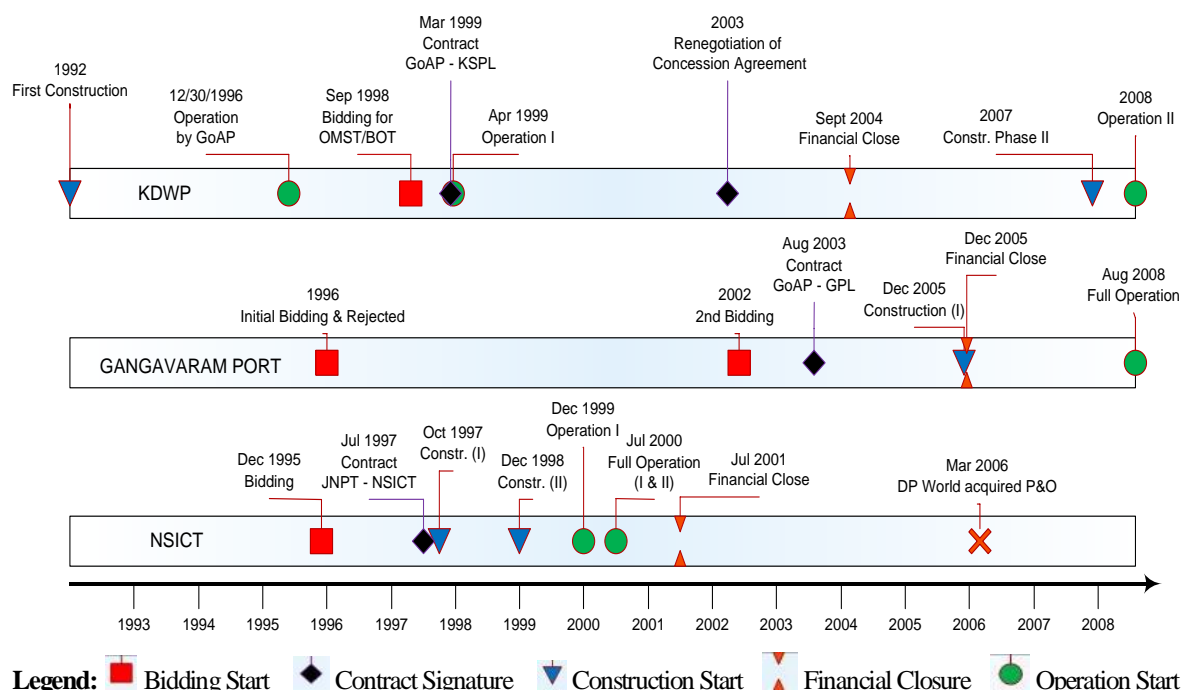


Figure 5: Important milestones of three PPP seaport projects in India

CASE DESCRIPTIONS

These three cases have been selected because they are three of the most important PPP projects in India, and because data for cross case analysis was available.

Table 1: Three selected PPP Seaport Projects in Indian for case study (DEA, 2012)

Case Study No.	Project	Sector	PPP Project Structure	State and Year PPP Contract Signed	Project Cost	Concession Period
1	Nhava Sheva International Container Terminal	Ports (Major)	BOT (includes Design and Finance)	Maharashtra (1997)	Rs. 733 crores	30 years
2	Gangavaram Port	Ports (Minor)	BOOT (includes Design and Finance)	Andhra Pradesh (2003)	Rs. 1,696 crores	30 years (extendable by additional 2 periods of 10 years each)
3	Kakinada Deep Water Port	Ports (Minor)	OMST/BOT (includes sharing of revenue with Govt)	Andhra Pradesh (1998)	Rs. 330 crores (4th Berth including offshore jetty)	20 years (extendable by 2 periods of 5 years each) Later extended to 30 years (extendable by 2 periods of 10 years each)

The Nhava Sheva International Container Terminal

The Jawaharlal Nehru Port Trust (JNPT) was established in 1989 and equipped with modern container and bulk handling facilities to overcome the existing port's deficiencies and the anomalies that characterized the Indian port sector. However, the JNPT failed to live up to the expectations it had generated regarding its performance since its inception right up to 1994. The JNPT also suffered from some of the drawbacks inherent in the Indian port sector in the pre-reforms era, especially in terms of capacity that prevented it from achieving world standards of port efficiency and performance.

Subsequently, the Port administration soon realized the urgent need to upgrade and augment the port's equipment to ensure larger cargo handling capability. The JNPT took the initiative to introduce private participation in ports for the first time in India. In January 1994, tender documents were initially prepared for contracting out the container terminal at JNPT to private operators. However, in 1995, the proposal was amended and it was decided to invite private participation in creating a new container terminal while retaining the existing one under government ownership and operation. After issuing a global tender, the Nhava Sheva International Container Terminal (NSICT) was appointed in 1997 to construct a new two-berth container terminal of 600-meter quay length on Build-Operate-Transfer (BOT) basis for thirty years. Detailed information about the project and the main stakeholders, are in tables 1 and 2.

The Gangavaram Port

The Gangavaram Port was first conceptualised in 1994 as all weather, multipurpose, deep water port, capable of handling Super Cape size vessels of up to 200,000 DWT. The first round of bids in 1996 was rejected by Government of Andhra Pradesh (GoAP) because the evaluation revealed speculative concerns regarding the validity and practicality of the market assumptions (traffic and tariff) and the underlying viability of the projections. In order to follow up the initial master plan that has a provision for 29 berths with a capacity of 200 MTPA to be developed in three phases over 15-20 years, the GoAP corrected the shortcomings of the first round and appointed an independent consultant to prepare a comprehensive feasibility study and manage the tender process in 2001. After conducting an international tender process, the consortium of Gangavaram Port Limited (GPL) led by Mr. D.V.S. Raju was selected to develop the port on BOOT basis in 2002. Then, concession contract was signed in 2003 (see Table 1).

The Kakinada Deep Water Port

The Kakinada Deep Water Port (KDWP) was developed by the Government of Andhra Pradesh (GoAP) from 1992 to 1996. The master plan for further development of 3 existing berths with 15 additional berths required an investment of over Rs. 1,500 crores. Being under deprived circumstances, such as limited capacity to develop the full infrastructure and inefficient operation, the GoAP decided to privatise the port operations under the PPP route in 1999. Kakinada Seaports Limited (KSPL) was appointed to operate the KDWP with OMST/BOMST (Operate Maintain Share and Transfer/Build Operate Maintain Share and Transfer) PPP model (see Table 1 and 2).

Table 2: The Main Stakeholders in the PPP Seaports Projects in India

Case Study No.	Project	Stakeholders			
		Government / Sponsoring Authority	Independent Regulator	Private Sector Promoter / Sponsor / Consortium Members	Lenders
1	Nhava Sheva International Container Terminal	Jawaharlal Nehru Port Trust	Tariff Authority for Major Ports (TAMP)	P&O Australia Ports Pty Limited, Konsortium Perkapalan Berhad and Trans Impex Private Limited (P&O Ports subsequently taken over by Dubai Ports World Limited (DP World))	A consortium of lenders led by ICICI Bank, ANZ Investment Bank, HSBC and Standard Chartered
2	Gangavaram Port	Government of Andhra Pradesh (No VGF has been provided to the project)	Tariff Authority for Major Ports (TAMP)	D.V.S. Raju of VisualSoft Technology (80% of Equity) & Dubai Port Authority, was later replaced by Integrax Berhad (20%), Warburg Pincus and the Andhra Pradesh Infrastructure Investment Company (APIIC)	A consortium of 13 Banks (State Bank of India, IDBI, Punjab National Bank, State Bank of Hyderabad, State Bank of Patiala and Oriental Bank of Commerce) led by SBI Capital Markets arranged term senior & subordinate loans of Rs.
3	Kakinada Deep Water Port	Government of Andhra Pradesh	Tariff Authority for Major Ports (TAMP)	Larsen & Toubro Ltd, India, Stevedoring Services of America, USA, Precious Shipping Company, Thailand, Konsortium Perkapalan Berhad, Malaysia	Asian Development Bank

MANAGEMENT OF PPP PROJECT PROCESS

The Nhava Sheva International Container Terminal

The preparation for the procurement process of a new container terminal by JNPT Port Planning and Development Department took a long time. Earlier involvements of the World Bank, Ministry of Surface Transport (MoST) and other ministries, from the inception and procurement stages, did not guarantee a smooth evaluation process in finalising the bid documents. The procurement process was delayed by about 2 years.

In December 1995, JNPT finally issued the international tender for a new container terminal on “Build, Operate and Transfer” basis for 30 years. Although 30 firms from India and abroad purchased the bid document, of which five consortia submitted proposals, the tender evaluation criterion used was too simplistic. The bidder with the highest NPV of Royalty payment was selected, which was a consortium led by P&O Ports Australia Pvt. Ltd. including DBC Port

Management and Konsortium Perkapalan Berhad. The royalty was based on Twenty-feet Equivalent Unit (TEU) handled traffic, which ranged from about 2% in the initial years to about 50% of the Minimum Guaranteed Royalty payment in the terminal year. The concession agreement between JNPT and the Special Purpose Vehicle (SPV) Company led by P&O Ports (now Dubai Ports) was finalised and signed in January 1997.

The Gangavaram Port

The procurement process of Gangavaram port privatisation started with a number of shortcomings due to unrealistic traffic projections prior to tendering, vague bid criteria, and thus created speculative offers that were unsustainable. The bid criteria gave separate weights for *Minimum* Guaranteed Amount (MGA), revenue share and investment commitments. Thus higher scores could be disproportionately achieved by giving larger investment commitments, though unrealistic. Consequently, after much deliberation, the GoAP decided to terminate the bid process in 1996. A second feasibility study with robust bidding preparation for the second round of global tender was prepared in 2001. Eventually, after the GoAP corrected the shortcomings in the first bidding, the concessionaire (GPL) was selected in 2002 through comprehensive evaluation criteria. However, the contract finalisation was a long drawn process that culminated with the signing of the concession agreement on Build-Operate-Own-Transfer (BOOT) basis in August 2003.

The Kakinada Deep Water Port

The GoAP issued an international competitive bidding for development of Kakinada Deep Water Port (KDWP) in September 1998. Although 14 parties participated in the prequalification (RFQ) stage, only four consortia submitted detailed proposals at the Request for Proposal (RFP) stage. Since one of the four consortia withdrew their proposal because errors were found in the proposal, only three proposals were considered for further evaluation. Three financial parameters were used to evaluate the bids across the following parameters: (1) Minimum Guaranteed Share of Income (MGA) for 50% of weight; (2) Percentage Share of Income to be paid to the GoAP with 30% of weight; and (3) 20% of weight for Investment Planed in Phase 1 development.

The procurement process of KDWP was faster than the previous two case studies. The consortium of International Seaports Pte Limited (ISPL) was awarded the contract in December 1998. Shortly after the award, the contract on the Operate-Maintenance-Share-Transfer (OMST)/Build-Operate-Maintenance-Share-Transfer (BOMST) format was signed on the 19th of March 1999. Subsequently, the consortium floated a special purpose vehicle (SPV) company, the Cocanada Port Company Ltd (CPCL), which was renamed as Kakinada Sea Ports Ltd (KSPL) for managing the port operations.

FINANCIAL VIABILITY ANALYSIS

The Nhava Sheva International Container Terminal

The cost of terminal project development was Rs. 733 crores, funded without Viability Gap Funding (VGF) support from the government. The financial structure proposed by the SPV was 50% debt and 50% equity. A consortium of lenders led by ICICI Bank loaned around Rs. 190 crores (26% of project cost) to the SPV under a guarantee provided by P&O Ports, Australia. The remaining debt of Rs. 177 crores was raised from other financial institutions. The cost of debt is 10.5%. The financial viability analysis showed that the estimated project IRR was 18% and the NPV based on the winning consortium's bid was Rs. 224.59 crores.

Although the project was considered financially viable, the lack of a methodology in evaluating the royalty payout to JNPT and the failure to anticipate problems arising from the relations of the royalty with the tariff level triggered several issues in the following operations phase. There were two interpretations on whether royalty payment should be considered as an expense or a share in the profit in the SPV's accounts while determining the port tariff. Eventually, the Tariff Authority

of Major Ports (TAMP) allowed royalty to be considered as a cost in the tariff computation for bids received prior to July 29, 2003. This revision resulted in a reduction in NSICT's tariff by 12%. However, it still imposed excess burden on port users. Therefore, in 2005, TAMP recognised the principle that royalty would be paid out of the Operating Surplus (i.e. Profit) of the concessionaire in the latest revised guidelines.

The Gangavaram Port

The total project costs, which were estimated at Rs. 1,696 crores, were funded without VGF. The financial structure of the project comprises 31% equity and 69% debt. A consortium of 13 Banks led by SBI Capital Markets arranged term senior & subordinate loans of Rs. 1,170 crores for the Phase I development. GPL successfully obtained an attractive rate of under 9% p.a. for the 14 year loan facility. The financial viability analysis showed that the estimated project IRR (post tax) was 22% while the Equity IRR was 30%. The project also demonstrated a very strong ability to pay interest and principal with an average Debt Service Coverage Ratio (DSCR) of 2.2. It is worth noting that higher DSCR reduces risks for lenders. Bakatjan, *et al.* (2003) stated that the range of 1.10 to 1.25 for DSCR is bankable, the range between 1.30 and 1.50 is satisfactory, and above 1.50 is preferable.

The Kakinada Deep Water Port

The construction costs of three berths at KDWP were Rs. 293 crores, which existing project were constructed by GoAP and funded by a loan of Rs. 242 crores from the Asian Development Bank. KSPL was responsible for operation and maintenance of the three berth facility and for developing the fourth berth. The cost of fourth berth development including an offshore jetty was Rs. 330 crores. The development comprised two phases. Phase 1 of the development, on the existing 3 berths, involved an investment of Rs. 175 crores, which had an equity contribution of Rs. 60 crores and debt funding of Rs. 115 crores. *Infrastructure Development Finance Corporation* (IDFC) was the lead lender providing Rs. 60 crores of the debt. The loan had tenure of 11 years. The financial viability analysis showed that the estimated project IRR (post tax) for Phase 1 and Phase 2 was 18.46%. However, the project was not likely to be viable due to over-estimated traffic and high component of MGA that the KSPL had to pay to the GoAP. Therefore, KSPL was unable to meet the obligation of the MGA. Only after KSPL requested the government to withdraw the MGA clause, did KSPL achieve financial closure for the Phase 1 development in September 2004.

VALUE FOR MONEY (VFM) ANALYSIS

Nhava Sheva International Container Terminal

In the absence of a database of previous project costs such as budgeted costs and actual costs (including overruns), the VfM analysis at the inception phase could not be conducted. Nevertheless, the post facto VfM analysis shows that NSICT is a classic case of a successful PPP process implementation in terms of time efficiency and cost over-runs in public works.

Gangavaram Port

The VfM analysis for this project is limited due to the absence of the financial model by the private port operator, since this is not in the public domain. Therefore, a post facto VfM analysis is presented in the comparison form between what was planned in the feasibility study and what has been achieved by the private operator based on publicly available information. Table 3 shows the summary of post facto VfM analysis of the Gangavaram Port project.

In general, the Gangavaram Port project has demonstrated value for money. Although the actual project cost was higher than the estimated cost, the actual unit cost of each berth (Rs.340 Cr/berth) is much cheaper than the estimation (Rs.382 Cr/berth). In other words, the capital expenditure efficiency achieved in project cost is 11%. Another contributing factor to the

efficiency in capital expenditure was the ability of the concessioner company to negotiate better financing terms with the lenders. Since interest rates are a function of prevailing market conditions, a lower interest rate (9% as compared to 15.5%) and longer tenor of debt (from 10 years to 14 years) would have been a fortuitous timing in the investment cycle that could have contributed to this efficiency.

Table 3: *Post facto* VFM analysis of Gangavaram Port project (DEA, 2012)

Variable	Feasibility Study	Actual Achieved
Project Cost	Rs. 1528 Cr	Rs. 1700 Cr
Berths	4	5
Maximum vessel size	120,000 DWT	200,000 DWT
Cargo in Year 1	10 MTPA	8 MTPA
Interest Rate	15.50%	9%
Tenure	10 years	14 years
Efficiency in Project Cost		11%
<i>[% Savings in Average Capex per Berth Achieved]</i>		

The Kakinada Deep Water Port

Again, due to the limited financial information available in the public domain, post facto VFM analysis was carried out on basis of the benefits from this project. The first benefit was the ability of KSPL to ensure adequate traffic to take up the development of the fourth berth. Secondly, the GoAP enjoys a steady revenue stream by way of revenue share and lease payments from KSPL. Third, KDWP paved the way for other port projects to be taken up on the PPP route. And the last is a substantial improvement in terms of port performance.

FINDINGS FROM THE CASE STUDIES

This section comprises two main findings which are derived from cross case analysis and discussion. Three cases are examined by using cross case analyses with three units of analysis analyses: 1) Management of PPP project process; 2) financial viability analysis; and 3) value for money analysis. The commonality patterns were identified within each unit of analysis in three case studies. In addition, some important factors within each pattern will also be discussed.

CROSS CASE ANALYSIS

Management of PPP project process

From the three case studies, the implementation of PPP project requires extensive project preparation and management in order to achieve an efficient procurement process. However, the procurement process for a brownfield project is faster than a new project in general. As demonstrated by KDWP, the procurement process was faster than in the two other cases because KDWP has an advantage of having historical information that could be used for realistic traffic projection. Without comprehensive preparation, the procurement process tends to be longer.

The three case studies also demonstrated that the main stakeholders should consider the interests of the other stakeholder's interest in order to manage the risks in a PPP project. The same pattern of these cases is independent regulator (e.g. TAMP) played an important role in protecting the interest of lenders by scrutinising the capital expenditure on port terminals for the purpose of tariff setting.

Financial viability analysis

The project financial viability is determined by a robust financial model that examines the key questions of financial viability and the “what-if” scenarios used from project preparation up to operation stages. The three cases demonstrate that PPP financial models were utilised in their evaluation. It also emerged that there are several important financial indicators that they have been using; such as: Tariff, Royalty, Debt to Equity Ratio, NPV, IRR, and DSCR.

Two matched pattern from the three cases demonstrated as follows:

- Unrealistic traffic projections resulted in cancellation of tendering (e.g. first round tendering for the Gangavaram Port) and tariff setting issues in the subsequent operation phase (i.e. An excess tariff burden on NSICT port users and inability of KSPL to meet obligation of the MGA).
- The concessionaire could not achieve the required financial closure within 180 days (plus a grace period of 120 days) from the date of the agreement due to poor project preparation at the pre-bid stage.

Value for money analysis

Since the spirit of PPP project is based on the ability of the project to deliver VFM, it is essential to ensure that the project offers more benefits than the traditional project. The three cases have successfully demonstrated the ability to deliver value for money in terms of time efficiency, cost overrun anticipation, traffic performance, attractive interest rates and tenor of debt.

DISCUSSION

Leveraging the roles of the main stakeholders in managing risk

Initially the host government starts identifying a project that needs private sector participation. This process requires pre-feasibility analysis including demand assessment, environmental assessment, cost estimates, risk management mechanism and financial structuring of the project. Without a comprehensive project preparation, the procurement process will be longer than the expected or may even be rejected as demonstrated in NSICT and Gangavaram Port cases. Once the project is ready for the bidding process, private companies are invited to participate in the tender. Given that one of the shortlisted bidders of KDWP case had to withdraw their proposal due to error, it is of paramount importance that the proposal is double checked before being submitted. Then, the prospective bidder is selected. However, it is also important to be realistic in accepting the bidder's proposal. The KDWP case proved that higher MGA was not a good parameter in evaluating bidders' proposals. Consequently, the GoAP had to withdraw the MGA clause in favour of KSPL. After signing the concession agreement, lenders are invited to participate in funding the project. On the condition that lenders are satisfied, financial closure can be achieved. Otherwise, delay in reaching financial closure is likely to happen as shown in all the three cases. Finally the construction and operation of the project can be started. In the operation stage, the independent regulator plays an important role in balancing stakeholders' interests. TAMP has the authority to scrutinise the capital expenditure of the three cases and allow or disallow certain expenditure to be included under the heading of ‘allowable expenditure’ for the purpose of tariff setting. Therefore, these processes need extensive evaluation procedures that should be followed by all participants.

Realistic traffic projection

Although optimism bias is a common phenomenon in most public projects, it is essential to be realistic in assessing the market of a project. This is so because traffic projection is the key input in tariff setting and it is directly linked to the revenues against which cost and returns are set off. In the absence of robust project preparation, the three cases faced various problems that are linked to unrealistic traffic projection. For instances: TAMP had to cut NSICT's tariff by 12% because

of excessive revenue, the GoAP had to withdraw MGA clause in favour of KSPL, and the GoAP had to reject speculative offers that were unsustainable. We suggest giving attention to the projection of traffic volume and avoidance of unduly optimistic traffic forecasts.

Financial closure period

Theoretically, a good PPP project is indicated by a short financial closure period. When a project has sufficient revenue stream and strong commitment support from the host government, the project is financially viable. However, having those criteria is not good enough for procuring large infrastructure projects. It is argued that a robust evaluation procedure should be present in order to speed up the due diligence process. When lenders are convinced of the financial viability of the project, the due diligence process becomes faster. Otherwise, financial closure delay is likely to happen as revealed in all the three cases. Therefore, one of the indicators of a good PPP project is a short financial closing period.

If we focus on the financial closing period, we cannot overlook the importance of PPP financial model as a tool for evaluating a project. PPP financial model is not just tool for evaluating the project but it is also a tool for negotiating the risk sharing mechanism. Back to the project evaluation at pre-bid phase, PPP financial model is used to assess the project's financial viability in terms of project cost, traffic, tariff, and revenue. When proper project evaluation is undertaken, the project will be ready for the next stage. The next stage is contract negotiation between the prospective bidder and the host government. Without a comprehensive financial model derived from pre-bid stage, it is unlikely that the negotiation process will be undertaken within a short period. A comprehensive financial model generally contains all the important information needed by both stakeholders. However, there is usually a misconception from the government side. They tend to assume that when PPP is used in procuring large infrastructure projects, all the risks and the responsibility related to financial viability of the project fall on the private parties including the lenders. Unfortunately, this misconception still exists up till now, with some government representatives being reluctant to enter into contract negotiation with the private parties. From the interviews and the literature on the Indian case, they prefer to simplify the process of procuring PPP projects by selecting the prospective bidders without considering the prospective lenders who are willing to support the project funding. Lenders are part of the private parties that also play an important role in achieving a successful PPP project. This is because most PPP projects are funded mainly by loans from lenders or financial institutions and with less funding from private equity investors. As such, they should be given due consideration in the selection process in order to ensure quick closure.

Independent regulator

Since a PPP project has a long concession period, an independent regulator is needed to balance the interests between public and private that are represented by licensor and concessionaire. This is necessary because the licensors sometimes have an authority to manage their own port facilities (e.g. Post Trust). In this case, TAMP is an independent regulator for controlling the tariff issued by private ports and port trusts in India. In order to do their job, TAMP scrutinises the capital expenditure of the port terminals and allows or disallows certain expenditure to be included under the heading of 'allowable expenditure' for the purpose of tariff setting. Moreover, TAMP also monitors the project's financial performance and ensures that audited results reflect the true performance of the port rather than under-reporting of profits. Such an authority is a must for good practice.

CONCLUSIONS

The advent of PPP as an alternative procurement strategy offers opportunities and challenges to public and private sectors. Some common problems such as time and cost overruns, low productivity, and operational inefficiency, have been experienced by public sector asset managers. Meanwhile, in the same domain, the private sector has demonstrated higher productivity and

efficiency for the sake of profit maximization. Private participation in public projects should be comprehensively evaluated in order to achieve successful PPP projects.

The study shows that there have been major drawbacks in the evaluation and implementation process of PPP projects as influenced by some important actors in India. With the use of cross case study for in-depth investigation, some patterns have emerged from the study that forms the basis for suggestions for improving PPP implementation. First, the independent regulator played an important role in protecting lenders' interest by scrutinising the capital expenditure of port terminals for the purpose of tariff setting. Such an authority is necessary for regulating PPP projects. Second, unrealistic traffic projections resulted in cancellation of tendering and tariff setting issues in the operation phase. We suggest that PPP stakeholders insist on realistic forecasts as a means of preventing projects from ending in failures. Third, concessionaires could not achieve the required financial closure within 180 days (plus a grace period of 120 days) from the date of the agreement due to poor project preparation at the pre-bid stage. We therefore suggest that PPP stakeholders devote sufficient time to pre-project planning as a means of ensuring success in early project closure. And the fourth commonality shows that three cases have successfully demonstrated the ability to deliver value for money in terms of time efficiency, cost overrun anticipation, traffic performance, attractive interest rates and tenor of debt. These lessons can be learned by other developing economies. The study also shows that Indian government has successfully developed a PPP toolkit based on the experience from previous PPP projects.

REFERENCES

- Askar, M. M. and Gab-Allah, A. A. (2002) "Problems Facing Parties Involved in Build, Operate, and Transport Projects in Egypt". *Journal of Management in Engineering*, Vol. 18, No. 4, pp. 173-178.
- Bakatjan, S., Arikian, M. and Tiong, R. L. K. (2003) "Optimal Capital Structure Model for BOT Power Projects in Turkey". *Journal of Construction Engineering and Management*, Vol. 129, No. 1, pp. 89-97.
- Bichou, K. and Gray, R. (2005) "A critical review of conventional terminology for classifying seaports". *Transportation Research Part A: Policy and Practice*, Vol. 39, No. 1, pp. 75-92.
- Cheng, H.-K. (2010) "Lessons Learned from BOT Infrastructured Development in Taiwan: A Case Study of the Taiwan High Speed Railway (THSR) Project". *Public Administration Quarterly*, Vol. 34, No. 1, pp. 51-75.
- Cheung, E. and Chan, A. P. C. (2009) "Is BOT the best financing model to procure infrastructure projects? A case study of the Hong Kong-Zhuhai-Macau Bridge". *Journal of Property Investment & Finance*, Vol. 27, No. 3, pp. 290-302.
- DEA (2012) "Public Private Partnership: Overview", Available from: <http://pppinindia.com/overview.php>. (Accessed August 22, 2012).
- Kakimoto, R. and Seneviratne, P. N. (2000) "Financial Risk of Port Infrastructure Development". *Journal of Waterway, Port, Coastal, and Ocean Engineering*, Vol. 126, No. 6, pp. 281-287.
- Kulkarni, N. and Prusty, A. (2007) "Bidding Strategy for BOT Port Terminal Projects in India". *The Journal of Structured Finance*, Vol. 12, No. 4, pp. 90-106.
- Liou, F.-M. and Huang, C.-P. (2008) "Automated Approach to Negotiations of BOT Contracts with the Consideration of Project Risk". *Journal of Construction Engineering and Management*, Vol. 134, No. 1, pp. 18-24.
- MoST (1996) "Guidelines for Private Sector Participation in Ports for Leasing Out Existing Assets and Construction/Creation of New Assets", Ministry of Surface Transport, G. o. I., New Delhi.

- Ngee, L., Tiong, R. L. K. and Alum, J. (1997) "Automated Approach to Negotiation of BOT Contracts". *Journal of Computing in Civil Engineering*, Vol. 11, No. 2, pp. 121-128.
- Perard, E. (2011) "High Level of Private Activity in Energy, Transport, and Water in IDA Countries", Available from: <https://openknowledge.worldbank.org/handle/10986/10904>. (Accessed 11 October 2012).
- Ray, A. S. (2005) "Managing Port Reforms In India: Case Study of Jawaharlal Nehru Port Trust (JNPT) Mumbai", Available from: http://siteresources.worldbank.org/INTWDR2005/Resources/477407-1096581040435/wdr2005_india_port_reform2.pdf. (Accessed 14 October 2012).
- TRW (2010) "Basic Port Statistics of India 2008 - 2009", Transport Research Wing (TRW), New Delhi.
- World Bank (1995) "India - Port Sector Strategy Report", Available from: <http://documents.worldbank.org/curated/en/1995/03/697551/india-port-sector-strategy-report>. (Accessed 14 October 2012).
- Yin, R. K. (2003) *Case Study Research: Design and Methods*, London, Sage Publications.

MONITORING PERFORMANCE REQUIREMENTS IN PUBLIC PRIVATE PARTNERSHIPS: DUTCH PRACTICE

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Monitoring as a part of Contract Management is an important issue in all projects but particularly in integrated projects such as Design Build (DB), Design Build Maintain (DBM), Public Private Partnership (PPP) / Design Build Finance Maintain Operate-projects (DBFMO) and Integrated Maintain Contracts (IMC). In integrated projects more risks and responsibilities are embodied in an agreement with the Contractor. The Contracting Authority is less involved in the realization, operation and maintenance of the building and the services. However, the Contracting Authority will keep the inalienable responsibility regarding its goals and primary process in the end result. A proper monitoring seems the only way to handle this dilemma. Moreover, special attention is required considering the duration of integrated contracts, extending over 15 years and more over time. The Rijksgebouwendienst (NL Government Building Agency) has adopted System-oriented Contract Management (SCM), introduced by Rijkswaterstaat (the executive agency of the Ministry of Transport, Public Works and Water management in the Netherlands). Monitoring performances and controlling risks is an essential part of the SCM. To ensure that performances, described in the Output Specifications are met and risks, related to the building and services, are efficiently and effectively controlled by the Contractor, it is essential to describe the monitoring process. In the Dutch Public Private Partnership-projects (PPP-projects) monitoring is an integral part of the Output Specification. This paper discusses the Dutch approach with regard to monitoring performance requirements, described in Output Specifications, during the operational phase of the project and clarifies the relation with the Payment Mechanism. The Output Specification and the Payment Mechanism are both supplements of the Dutch PPP/DBFMO-agreement.

Keywords: Performance Based Briefing, Output Specification, Payment Mechanism, Public Private Partnership (PPP), System-Oriented Contract Management (SCM)

INTRODUCTION

In the Netherlands the Rijksgebouwendienst (Rgd), i.e. the Government Building Agency, acts as the national corporate real estate agency and is the Contracting Authority for traditional and integrated projects like PPP-projects.

In the early nineties the Rgd started applying more integrated procurements like DB(M). In 2003 the first PPP / DBFMO project was procured. Nowadays more integrated procurement methods are developed and applied, driven by the policy of the Dutch Government in general and of the Rgd in particular, increasingly following the slogan “The market delivers”.

Dutch PPP-projects are of a contractual nature. The partnership between the public and the private sector is based solely on contractual links. [Private-Public Partnerships: contracts and risks- Rui Cunha Marques, February 2010].

Along with the introduction of more integrated procurements the content of the brief (called Output Specification for DBFMO-agreements) is substantially altered compared to the traditional project brief. The Rgd adopted the performance based briefing approach instead of the prescriptive based briefing. The performance approach focuses on what the building is required to do, and not on describing the technical solutions i.e. how it is constructed (CIB 1982). In the Output Specifications the Rgd describes the performances that must be met by the Contractor,

including the verification methods urging the Contractor to verify that the described performances are met during the design-, realization- and operational phase over time. Realising that the contract duration covers 15 years and more, it is obvious that monitoring the process is a critical success factor.

In the early nineties the emphasis of verification was predominantly on the delivery phase and not particular on the operational phase of the project. In 2003 the first Dutch PPP / DBFMO-projects with a contract period of 15 – 25 years were initiated. To ensure that the performances described in de Output Specification will be met during the whole contract period, the focus of the verification process moved increasingly towards the operational phase. The emphasis of verification shifted also from verification (doing things right) towards validation (doing the right things). The whole process of verification and validation of the building and the services during the operational phase is called monitoring. The whole monitoring process does not stand on its own but is an important part of System-oriented Contract Management (SCM) which the Rgd is developing.

SYSTEM-ORIENTED CONTRACT MANAGEMENT

The Rgd adopted the contract management approach of Rijkswaterstaat (the executive agency of the Ministry of Transport, Public Works and Water management in the Netherlands). System-oriented Contract Management is defined as:

- All activities being executed by or on behalf of the Contracting Authority and aiming at
 - The performances in the DBFMO-agreement being met;
 - Risks for the Contracting Authority being controlled.
- Contract management must be:
 - Efficient (at a distance and with minor effort).
 - Effective (based on top and top-effect risks).

Within System-oriented Contract Management 3 levels of verification are described (Rijkswaterstaat 2011):

1. System verification.
2. Process verification.
3. Product verification.

Contract management is divided in two components:

1. a component which is content-related (performances being met: yes /no)
2. a component which is process-related (processes being controlled)

In PPP / DBFMO-projects the Contracting Authority steps away from the design-, realization- and operational process and from solutions chosen by the Contractor. The Contracting Authority describes basically **what** he wants in (functional) performance requirements, while the Contractor is responsible for **how** the performances are met. Consequently the Contracting Authority prefers not to be (too much) involved in the verification process. Effective (from a distance) and efficient (only focused on top and top-effect risks) are key words when it comes to System-oriented Contract Management in the design, realization and operational phase.

In Dutch PPP / DBFMO - projects the way in which building and service related performances and processes are monitored during the operational phase, is described in the Output Specification.

OUTPUT SPECIFICATIONS

The Output Specification for PPP/DBFMO-projects is a supplement of the DBFMO-agreement as well as a communication document. It describes the (functional) performances to be met by the Contractor. However reading the document it must be clear for the Contractor what must be realized and what is important for the Contracting Authority.

The Rgd has developed a systematic approach based on the Nordic Five Level Structure (NKB 1978), as to structure the briefing process.

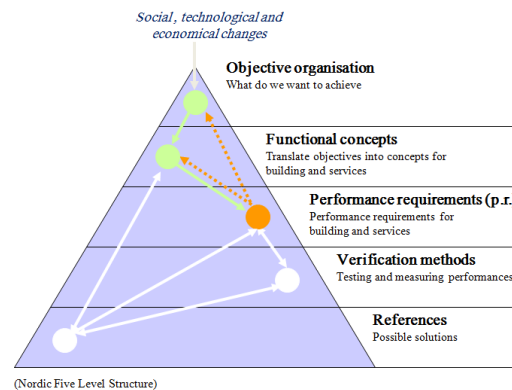


Figure 1: Systematic approach based on the Nordic Five Level structure

1. *Objective of the organisation:* The first step in the pyramid is a description of the goals and mission statements of the organisation. These are generally written documents provided by the client-organisation as to communicate the mission and vision of the organisation and their staff. The client of the Rgd will take the lead to analyse the documents and extract useful information in terms of building and service-related mission statements in behalf of the brief.
2. *Functional concepts:* The next step in the pyramid is to “translate” those building and service related mission statements into the functional concepts. Goals and mission statements of an organisation do affect the way the primary process is organised and will influence numerous functional requirements. For example: the client wants a pleasant work environment for their employees, which stimulates communication. This requirement deals with aspects related to the building itself, the workplaces, logistics, communication etc. But it also affects the services to be provided. In this step clarification is urgent on what the client really means and what he really wants and why he wants it (pursue the “question behind the question”), and what it’s impact will be with regard to the building design and the provided services. This is a very important part of the process because it provides very much information for the expert who is assigned to write the performance requirements and, moreover, it generates important input in behalf of the monitoring process. In this step of the process one must be aware to sustain the principle to describe those concepts in a performance based way and not in a solution based way.
3. *Performance requirements:* In the next step the functional concepts must be “translated” into Specific, Measurable, Acceptable, Realistic, Timely performance requirements (functional as well as technical). Especially the relation between the functional concepts and the performance requirements is very important in the communication between the client and the expert.
4. *Verification methods:* In step four verification methods for each requirement are described. To verify the requirements one can use national and/or international standards like the ISO standards for example. In the case of PPP / DBFMO-projects most verification methods must be applicable as a part of the monitoring system during the operational period.
5. *References:* References can be added to facilitate communication for both the client and the expert and/or in support of the communication between the Contracting Authority and the

Contractor. Sometimes it is hard to express in words what one really wants, for example when it comes to architecture. References can be added to the brief as to illustrate the views or images expressed by the client and/or to underpin a required performance, but one should carefully avoid interpretation of a reference as a “hidden” solution.

Figure 1 shows that with the describing of the performance specifications one also have to describe the way how the performance is to be verified. The verification method must be applicable for the phase it is applied for. During the operational phase of a building the verification methods will mainly consist of measurement-methods instead of calculation methods which are mainly used during the design phase.

Using the Nordic Five Level approach helps a lot to identify the most important aspects regarding the client’s primary process, the distinguished risks and the consequences for the required building and services. For PPP / DBFMO-projects the whole Output Specification is described in a semantic database. In this semantic database all relations between objectives, functional concepts, performance requirements, verification methods and reference are made visible. Top and top-effect risks are made more clear in a semantic database than in only a written document, like a Word document.

MONITORING

Objectives

The objectives for the Contracting Authority with regard to monitoring are:

- Risk control assurance.
- Quality assurance.
- A system with which the Contracting Authority can effectively guide and maintain the processes with a minimum effort of own personnel (efficiency).
- The whole monitoring system is described in the DBFMO-agreement and the supplements Output specifications and Payment Mechanism.
- In the DBFMO-agreement obligations of and between the Contracting Authority and the Contractor are described;
- In the Payment Mechanism the Gross Availability Payment (GAP) and the way Deductions are calculated (Availability Correction (AC), the Performance Deduction (PD), deduction Periodic Monitoring, Repeat deduction etc.) are described;
- In the Output Specification the performances, verification methods, Correction Deadlines and the several Deductions are described.

Monitoring-system

The monitoring-system consists of three levels:

- System audit
- Periodic monitoring
- Malfunction

System audits

The Contractor must describe all his procedures including the improvement cycle - Plan – Do – Check – Act cycle (Deming cycle) in an quality management plan (ISO 9001) and act according

to this plan during the operational phase. The Contracting Authority must approve the plan. This seems a bit illogic in a PPP / DBFMO, where the Contractor is given the maximum freedom to arrange his own processes. However, for the Contracting Authority it is absolute necessary to have knowledge of the Contractors processes:

1. Making a quality management plan implies that the Contractor is urged to consider his processes and to properly reflect on the way he will manage and control risks;
2. The Contractor is urged to think about the way he will monitor performances, register Malfunctions and prove requirements are met after Malfunction, the time a Malfunction is repaired and the consequences (deductions) for his Periodic Payment (legality of payments).
3. The Contractor is also urged to reflect about the improvement cycle of his processes;
4. A quality management plan will reveal possible conflicts with the processes of the Contracting Authority. In such cases the Contractor can modify his processes on forehand;

A quality management plan is no guarantee for the Contracting Authority that the Contractor is in control, but the plan may give the Contracting Authority some trust in advance.

During the operational phase a quality management plan is not without obligation. The system will be periodically audited. If the audit shows that the Contractor systematically does not work according to his own quality management plan the trust relation between the Contracting Authority and the Contractor will be damaged and a high Deduction on the Periodic Payment will be the result (or worse the agreement will be broken).

Periodic monitoring

The services provided by the Contractor will influence the inalienable responsibilities and the primary process of the Contracting Authority. For the sake of accountability the Contracting Authority wants to ensure the Contractor is in control and the risks are minimized. This is to be proved by Periodic Monitoring. Periodic Monitoring is focused on top and top-consequence risks. Periodic monitoring will check the most important parts of the processes with regard to a subject and the outcome of the process (products). Fire safety of a building is, for example, an inalienable responsibility of the Contracting Authority. Periodically this aspect must be checked. Therefore the described procedures in the quality management plan will be evaluated, logbooks will be checked and, at random, the results of activities (products) will be checked.

The Periodic Monitoring is executed by independent organizations (efficiency). An independent organization has no interest in the result so the outcome of the Periodic Monitoring is more or less undisputed. When the independent organization concludes that the performances set in the Output Specification or in the described processes within the quality management plan are not met, the Contractor will get a Deduction Periodic Monitoring on his Periodical Payment. The Malfunctions will be registered in the registration system and must be solved conform the Malfunction procedure (see later).

If the Contracting Authority presumes that some processes are not fulfilling the requirements and/or the quality plan the Contracting Authority may have an independent organization to execute a Random Monitoring. When the results reveal that the requirements are not met, the Contractor must pay the Random Monitoring and solve the identified Malfunctions.

Malfunction

When a performance requirement in the Output Specification is not met (Malfunction), the Contractor must solve the problem and verify the performance after solving it. There are two sorts of Malfunction:

1. With regard to the availability of spaces in the building;
2. With regard to the performances of the services.

When a Malfunction occurred the Contractor is given a certain amount of time to repair the Malfunction(s). This is called the Correction Deadline (CD). This Correction Deadline depends on the seriousness of the Malfunction. For instance, a Malfunction with regard to a security issue must be repaired much faster than a Malfunction with regard to a functionality.

There are 5 levels of seriousness:

- Security and safety (availability and performance)
- Legislation (availability and performance)
- Functionality (availability and performance)
- Comfort (availability)
- Representativeness (availability)

Each level has their own Correction Deadline.

The time it takes the Contractor to repair the Malfunction is called the Correction Time (CT). When a Contractor takes more time than the prescribed Correction Deadline ($CT > CD$) he will get a Deduction at his periodical payment. The Deduction is a fixed amount. The total Deduction on the Periodical Payment is related to the time the Correction Deadline is exceeded and the level of the Malfunction. The longer the Correction Deadline is exceeded the higher the total Deduction (Deduction * exceeding time).

The fundamental idea of the monitoring-system is that the Contracting Authority will not measure for the sake of measuring. Only the performances which are important for the process of the user will be measured constantly (for example the temperature in the Main Equipment Room (MER)). These performances are described in the Output Specifications. When a Malfunction is detected the Contractor is warned automatically by an alarm system and the Correction Deadline starts at once. Other Malfunctions are reported to the Contractor by the user (email, phone or else). This is called the “Beep”-system. When the user has reported the Malfunction the Correction Deadline starts.

The Contractor must register the Malfunction in a registration-system including the time when the Malfunction was reported (automatically or by the user), register the actions he took to restore the requirements (including verification that proves the malfunction is repaired and the requirement is met again) and the end of the repair time. This registration-system is linked to the Contractor’s financial system and is also audited on a regular basis.

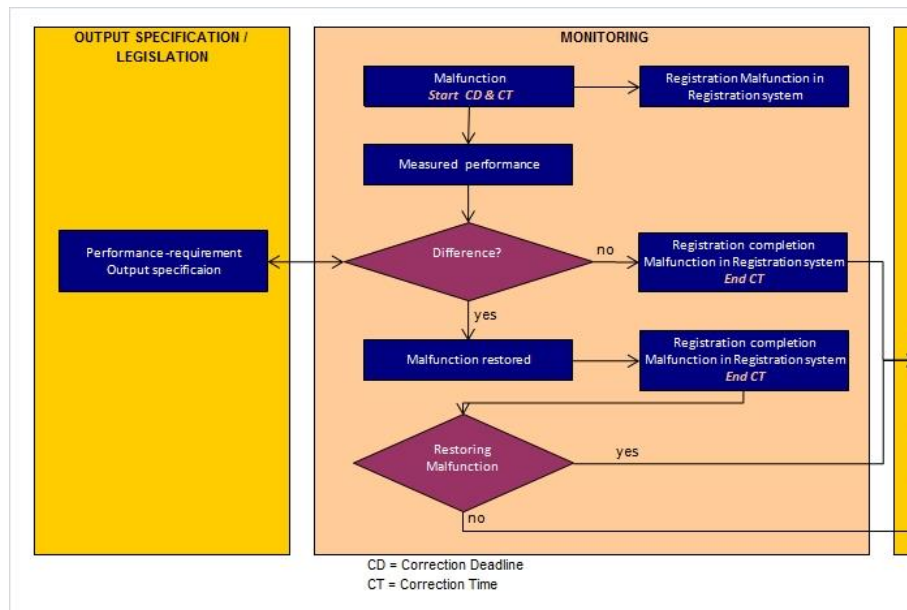


Figure 2: Malfunction procedure

The Contracting Authority requires a pro-active attitude of the Contractor. The height of the Deduction and the length of the Correction Deadline will influence that. When Malfunctions occur the Contracting Authority wants the performance restored permanently, and not temporally. In the Output Specification limitation of Malfunctions per space or per service per payment period are given. When the Contractor exceeds the limit per space or per service he gets a Repeat Deduction. The Repeat Deduction is a kind of “irritation Deduction”. The limitation of Malfunctions per space or per Service is built in the DBFMO-agreement to force the Contractor to solve the Malfunction at once and not temporality.

For example, when a security camera is out of order several times per month the primary process of the user is disturbed too frequently and security personnel must take precautions because they can’t rely on their “equipment”. They will be getting irritated by the Malfunction.

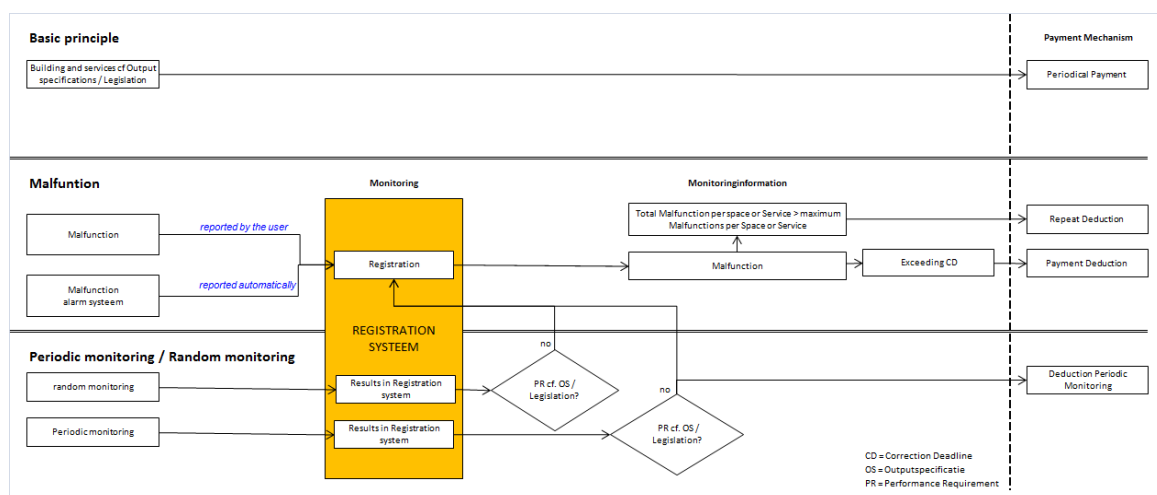


Figure 3: Basic principle Monitoring

Scenarios

When the monitoring-system, including the Correction Deadlines, Malfunction limitations, the Payment Deductions etc., is described for a project, one or more scenario sessions will be held. Within such session the whole system will be reviewed, preferably based on realistic cases. During a scenario session a group of people will check whether the Output Specification is

complete and SMART enough, whether the Correction Deadlines are not too long or too short and if the described Deductions are not too high or too low.

Everybody working on their part of the Monitoring System have a view on how the system works but in a scenario-session all separated parties come together and with scenario's based on realistic cases the whole system comes to life.

CONCLUSIONS

Developing a monitoring-system is more or less based on worst case scenario's. The Contracting Authority must reflect about all possible scenario's in advance and describe and secure them in the monitoring system. Also the frequency of Periodical Monitoring must be described. It is appropriate to intensify a Periodical Monitoring, the Contractor will not accept that without extra payment. It is much easier to reduce the frequency when the Contractor have proven he is in control (a kind of reward).

The negative site of the developed system is that it is very much based on Deduction instead of Rewarding. This can influence the partnership ("whatever we do it is not good enough we always get a Deduction"). This is a serious item which will be investigated in search for improvement.

The developed Monitoring-system has proved to function in practice. The Contracting Authority can guide and maintain the processes. The overall quality is realised in projects in practice. The system requires consistent contract management. Giving Deductions is seldom without a shrug. This is a point of attention.

One of the objectives of the system, pro activeness, is not yet achieved. Contractors are still organised in a traditional way. Life cycle thinking is not yet common sense. The organisations are more focused on "trouble shooting" then on prevention by pro-active working. Because Contractors are not used to work this way it takes time before the whole organization understands the principle. Therefore Contract Management is not yet so efficient as it should be, but the Contracting Authority as well as the Contractor will learn and communication plays a crucial role in this learning curve.

REFERENCES

- Rui Cunha Marques, February 2010, *Private-Public Partnerships: contracts and risks*,
<http://www.regulationbodyofknowledge.org/faq/pppTypes>
- CIB Report, 1982, *Working with the Performance Approach in Building*, CIB Publication no. 64, Rotterdam, Netherlands
- NKB (Nordic Committee on Building Regulations), 1978, *Structure for Building Regulations*. NKB Report No. 34. November. Stockholm, Sweden. NKB
- Rijkswaterstaat, Oktober 2011, *Systeemgerichte Contractbeheersing Anno 2011*, Rijkswaterstaat

VULNERABILITY IN THE TRANSPORTATION PUBLIC PRIVATE PARTNERSHIPS

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Public Private Partnerships (PPPs) are becoming a favourite tool of governments around the world to leverage private capital and expertise in order to develop and manage their national and urban transportation networks. The value for money (VFM) approach using PPPs models for project delivery has attracted many researchers from academia and industry to explore, develop and evaluate codes of conduct for private business in public infrastructures. Despite the availability of a huge number of research, international experiences with transportation infrastructure PPPs have shown massive problems and partnership failures where both the public and private sectors suffered huge losses. The facts behind such failures is that any transportation PPP project, irrespective of the hosting country, is always vulnerable to certain factors; and failure of the timely realization of such factors increases the probability of partnership failure. The existence of such factors has been confirmed via case studies of failed transportation PPPs projects from developed and developing nation, and named as ‘failure drivers’. Consequently, this paper explores vulnerability in transportation PPPs and the failure drivers to which any transportation PPP is vulnerable. The role of identified failure drivers is then elaborated with respect to the project life cycle with examples drawn from case studies.

Keywords: Transportation; Public Private Partnerships; Failure Drivers.

INTRODUCTION

Public Private Partnerships (PPPs) are the procuring models to develop and manage public infrastructures. PPPs constitute extended involvement of private sector partners compared to the conventional procurement systems commonly adopted by the public sector agencies for procuring public infrastructures. In the recent past, PPPs have proved their potential to be more efficient procurement frameworks for public agencies looking after efficiency gains and extended value for money (VFM) for their subscribers/users. However, organizing PPPs is not as easy or similar to conventional procurement methodologies, and therefore PPPs entail larger amounts of risks and pitfalls for public sector personnel new in the PPP business. The successful implementation of PPPs usually requires a tailor-made set of tools and methodologies apart from those which were applied in conventional procurement systems. Due to the fact that transportation PPPs involve multiple stakeholders that include the general public, who constitute the largest share of PPP infrastructure consumers, the organizational structures of typical transportation PPPs have a significant amount of risks. Therefore, despite the availability of an ideal atmosphere for PPP business, there are some factors to which all transportation PPPs remain vulnerable, irrespective of their location.

The recent popularity of transportation PPPs, and the risks and pitfalls attached, has attracted many researchers to evaluate public needs and to develop codes of conduct for private business in public transportation infrastructures. Consequently, the literature published in last two decades is quite saturated with PPP research. However, despite the availability of a massive amount of research, on almost every aspect of developing successful transportation PPPs, the practical experiences with PPPs have witnessed numerous problems and partnership failures; where both the public and private sector partners suffered huge losses. The World Bank’s Private Participation in Infrastructure (PPI) database reflects US\$93,740 million losses in failed transportation PPP projects since 1990 (World Bank 2012); and this figure does not contains

failed projects in developed nations like the UK, USA and Canada, and projects which were completed but did not yield any VFM to the public. This study is inspired by the existence of such a large number of failed and flawed transportation PPPs around the world, and has investigates the cases of transportation PPPs failures observed in the past two decades, and evaluates the failure drivers, which caused the PPP failures.

RESEARCH METHODOLOGY

This research is based on case studies of failed transportation PPP projects around the world. The failure cases are identified through the World Bank's PPI database and an extensive literature review. The documents utilized for this study include, research papers, evaluation studies made by public sector organizations and other international financial institutes, audit reports and reports by non profit organizations. Out of numerous documents and the World Bank's PPI database, many failed projects were identified but only 35 failed projects are evaluated, as represented in table 1 along with their failure statuses. The selection of failure cases is based on three criteria that each project must satisfy, (1) The failure criteria established in table 1, (2) the availability of reliable documents citing project events, and (3) the validity of the available documents. The third criterion is applied only to the failed case categorized as not delivering VFM. The reason is that numerous documents prepared by nongovernment organizations, especially some anti-privatization organizations, describe many projects not delivering VFM, however the annual reports from the concerned officials of these projects were satisfied that VFM was achieved. Therefore, such cases are not analysed further unless supported by valid documents like research papers published by renowned journals, government and audit reports etc. To maintain the rigorousness of the research and in assessing the validity of the documents from multiple sources, a document reliability hierarchy is developed based on the source of documents. The document reliability hierarchy is then utilized to choose between different documents for improving the contradictory information about project events which had negative impacts on project progress.

Each of the failure case is analysed individually in such a way that information from all available documents was segregated in terms of project events; e.g. type of tendering performed, type of private partners selection procedures adopted etc. The identified events included events which were undertaken in the context of the PPP frameworks and brought no harm to the partnerships, and the events which had negative impacts on the project progress. The identification of negative events in each project marked the first indication of the existence of failure drivers in the transportation PPPs. The negative events identified in all projects are then reassessed for consolidation to evaluate the specific failure domains in the transportation PPPs. For example, two negative events found in two different projects are 'absolute no competition rights' and 'concessionaire's right to collect tolls before performing any rehabilitation works', which were consolidated to represent the failure domain of 'unfair rights to the concessionaire'.

Table1: Failed transportation PPP projects considered for this study

No.	Project Name & Country of origin	Type of failure
1	Belgrade Novisad Motorway, Czech Republic	Concession cancelled
2	D47 Motorway, Czech Republic	Concession cancelled
3	Horgos-Pozega Highway, Serbia	Concession cancelled
4	M9 Motorway, Pakistan	Concession cancelled
5	Mexico Toll Road Program, Mexico	Concession cancelled
6	Mumbasa container terminal, Kenya	Concession cancelled
7	Trakia Motorway Project, Bulgaria	Concession cancelled
8	Transgabonais, Gabon	Concession cancelled
9	Jakarta Outer Ring Road, Indonesia	Concession cancelled + Project nationalization
10	Bangkok Elevated Road and Track System, Thailand	Concession cancelled
11	D5 Motorway, Czech Republic	Concession tender cancelled
12	M3/M30 Toll Road, Hungary	Concession tender cancelled
13	M7 Toll Road, Hungary	Concession tender cancelled
14	M9 Danube Toll Bridge at Szekszárd, Hungary	Concession tender cancelled
15	Pitesti-Bucharest-Lehliu (140 km) First Phase, Romania	Concession tender cancelled
16	Argentina Toll road program (first generation), Argentina	Contract suspension
17	Beiras Litoral / Alta Shadow Toll Road, Portugal	Project Halted
18	91Express Lanes California, USA	Project nationalization
19	Camino Colombia Toll Road, USA	Project nationalization
20	London Underground – Metronet, UK	Project nationalization
21	London Underground - Tubelines, UK	Project nationalization
22	M1/M15 Toll Road, Hungary	Project nationalization
23	Railtrack, UK	Project nationalization
24	Siza Rail, Democratic Republic of Congo	Project nationalization
25	Skye bridge, UK	Project nationalization
26	Tha Ngone bridge project, Lao PDR	Project Nationalization
27	Zagreb-Gorican Motorway, Croatia	Project nationalization
28	Channel Tunnel, United Kingdom	VFM not achieved
29	Channel Tunnel Rail Ling (CTRL), UK	VFM not achieved
30	Confederation Bridge, Canada	VFM not achieved
31	Highway 407, Canada	VFM not achieved
32	Railfreight Distribution, UK	VFM not achieved
33	Rolling Stock Leasing Companies (ROSCO), UK	VFM not achieved
34	Royal Dockyards (at Davenport and Rosyth), UK	VFM not achieved
35	Wijkertunnel Randstad, Netherlands	VFM not achieved

THE NATURE OF IDENTIFIED FAILURE DRIVERS

The failure drivers are the factors bringing vulnerability to transportation PPPs, and include inappropriate actions and decisions by the project partners, socio-economic factors, factors associated with the political and national situations and other associated events responsible for transportation PPP projects failures. This research shows that failure drivers are spread all over the PPP project life cycle. This identification reflects the notion that transportation PPP projects entail failure risk throughout their life. It is also identified that failure drivers transmit their impacts across the whole project life and in consequence new failure drivers emerge in simultaneously and at later project stages. Based on the identification of a failure driver's tendency of setting-off new failure drivers, the failure drivers in transportation PPPs can be categorized as primary, or initiating failure drivers, and secondary failure drivers. The secondary failure drivers arise as the consequences of failure drivers, and represent the impact of primary failure drivers on other project partners. Secondary failure drivers also tend to generate new failure drivers, if not dealt in a timely manner. Therefore, primary failure drivers have very high potential to trigger a chain of failure drivers which may not only cause problems in the current and simultaneous project stages but their impact may remain till the last stages of the transportation PPP projects.

The failure drivers also have potential risks characteristics to which transportation PPPs are always vulnerable, unless timely and efficient preventive measure are taken. Keeping in view the notion of vulnerability due the existence of failure drivers in transportation PPPs, the following paragraphs discuss the failure drivers induced by the public and private sector partners. Due to the limitation of the scope of the paper, the failure drivers associated with socio-political issues are not discussed this paper. The failure drivers are discussed with respect to the transportation project life cycle. Figures 1 to 4 represent primary failure drivers and their consequent secondary failure drivers in different PPP project stages. The primary failure drivers are illustrated in the oval shaped box and secondary failure drivers are represented in the rectangular boxes.

THE FAILURE DRIVERS IN TRANSPORTATION PPPS

Failure drivers in Project Feasibility study stage

The first primary failure driver in a transportation PPP project life cycle that brings vulnerability to the transportation PPPs is ‘inadequate feasibility assessment’. Figure 1a depicts the identified secondary drivers caused by inadequate feasibility assessment of a transportation PPP project. The feasibility assessment is intended to unveil all possible alternatives and their associated technical, financial and socio political requirements and constraints to be followed by the project developer. Neglecting or an inability of performing rigorous feasibility assessment has potential to induce risk and vulnerability in transportation PPPs. Therefore, the secondary failure driver caused by inadequate feasibility assessment is ‘slow project progress’ which occurs during project construction. The failure case of the Bangkok Elevated Road and Train System (BERTS) in Thailand witnessed the impact of inadequate feasibility assessment in terms of slow and hindered project progress; where only 13% of the total work was completed in the stipulated time (World Bank 2000).

Inadequate feasibility assessment in terms of poor economic and financial evaluation of the planned PPP project is also a vulnerability factor, leading to transportation PPP failure. It is found that public sector personnel’s inability to assess economic and financial viability of a PPP project leads to privatizing the low traffic corridors which ultimately results in no value to the public. The attempt to privatize low traffic corridors was witnessed in the cases of D5 Motorway in Czech Republic, the M3/M30 toll road, the M7 toll road and the M9 Danube Bridge in Hungary (see Carpintero 2010; World Bank 1999), and all these ended in cancelling the concession tenders.

This study shows that privatizing low demand corridors causes a demand for higher subsidies by the concessionaire or the preferred bidder, and refusal to such demands by the public sector client can provoke conflicts between the partners which could lead to legal proceedings. This research also identifies that legal proceedings are also vulnerable in bringing negative VFM; as such legal proceedings only decide between claims of the two partners rather than to decide what is best to protect the VFM. On the other hand, granting any demanded guarantees by the concessionaire may also not bring VFM to the public.

Another factor that influences the financial viability of transportation PPPs is demand forecasting. ‘Improper demand forecasting’ is another primary failure driver that may occur during the project feasibility study. Figure 1b depicts the consequent secondary failure drivers caused by improper demand forecasting. Demand forecasting is a vital element defining the potential revenue generation capability of the transportation PPP project and consequently indicates the profitability factor for the private sector. As toll income from vehicles using the facility is the only source for producing revenue for transportation PPPs, therefore improper demand forecasting brings a greater amount of risk causing lower than expected traffic that ultimately leads to lower revenue generation, and increases the probability of the concessionaire’s insolvency. Low traffic demand, lower revenue generation and concessionaire insolvency are the secondary failure drivers originally caused by improper traffic demand.

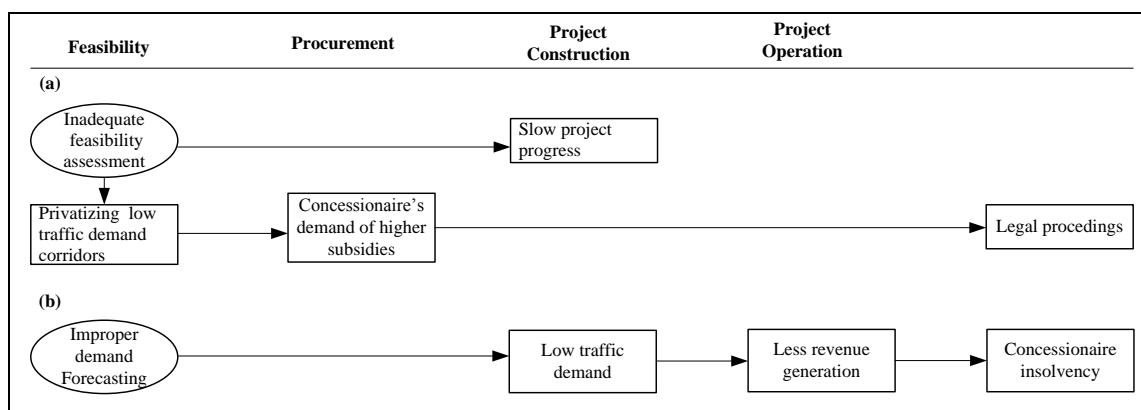


Figure 1: Primary and secondary failure drivers in feasibility study stage of transportation PPPs

Failure drivers in Project Procurement stage

Improper Public Sector Benchmarking (PSB) is a failure driver having the most catastrophic effects on a whole PPP project and its embedded VFM. Figure 2a shows secondary failure drivers caused by improper PSB practices. The PSB is a tool defining the hypothetical risk adjusted life cycle cost of a planned project if it is to be completed via public finance. In a usual case of PPP project procurement, the PSB is compared against PPP bids to evaluate the economical and financial suitability of the project to be adopted as a PPP. Therefore, improper public sector benchmarking may yield improper financial evaluations, which may cause public sector personnel to make wrong decisions. Apart from ex-ante financial evaluations, PSB is also used to decide the primary risk allocation and the premiums. Therefore, the improper public sector benchmarking may also lead public sector officials to decide on improper risk allocation. As optimal risk allocation is a primary VFM driver, similarly the improper risk allocation is a failure driver cause losing of VFM.

Healthy bid competition is important to cater for the value characteristics of a PPP model of project delivery. Figure 2b depicts the secondary failure drivers caused by non competitive bidding. This research identifies that non competitive tendering, i.e., the primary failure driver, tends to outbreak more failure drivers than any other identified failure drivers; and thus it consequently creates more massive problems in the later stages of a transportation PPP project. The competitive tendering forces the bidder to come out with most effective and economical offer. Therefore, a direct award or negotiated contract may appear to be superior to the public sector bench mark but it does not clearly demonstrate VFM (Palmer 2000). Non competitive tendering provides the concessionaire with a strong position to negotiate for better terms for his better profitability; and consequently may be granted the rights and privileges which can be termed as 'unfair' in the context of social justice. The observed unfair rights and privileges, under such circumstances, are the right of collecting tolls (at newly privatized routes) before performing any improvements or rehabilitation works, and the concessionaire's absolute and unconditional right for no competition. The failure case of the Trakia toll road in Bulgaria witnessed this situation, where concessionaire was granted the right to collect tolls from already built road sections and facilities on roadsides (McGrath et.al.2008). The non competitive tendering and consequent granting of unfair rights to the concessionaire also has the potential to cause outbreaks of public protests. The impact of public protests is discussed in later paragraphs. Non competitive tendering also increases the risk of selecting an unsuitable concessionaire which ultimately increases the risk of slow project progress. Weak scrutiny and concessionaire selection procedure is another primary failure driver that may also lead to selection of an unsuitable concessionaire.

Shifting pricing power to the concessionaire is another primary failure driver bringing vulnerability to the transportation PPPs. Figure 2c depicts the causal impacts of shifting pricing control to the concessionaire in terms of the occurrence of secondary failure drivers. Although it is quite odd to transfer absolute pricing power to concessionaire, it is also a fact that such transfer of power has been witnessed in the past. The case studies proved that whenever pricing power is transferred to the concessionaire, it is exploited. Four failed PPP projects were found in

transferring pricing authority to the concessionaires and all four resulted in enforcement of unfair pricing. The four projects are Highway 407 in Canada (Holzer 2006), the M1/M15 toll road in Hungary (Joosten 1999), the Skye Bridge in UK (Wikipedia 2012) and 91 Express lanes in California USA (Munaya 2010 and Sullivan 2000). The unfair toll pricing has a strong potential to create public protests. Such public protests against higher tolls or against private provision of the infrastructure are found to have catastrophic outcomes. The case studies have shown that public protests lead to developing political situations in which politicians may demand the lease back of the infrastructure. In another case, the public protests lead to refusal of payment of the tolls by the users. Both of the above scenarios, caused by public protests, were observed in the failure case of Skye Bridge in UK. The Skye Bridge was bought back by the public sector after only a few years of operation and at a cost higher than its real value (Wikipedia 2012).

The final phase of the procurement stage is to sign a concession contract between the public and private partners. During this stage, a vague contract description is another primary failure driver, which creates fuzzy boundaries between roles and responsibilities of the partners and may cause conflicts between them; such conflicts may lead both partners towards a legal battle which ultimately impacts negatively on VFM. Figure 2d shows the consequent secondary failure drivers caused by vague contract descriptions.

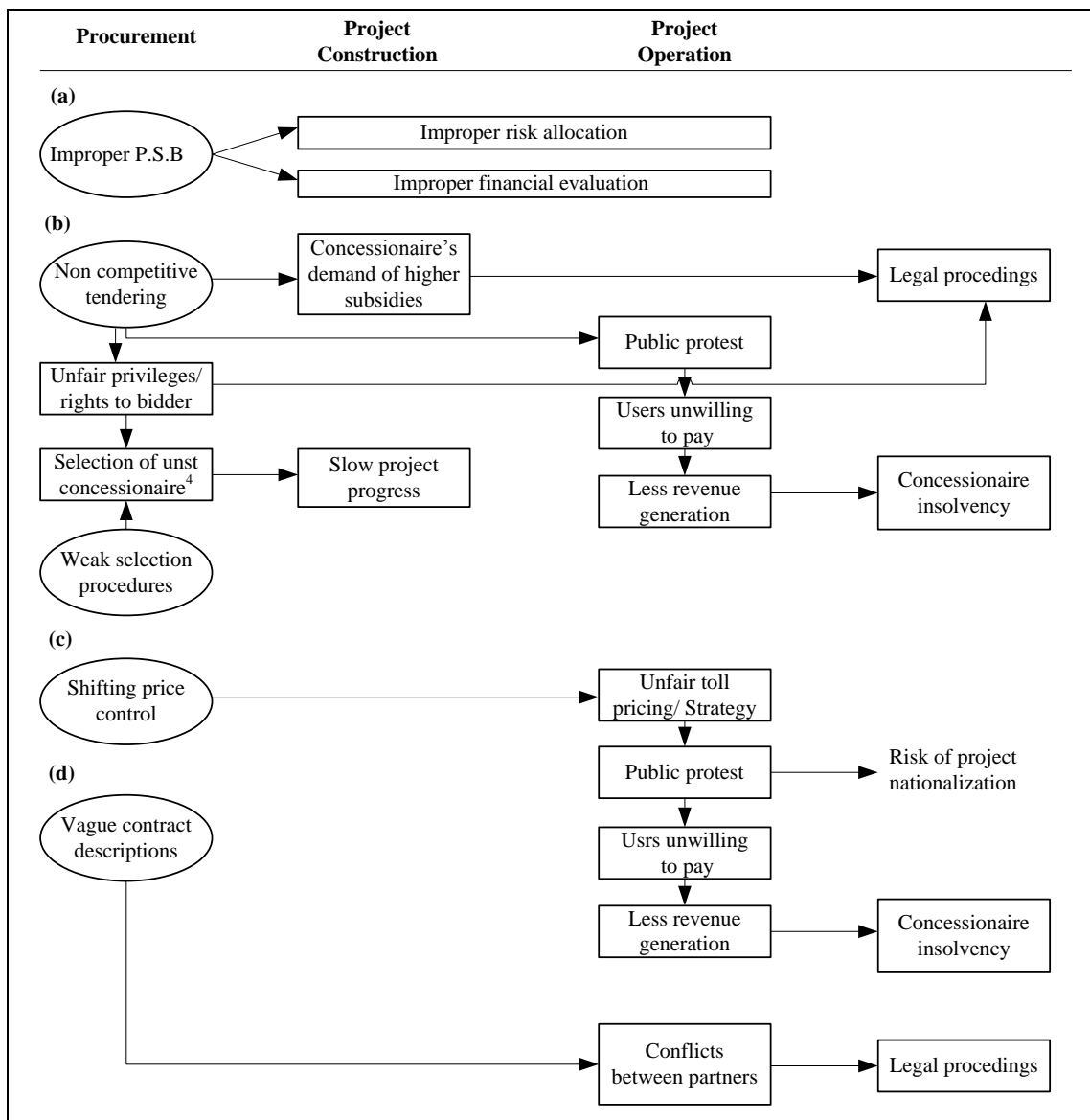


Figure 2: Primary and secondary failure drivers in project procurement stage of transportation PPPs

Failure drivers in Project Construction Stage

The initial phases of the project construction stage are very critical for vulnerability in transportation PPPs. In this stage of a project, ineffective project monitoring is identified as a primary failure driver usually induced by public sector clients. Figure 3a illustrates the causal impacts of ineffective monitoring. Ineffective project management refers to the unavailability of a firm project monitoring framework and established goals and is due to less experienced personnel representing public sector partner. The two secondary failure drivers caused by ineffective project management are the delayed acquisition of land and delayed approvals by the public sector personnel. Timely acquisition of land is very critical in transportation PPP projects, and failure to do so may cause slow and hindered project progress. BERTS in Thailand and the Mexico Toll road program suffered through this failure mechanism (see World Bank 2000; Ruster 1997). Delayed approvals and actions a main failure driver associated with the organizational setup of public sector authorities and can create massive problems for private sector partners in terms of slowing down project progress. This research identifies that delayed approvals and actions by the public sector authorities are mostly due to the absence of a defined authority hierarchy in the public sector establishment.

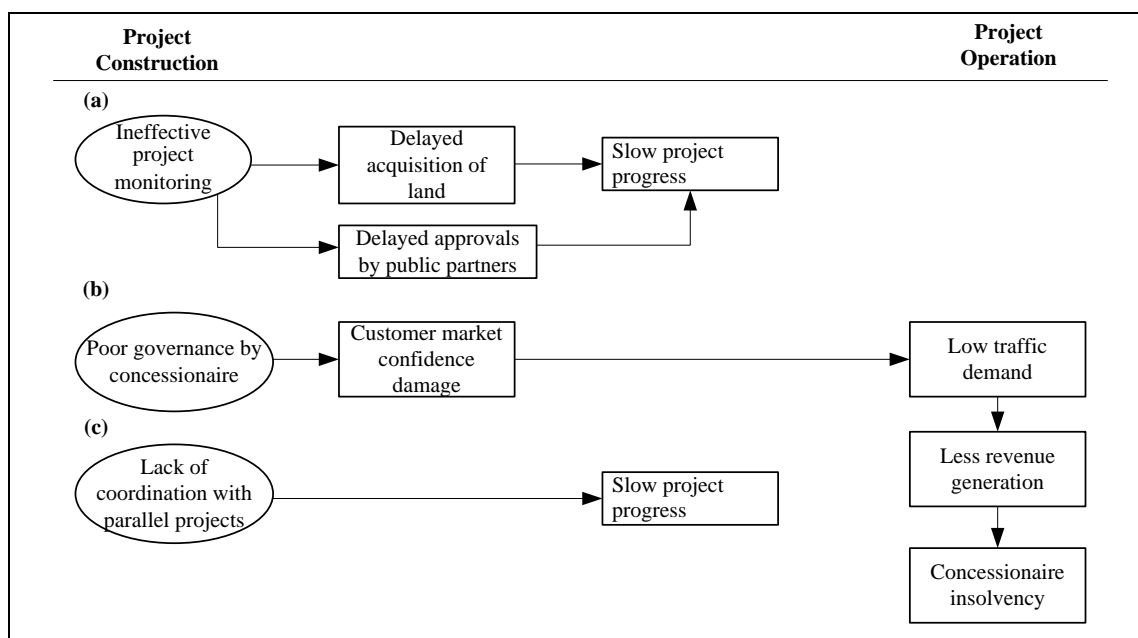


Figure 3: Primary and secondary failure drivers in project construction stage of transportation PPPs

Similar to ineffective project monitoring by the public sector personnel, the poor governance by the concessionaire is another primary failure driver making transportation PPPs vulnerable to lose VFM and giving rise to other failure drivers. Figure 3B shows the identified secondary failure drivers caused by poor governance of the concessionaire. Good governance is very critical in achieving project goals and failure to do so jeopardizes the project success and VFM attached with the PPP model of project delivery. This research identifies that poor governance of a PPP project by the concessionaire leads to slow project progress that further increases the probability of project nationalization or cancellation of the concession agreement. It is also found that poor governance of a concessionaire damages the confidence of customers; that further results in low traffic demand and consequently less revenue generation which increases the chances for concessionaire insolvency. The failed PPP case of Railtrack privatization in UK witnesses these failure scenarios caused by poor governance of the concessionaire (see Funding Universe 2012).

Lack of coordination with parallel projects is another primary failure driver that also leads towards slow project progress. Figure 3c depicts the consequences of having lack of coordination between parallel projects. This failure driver is not very common and can only transpire if other parallel development projects exist alongside the transportation PPP project corridors. The

existence of parallel projects may cause difficulties for a transportation PPP project to proceed further if proper coordination plans are not prepared in advance and agreed by the managing authorities of all the existing parallel projects. The failure case of BERTS in Thailand depicted this failure driver. In the case of BERTS, another greenfield project of the Don Muang toll way and the Bangkok Skytrain created site handover and cross interfacing problems and badly impacted on the BERTS project progress so that only 10-13% of work was completed by the end of the stipulated construction time (World Bank 2000); and consequently the project was cancelled by the Thailand government.

Failure drivers in Project Operation Stage

The adoption of non effective business strategies is a primary failure driver induced by the concessionaire during the operational stage of a transportation PPP project, which impacts the project's ability to compete in the market. Figure 4 shows the impact of non effective business strategies by the concessionaire. The project's inability to compete efficiently has further implications in causing lower traffic demand and consequently less revenue generation and possibly concessionaire's insolvency. The case of the Channel Tunnel in the UK is a good example to understand this failure mechanism. The Channel Tunnel serves traffic between the UK and France; and apart from freight transport, it mainly serves the leisure passenger market which is driven by promotions and attractive offers, rather than on a need basis. The Channel Tunnel did not realize this fact early enough (Castle 2003), and this impacted the on the business strategies during the operational phase of the tunnel. The ferry operators were the main competitors of the Channel Tunnel, and during the construction of tunnel, invested heavily in new vessels and offered attractive promotions for different categories of passengers. A later analysis by Castle (2003) found that ferries were able to breakeven on only half of the available capacity on their vessels. All these market situations left very little space for the Channel Tunnel and its rail link to compete in the market. The situation of low traffic persisted for a long time, until the high speed rail link was completed in 2007; and since then a continuous increase in traffic has been observed (Eurotunnel 2011).

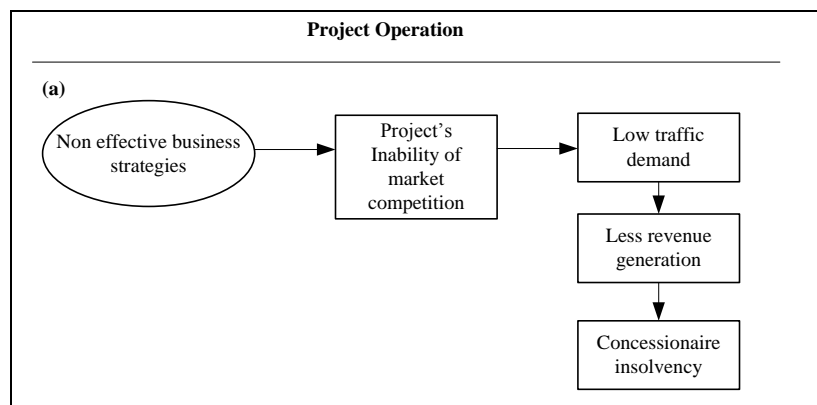


Figure 4: **Primary and secondary failure drivers in project operation stage of transportation PPPs**

CONCLUSIONS

The vulnerability in transportation PPPs, due to the existence of failure drivers, has been elaborated in this paper. The failure drivers are identified based on 35 case studies of failed transportation PPP projects. In particular, this paper has addressed the failure drivers associated with the public and private partners in a typical transportation PPP project. The failure drivers associated with the public and private partners are actually inappropriate actions and decisions made in the context of the PPP framework. However, such inappropriate actions and decisions by either partner do create problems for other project participants. In fact, this study has also identified that the failure drivers have a tendency to trigger new failure drivers, if not dealt with a proper and efficient manner, in simultaneous and later project stages. Based on such tendencies,

the failure drivers are categorized as primary failure drivers, i.e., initiating failure drivers, and secondary failure drivers, i.e., the consequences of the failure drivers. It is also found that the tendency of triggering new failure drivers remains the same for secondary failure drivers and ultimately causes a partnership failure, unless efficient preventive measures are not taken.

This study has found that in a whole project life cycle, the procurement stage the most critical in inducing failure drivers in transportation PPPs. As decisions made during this stage influence the rest of the PPP project life, the failure drivers during procurement create more problems and new failure drivers for the rest of the project life. The project construction stage is second to the procurement stage in triggering the failure drivers. Compared to the procurement stage where the majority of failure drivers are initiated by public sector personnel, in the construction stage both the public and private sector partners are found to cause failure drivers. In this study, the criticality of each project stage is defined based on the initiating failure drivers at each project stage; however in real life practice, each project stage should be handled with the utmost care to avoid vulnerability to the consequent problems that may cause a PPP failure.

REFERENCES

- Carpintero, S (2010) Toll roads in central and eastern Europe: promises and performance. *Transport Reviews*, 30(3), 337–359.
- Castles, C (2003) The economics of the Channel Tunnel--Success or failure. *The International Consulting Economists Association (ICEA)*, [www.icea.co.uk /archive/CastlesPaper.doc](http://www.icea.co.uk/archive/CastlesPaper.doc) (accessed Feb. 11, 2011).
- Eurotunnel (2012) *Press Release* Eurotunnel Group [http://www.eurotunnelgroup.com /uploadedFiles/assets-uk/Media/Press-Releases/2012-Press-Releases/120130 Traffic-and-Revenue-2011.pdf](http://www.eurotunnelgroup.com/uploadedFiles/assets-uk/Media/Press-Releases/2012-Press-Releases/120130%20Traffic-and-Revenue-2011.pdf) (accessed October 25, 2012).
- Funding Universe (2012) Railtrack Group PLC, [http://www.fundinguniverse.com /company-histories/Railtrack-Group-PLC-Company-History.html](http://www.fundinguniverse.com/company-histories/Railtrack-Group-PLC-Company-History.html) (accessed October 23, 2012).
- Holzer, M and Schweser, R (2006) Privatization and the Public Interest: Highway 407 Revisited *Journal of Public Administration Research and Theory*, 6(3), 495–497.
- Joosten, R (1999) M1/M15 How a successful Project ended unnecessarily in tears. *Private Finance International*, (179), 52–55.
- McGrath, F B, Cisarova, E, Eger, A, Gallop, P, Kalmar, Z, and Vera P (2008) Never mind the balance sheet: The dangers posed by public-private partnerships in Central and Eastern Europe. CEE Bankwatch Network, [http://www.bankwatch.org /documents /never_mind_the_balance_sheet.pdf](http://www.bankwatch.org/documents/never_mind_the_balance_sheet.pdf) (accessed on Feb 21, 2011).
- Munaya, A (2010) The advantages and risks of pursuing public private partnerships elements of express lane networks in California, USA: lessons for developing countries. 46th ISOCARP Congress, Nairobi, Kenya.
- Palmer, K (2000) Contract issues and financing in PPP/PFI Cambridge Economic Policy Associates Ltd. [http://www.cepa.co.uk/documents/ Finalcontractissuesand financing inPPP-PFI.pdf](http://www.cepa.co.uk/documents/FinalcontractissuesandfinancinginPPP-PFI.pdf) (accessed on October 23, 2012).
- Ruster, J (1997) A Retrospective on the Mexican Toll Road Program (1989–94). *Public Policy for Private Sector*, No 125. September 1997.
- Sullivan, E (2000) Continuation study to evaluate the impacts of the SR 91 value-priced express lanes: Final report. Sacramento: California State Department of Transportation.
- Wikipedia (2012) Skye Bridge, http://en.wikipedia.org/wiki/Skye_Bridge (accessed on Feb 23, 2012).

- World Bank (1999) Asian toll road development program review of recent toll road experience in selected countries and preliminary tool kit for toll road development. Draft Final Report Ministry of Construction, Japan May 1999, http://www.worldbank.org/transport/roads/tr_docs/padeco/front.pdf (accessed on Jun. 05, 2011).
- World Bank (2000) Study on urban transport development: Preliminary tool kit, Final report, August 2000, http://siteresources.worldbank.org/INTURBAN_TRANSPORT/Resources/ut_development_padeco.pdf (accessed Jan 01, 2011).
- World Bank (2012) Private Participation for Infrastructure <http://ppi.worldbank.org>. (PPI Database (accessed on 01 June 2012)).

RISK SHARING WITHIN PPPS: INCOMPLETE CONTRACTS THEORY AND BEARING VERSUS MANAGEMENT OF RISK

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The main aim of this research is to investigate the sharing of the risks, by adopting a holistic approach to risk sharing. The holistic approach to risk is rooted in the Incomplete Contract Theory (ICT) and it raises a new conceptualization of risk based on the risk governance. The analytical framework proposed through this study is based on a new paradigm: managing and bearing the risks by adopting a dynamic perspective. These criteria of risk sharing will be applied at two main levels: between public and private sector and within the SPV. Given the ever growing demand for public services together with the ongoing austerity measures in Italy, the solution is neither the use of public debt nor increasing taxes and so there is a need to find alternative sources of funding. Hence, it is desirable to seek the private financing of public utilities and service infrastructure through Public-Private Partnerships (PPPs). Aware that an optimal allocation of risks within PPPs can maximize the utility functions of both the public and private sectors, this study investigates the underpinning rationale for an efficient model of risk sharing. This study will be developed by adopting a comparative perspective in order to analyze the sharing of the risks in different context. More specifically, this research deals with co-financing energy infrastructures and utilities involving both the public and private sectors in the Italian context.

Keywords: Project Finance, Public-Private Partnerships, Risk Distribution Framework, Negotiated Risk Governance.

INTRODUCTION

The 2007-09 Credit Crunch may exacerbate some of the risks facing the actors involved in a PPP contract and this amplification could undermine the attractiveness of PPPs. For example, the long investment period of PPPs (i.e. more than 20 years) may exacerbate the refinancing risk that, together with the constraints regarding the lack of resources and the uncertainty of the future interest rate movements, represents an example of the negative effect of the credit crunch on PPP development.

CRITICAL LITERATURE REVIEW

Project Finance (PF) is defined as the structured financing of a project through the establishment of a specific economic entity, the Special Purpose Vehicle (SPV) called also the Project Company, created by sponsors using equity or mezzanine debt. PF can be seen as a set of contracts toward different counterparties. Each contract might satisfy the interests of the parties involved and, at the same time, it enables the allocation of risks among the various counterparties.

Pros and Cons of Project Finance compared with other forms of financing

More than one instrument is available to the private sector for the financing of projects. In addition to the traditional forms of financing ploughed back profits (i.e. corporate funds and borrowing), PF is playing an increasing role. While the traditional forms of funding require a separation of the different phases of the project - financing, construction and management - among different actors, PF is, instead, characterized by the creation of a SPV which is responsible

for all those three phases. Nowadays, PF is frequently used in infrastructure financing and the importance of PF as a financing tool in infrastructure can be dated back to 1992 in the United Kingdom (UK), where successive governments promoted the Private Finance Initiative (PFI) for toll road which has introduced the model of PF within public service contracts. The objective that UK governments intend to achieve through this Initiative is to stimulate the private sector in the funding and management public services, for example transport infrastructure, hospitals and school. Moreover, one of the main reasons for the growing importance of PF is its enhanced capability for managing the risks of the project through the creation of a contract as complete as possible, not merely a series of bilateral agreements. There are at least two alternatives to finance new projects: corporate financing and project financing. The Table 1 shows the main advantages and disadvantages of PF compared with corporate finance encompassed by the main authors' economic theories.

Project Finance and Public-Private Partnerships

Public-Private Partnerships (PPPs) in financing infrastructure are usually characterized by long-term duration and by substantial funding by the private sector. Some authors (Grimsey and Lewis 2004) promoted PPPs as a win-win agreement but their success is crucially dependent on the risks allocated between all actors involved in the contract. There is a wide range of forms of intervention in PPPs in both the public and private sectors, all these being detailed in a regulatory contract. The main advantages for public sector use of a PPP scheme in order to finance infrastructures (Hodge and Greve 2005, Yescombe 2007, Delmon 2009, Nisar 2007) are:

1. the use of private sector managerial expertise;
2. the acquisition of external funds;
3. the efficient allocation of risks to minimize costs.

According to Takashima, Yagi and Takamori (2010) the two main motivations, from a public perspective, for using PPP contract are: efficiency derived from market principles and entrepreneurship, the need to introduce private capital into the public sector. The commonalities of PPP and PF provide the rationale to focus on infrastructure projects financed through PF in a PPP scheme. Before continuing it is necessary to illustrate the spectrum of forms of co-operation between the public and private sector (see Figure 1). Esty (2003) identified four forms of co-operations between public and private sectors:

- *Nationalization*. This is the form of intervention in which both finance and management are under the responsibility of the public sector and assets are owned by State Owned Enterprises (SOEs). (e.g. in 1933 in Italy, the state, through a specially created entity called the IRI - Institute for Industrial Reconstruction - became a shareholder of strategic enterprises).
- *Privatization*. The private sector buys former SOEs and may provide additional capital and management services; therefore, privatization could be defined as the transferring of an enterprise from the state to the private sector (Savas 2000) (e.g. in 1986 in Italy there was the transition of Alfa Romeo – IRI - to FIAT).
- *Service Contracts*. The government can contract with the private sector for the provision of management services while continuing to finance the project and retaining ownership of the project assets (i.e. the Service Contract is based on the competences and expertise of the private sector, and use of these skills for public sector services in exchange for a fee). Contracts may also be made with the clarity and voluntary sectors (e.g. for social care services).
- *Leases*. The government can simply secure finance by leasing the project assets from the private sector, while continuing to be responsible for the project management (i.e. the lease allows the private sector to be the owner of a physical asset whilst accepting the management and the use of the asset is by the public sector in exchange for a fee).

Table 1: Pros and Cons of PF compared with other forms of financing

PROS of PF in Infrastructure Investment
<p>a) PF can sometimes be used to improve the return on the capital invested in a project by leveraging the investment to a greater extent than would be possible in a straight commercial financing of the project (Nevitt and Fabozzi 2000).</p> <p>b) PF eliminates all recourse to the sponsor's balance sheet, therefore it also eliminates the possibility that new capital will subsidize the already existing claims with higher seniority or reduce the value of junior claims (Myers 1977).</p> <p>c) PF differs from traditional risk management strategies because it involves a change in organizational form by isolating the asset in a standalone project company. This separation reduces the likelihood of risk contamination (Esty 2003).</p> <p>d) The project company is a new and independent firm, and so project sponsors have the opportunity to create asset specific governance systems to address the agency conflicts in ways that cannot be replicated under corporate finance (Esty 2003).</p> <p>e) The takeover market does not exist because project equity is privately held (i.e. no free riding), this implies relatively scarce information (Esty 2003).</p> <p>f) Sponsors use concentrated ownership, unique boards of directors, separate legal incorporation and high leverage to limit managerial discretion. Concentrated debt and equity ownership provide critical monitoring of managerial actions (Finnerty 1996, Kensinger and Martin 1988).</p> <p>g) Because the project debt repayment is totally dependent upon project cash flows, it has a much stronger incentive effect on project managers than corporate debt, whose repayment occurs through corporate cash flows (Esty 2003).</p> <p>h) High leverage can lead to risk shifting and under investment in many corporate settings (Jensen and Meckling 1976) and Myers and Majluf (1984) show that underinvestment occurs only when capital providers have asymmetric information about both assets in place and investment opportunities. PF is a fenced capital structure with high level of asset specificity this imply that, although PF capital structure is characterized by high leverage these distortions are not particularly important.</p> <p>i) Through the project structure, sponsors are able to share project risk with other sponsors and with related participants (e.g. contractors, customer, suppliers, etc.) and with debt holders (Esty 2003).</p>
CONS of PF in Infrastructure Investment
<p>a) PF is characterized by a long time horizon and it costs more to structure a legally independent project company than to finance a similar asset as a part of a corporate balance sheet (Esty 2003).</p> <p>b) Project debt is often more expensive than corporate debt because creditors cannot rely on the cross-collateralized cash flows and assets the way they can with corporate debt (Lewellen 1971).</p> <p>c) Host governments provide legal system and protection of property rights, and so they also assume opportunistic behavior in providing critical inputs: when corporate law does not exist or when property rights are not strictly enforced, sponsors are vulnerable to expropriation by host governments (Esty and Megginson 2003).</p> <p>d) Asset specificity can lead to more costly agents' conflicts. These conflicts may occur between transacting parties in the form of ex ante underinvestment and ex post opportunistic behavior (Williamson 1985, Klein, Crawford and Alchian 1978). In most cases the governance system is not designed to address asset specificity and agency conflicts. This is as true for PF as it is for other forms of infrastructure financing.</p> <p>e) There are often few hedging or insurance options available to cover catastrophic risks as the earliest catastrophe risk bond is related to the risk of an earthquake in Japan (Cox and Pedersen 2000). Moreover insuring large, catastrophic risks is extremely costly, especially when the exposures involve uncertain or ambiguous outcomes (Kunreuther, Hogarth and Meszaros 1993 and Froot 2001).</p>

(Source: personal elaboration (note: the ordering of pros and cons does not indicate their relative significance))

Gidman et al. (1995) identified ten forms of co-operation between public and private sector including:

- *Agreeing framework*. It is a form of co-operation because the public sector can intervene through different mechanisms according to an agreeing framework (e.g. Local Agenda 21) that constitutes a driver for development of local policy.
- *Built Operate and Transfer (BOT)*. In the BOT contract the public sector has the ownership of the infrastructure funded, constructed and managed by private sector according to predetermined performance.

- *Joint venture.* The joint venture is based on the co-ownership and co-responsibility for the provision of infrastructure through the creation of a new company or the sharing of an existing one.
- *Passive private investments.* The public sector can fund the infrastructure through the capital of private sector (i.e. Government Bonds) that assumes a passive role because he does not directly intervene in the management of infrastructure.
- *Passive public investments.* In this form of co-operation, viceversa, the public sector provides funding (i.e. equity, debt guarantees and grant) by assuming a passive role in the management of infrastructure.
- *Traditional public procurement.* This form of co-operation between public and private sector is characterized by an unbundled structure because the different private companies (i.e. construction and facilities management companies) are usually involved with separate arrangements.

However, these forms do not distinguish PPP and PFI and through Figure 1 it should be possible to make clear the distinction among the three main forms of partnership: PFI, PPP and Institutional PPP.

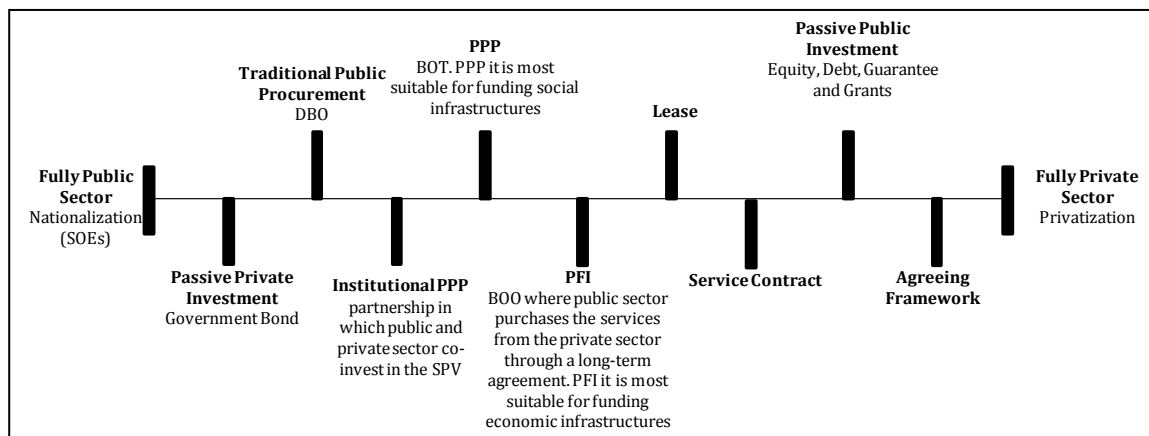


Figure 1: PPP Spectrum (Source: adapted from Gidman et al., 1995)

Before continuing it is useful to clarify the main differences between PPP and PFI with a particular focus on their implications for the sharing of the risks between the public and private sector. Some authors define PFI as a subset of PPP (Davies and Fairbrother 2003, Li, Akintoye, Edwards and Hardcastle 2005, Hall 2008, Singaravelloo 2010). Other authors define PPP as a subset of PFI (Grimsey and Lewis 2005). Others use interchangeably PPP and PFI without any distinction (Chesson and Maitland-Smith 2006). It has been argued that “the terminology of public-private partnership (PPP) represents little more than a cosmetic repackaging” of PFI (Quiggin 2004: p. 51). Social and economic infrastructures apply respectively to PPP and PFI. It is possible to understand how the PPP exacerbates the importance of the risk sharing and the possibility to allocate it in the most efficient and effective way. In a social infrastructure project (e.g. hospital) certain types of risks could be transferred from the public to the private sector in an appropriate way. However, the public sector has to bear the greater part of risks when they occur (e.g. service failure risks).

RISK AWARE

The PPP model extends the role of the private sector in the provision of what has generally been considered to be public sector model for provision of public services. It was not originally devised as a policy for managing risk but risk has emerged as the key feature because its optimal allocation is crucial for Value for Money (VfM) to be achieved (Hayford 2006). Froud (2003), in fact, identifies two success drivers of PFI: VfM and off-balance sheet treatment. According to Treasury Taskforce (1997), VfM can only be achieved if the additional costs of private capital for

public sector are outweighed by savings through private sector expertise, innovation, and competitive efficiency and from the transfer certain risks to the private sector (especially financial risk). However, this definition of VfM is too simplistic because it is static and does not refer to important elements of VfM most notably risk. An example given by Marques and Berg (2011) is that an efficient regulatory contract in PPP could improve VfM compared with the conventional model of public infrastructure procurement (e.g. loans). Arthur Andersen Enterprise and LSE (2000) identified six main drivers of VfM:

1. the transfer of risks;
2. the long horizon of contracts;
3. the use of an output specification;
4. competition;
5. performance measurement and incentives;
6. private sector management skills.

Most important for VfM is that competition should guarantee good quality of the output. Two of these drivers coincide with the definition given previously by Treasury Taskforce, in particular the competition and the private sector management skills. Grimsey and Lewis (2005) argued that there was still not enough effort by both practitioners and academics on the analysis of the problems related to the assessment of VfM. They identified the main drivers of VfM' achievement as a:

- high level of competition;
- proper evaluation and distribution of risks;
- proper comparisons between publicly and privately financed options.

The importance of risks was recognized also by Arthur Andersen Enterprise and LSE (2000) and Froud (2003). VfM is sensitive to risk transfer. The challenge now is try to fill the literature gap by identifying what is the allocation of the risks that maximizes VfM. One of the objectives of this study is to define a model of risk sharing based on the rationale for transferring risks to the parties best able to bear and manage them. Moreover, none of the authors cited above consider the importance of the time value of money which suggests a need to create a dynamic model instead a static model of VfM. Hence, the analytical framework to be developed for the empirical fieldwork will be based on a dynamic model of VfM.

Risk allocation in PPP projects is radically different compared with traditional public procurements projects. In traditional public projects the greater part of risks is allocated to the public sector. Privatization, transfers risks to the private sector. Sharing risks is the case of PPP. According to Jefferies et al. (2002), one of the critical success factors of PPP is the transparent procurement process that implies a clear and agreed allocation of risks between public and private sector. The underpinning rationale of the allocation of risk is that each risk should be allocated to the party best able to manage (as distinct from bear) it so minimizing the cost (Cooper et al. 2005). The allocation of risks based on the party best able to manage them could be an efficient allocation method, but in a static context. An efficient allocation of risks, in fact, should be flexible in order to follow potential external changes and events (Hayford 2006). The rationale for focusing efforts on PF and PPP derives from the awareness that a critical success factor for PF within PPP contract is the efficient distribution of risks firstly between public and private sector and subsequently among all the actors involved in the SPV using a dynamic perspective.

Quiggin (2004) argued that the conventional approach to public infrastructure evaluation scheme is inadequate because it is based on an incomplete risk allocation. In particular, the allocation of risks is based only on public versus private sector. There is a lack of consideration of risk allocation within the SPV according to the different phases of the project. Quiggin (2004) identified the problem of risk sharing by introducing a new level of analysis: the SPV or firm

level. He considers risk in relation to the different phases of the project, which in this analysis pertain the project level rather than in relation to the structure of the SPV. Hence, Quiggin (2004) does not refer to the analysis of the SPV in terms of the actors involved and changes in the system of governance.

Therefore, the evaluation of VfM in the PPP literature is inadequate. First, the allocation of risk between the public and the private sector, considers the latter as a single entity. Second, evaluation of VfM is static notwithstanding the long term nature of PPPs. Takashima, Yagi and Takamori (2010) identified other characteristics of project level, they cite share and scale of the investment, long payback periods, maturity of the project and public guarantees as project characteristics that have a direct impact on risk sharing. Each of these elements increases the perceived risk by private investors, except for the granting of guarantees by the public entity which mitigates the perceived risk from a private perspective.

According to An and Cheung (2010), Marques and Berg (2011), Chung (2012), the most important instrument of risk allocation is represented by the project contract because it defines the rights and obligations of each party. However, PPP contracts are necessarily incomplete because they are for periods of 25 years or so and the contract is unable to foresee all eventualities. An incomplete contract is a source of increasing risk exposure for both public and private sector (Jin and Doloi 2008, Jin 2010). VfM is clearly more difficult to ensure if contracts are incomplete. Such contracts require proactive governance and so VfM can only be secured within a dynamic governance arrangement. In fact, at the start of the contract procurement process the public client provides the contractor with an assumed risk allocation scheme. This scheme could take three forms:

1. risk catalogue;
2. risk matrix;
3. risk allocation framework.

At the end of the negotiation, the public sponsor and the private sector reach an agreed risk allocation scheme according to which the risks are assigned to the party assumed best able to manage them (Li, Akintoye, Edwards and Hardcastle 2005). A crucial role in PF, as the literature review reveals, is played by the 'contractual level' especially in the early stage of the process that leads to the development of infrastructures. The theory of incomplete contract, well known as Incomplete Contract Theory (ICT), extends some of the pillars of transaction cost theory (Williamson 1975, 1985, Klein, Crawford and Alchian 1978, Grossman and Hart 1986, Hart and Moore 1998). According to ICT the parties could assume opportunistic behavior in the presence of asset specificity, possible opportunistic and the way of achieving a more complete contract is the description of the behavior of the partners for each scenario. In a long-term project it is very difficult to achieve this objective and so the PF is based on a very complex contract in which there is also the allocation of risks between the actors involved in the project. An infrastructure developed within PPP contract has a long-term horizon and this specific characteristic increases the difficulties related to the creation of a contract as complete as possible. As stated by Marques and Berg (2011), the wrong wording of the contract implies not only that costs will not be minimized but also the eventual renegotiation of the contract between the public and private sectors. The critical factor of the renegotiation is generated from a misalignment between the actors in terms of information, legal skills and the technical support and the private sector tends to extract benefits from the renegotiation process. Therefore, using Agency Theory this phenomenon could lead to an inadequate contract and the private sector damaging public interests. Contractual completeness has an important role in the process of risk allocation because one of the critical aspects in PPP consists of asymmetric perceptions of risk that could distort optimal contract design (Chung 2012). Optimal contract design should be based not only on the definition of the party best able to manage the risk, but also on the party best able to bear the risk.

Starting from the ICT the original contribution of this research is to investigate the sharing of the risks adopting a holistic approach to risk sharing based on a proactive and dynamic governance of risks both between public and private sector and within SPV.

ANALYTICAL FRAMEWORK

RQ1: What are the main risks to take into consideration for financing an infrastructure investment using PF within a PPP?

RQ2: What are the main levels and dimensions of risks that influence their allocation?

RQ3: What is an efficient financial model for the static allocation of risks among the various actors involved in a PPP, assuming a complete fully specified contract?

RQ4: What are the appropriate arrangements for the governance of risks so as to achieve VfM in a dynamic situation of incomplete contracts by type of PPP?

This study is focused on the identification and allocation of risks in infrastructure investments, and their governance. It starts with the identification and analysis of differences between PPP and PFI in terms of risks and then considers their sharing. It analyses the main dimensions that influence sharing and the role played by risks for the achievement of VfM. The development of the research framework is deeply rooted in the theory of incomplete contracts, according to which it is not possible to create a fully specified contract that can foresee all future scenarios that may arise. A complete contract is based on the description of each action for each possible scenario (i.e. when a risk occurs the actors involved in the project must act as written in the contract). The literature review highlights that it is unrealistic to envisage a complete contract when an infrastructure is developed within a PPP scheme with a very long contract period. This consideration reveals the importance of flexible risk sharing among all actors involved in the partnership. However, the current literature is not sufficiently developed well in its comprehension of fundamental elements of risk sharing and the 2007-09 Credit Crunch highlighted the weaknesses of the current approach to share risks, mainly based on the party best able to manage (as distinct from bear) the risk.

This gap in the literature concerning the methods for an efficient allocation of risk can be bridged through the construction of an analytical framework based on the four pillars specified below. They are united by a common factor, namely the governance of risk intended to overcome the mechanistic and simplistic approach to risk sharing by replacing it with a new holistic approach to risk.

- *Manage and Bear.* The most important pillar of the research framework is the introduction of a new criterion for risk sharing, namely the ability to bear the transferred risk(s). The 2007-09 Credit Crunch demonstrated that the common criteria used for risk allocation is inappropriate and fails to achieve an efficient sharing of the risks. This is because it is possible to manage the risk, but at its occurrence an actor it is not able to bear it. This study does not remove the criterion according to which the risks should be allocated to the party best able to manage them, but adds a new one. The risks should be allocated to the party best able to manage and bear them. These two criteria could, in principle, be separated according to the nature of each risk and the actors involved in managing and/or bearing them.
- *Dynamic vs. Static.* Contracts for risk sharing can be fully specified in a static scenario but not in a dynamic context. This level is strictly related with the actors involved in the project. Hence, this pillar is characterized by ability to handle changes in risk scenarios in the governance of the project change the sharing of risks, hopefully by adopting a proactive rather than reactive approach to managing and bearing risk.
- *Between Public and Private Sectors.* The allocation of risks should be based on two levels of analysis. The first looks at the allocation of risks between the public and private sectors. In this level it is important to make a distinction between risks that could not be transferred at all, those that could or must be completely transferred, and those that must be shared in varying proportion. The focus is on this last category, therefore on risks that could be partially transferred to the private sector. Here, it is possible to distinguish between the management and the bearing of risks. For example, the bearing of the risk could either be shared or transferred from one sector to another.

- *Within the SPV.* The second level of risk allocation is within the SPV. Besides not distinguishing between the management and bearing of risk the literature review also overlooked this level of analysis. However, its relevance is crucial for an efficient sharing of the risks transferred from the public to private sector, especially in light of the new changes that are occurring in infrastructure financing in terms of new actors involved (e.g. pension funds, sovereign wealth funds, private equity investment funds, insurance company, etc.).

As mentioned earlier, these are the four fundamental pillars of risk sharing that have to be analyzed for the purpose of achieving an efficient risk sharing in an incomplete PPP contract. Their identification and analysis will constitute the original contribution to knowledge.

Mapping, managing and bearing risks is a critical factor in governance PPP contracts and the principal strategies for mitigating risk are:

1. transferring risks through contracts which allocate rights and obligations among the counterparties who are best able to bear and to manage those risks;
2. shifting some risks to a professional agent whose core business is risk insurance and who adopts them against payment of insurance premiums.

However, insurance against certain types of risks constitutes a passive form of risk management, and it might be more appropriate to manage those risks in a much more proactive way by adopting measures intended to decrease the probability of risk occurrence. Therefore in PPP projects it is necessary to understand the importance of risk mitigation as a proactive technique of risk governance rather than adopt only a passive risk hedging technique by insuring some risks. A proactive approach to risk sharing both between public and private sectors and within the SPV, is based on managing and bearing risks in a dynamic way and requires governance of risk. There is a lack of distinction in the literature between those risks that can or must be completely transferred, those which cannot be transferred at all and those which must be shared to varying degrees. This lack of distinction has resulted in an incomplete analysis of risk sharing and yet risk sharing via an efficient allocation of risk is now said to be the main (or a major) determinant of VfM. The analytical framework developed for this research makes that distinction and so make possible a more robust analysis of risk sharing.

RISKS IN PUBLIC-PRIVATE PARTNERSHIPS

In order to achieve VfM, the public and private sector partners need to reach a mutually acceptable risk allocation scheme before the contract is awarded. The different risks are presented by various authors with different levels of detail and therefore it is impossible to aggregate them. It would be better to make a separate classification of those risks using the risk category as a discriminator element. Many researchers have created a taxonomy of the main risks in a PPP (Treasury Taskforce 1997, Tinsley 2000, Kumaraswamy and Zhang 2001, Grimsey and Lewis 2002, 2004, Li 2003, Thomas et al. 2003, Shen et al. 2006, Estache et al. 2007, Ng and Loosemore 2007, Medda 2007, Zou et al. 2008, Xu et al. 2010, Marques and Berg 2011, Martins, Marques and Cruz 2011). Table 2 (see Appendix) shows the risks identified by each author divided in eleven categories for a comprehensive risk catalogue that allows the first research question to be answered. The categories are: default risk, demand risk, design risk, financial risk, force majeure risk, legal risk, operating risk, political risk, regulatory risk, services risk, technological risk.

Table 2 shows the approaches of the different authors in identifying risk categories. However, most authors do not detail in sufficient depth the different risk categories and they do not consider specific weights for each risk or risk category considering the particular nature and sector of infrastructure (e.g. technological risk for prisons will not have the same weight as for hospitals). Moreover, they have overlooked the interdependencies of some risks which could cause a 'domino effect' (e.g. regulatory risk is closely related to operational risk and financial risk). The potentially adverse systemic impacts of those interdependencies may be exacerbated by the high

level of uncertainty related to the Eurozone crisis and other ‘force majeure’ shocks in the global project finance/PPP sector.

Allocation of Risks in PPPs

Table 3 (see Appendix) shows the allocation of the risks made by different authors (Arndt 1998, Wang and Tiong 2000, Li 2003, Lam et al. 2007, Ng and Loosemore 2007, Ke et al. 2010). The criterion adopted for sharing the risks between public and private sector is based on the party best able to manage risks. However, the literature has underestimated the importance of the need to consider the ability to bear (not just manage) risk, and this has been confirmed by the 2007-09 Credit Crunch. In fact, the treatment of risk sharing in PPPs is inadequate because it is based on transferring the greater part of risks to the private sector. Li (2003) seems to have a more comprehensive view of risks and Ke et al. (2010), after the 2007-09 Credit Crunch, emphasized the importance of those risks that must be shared. However, the literature review reveals a lack of attention paid to bearing of risks.

Hence the purpose of this study is to create a model of risk sharing based on new criteria: allocate the risk to the party best able to both manage and bear it. This model will be developed on two different levels: public and private, plus within the SPV. Therefore, before creating the model for an optimal allocation of the risks it is necessary to analyze how the risks allocated to the private sector are influenced by the four levels presented in the analytical framework- Manage and Bear, Dynamic vs. Static, Public and Private, Within the SPV - and how risk allocation changes in relation to the system of governance. The importance of governance directly derives from the conceptualization of risk. According to the Table 3 it is possible to distinguish the risks allocated solely to the public sector, the risks completely and wholly transferred to the private sector and the risks shared between the two parties. The conceptualization of risks presented in this study consists of a net division between the risks that are not transferable (allocated to the public sector) and those that are wholly transferable. Within this last category there are the transferable risks that the public sector doesn't want allocate to the private sector because it is too expensive and/ because private sector could not bear those risks even if it could manage them. In this case the public sector decide to bear these risks while the private sector has the responsibility to manage the risks so shared. If the public cannot bear the risks itself it could arrange a pool of public organizations for the purpose of sharing the bearing of the risks (i.e. municipal insurance scheme), for example social risks or medical. Transferring only the management of certain risks could induce the private sector in a form of inefficiency management because he don't bear the risks, in this case the public sector should introduce a mechanisms of governance to limit potential opportunistic behavior. There are three main types of mechanisms (Denis 2001) that the Principal can use in order to reduce the distance between the actual choice of the Agent and that optimal for shareholders:

1. bonding consists in a reduction of the space of decisions for an Agent and it is suitable for long-term contract (i.e. as in the case of PPP);
2. monitoring consists in an observation of the Agent's behavior with the purpose of create an alignment between Principal and Agent by addressing Agent's choices (e.g. grant or punishment related to choices).

Both of these mechanisms, however, assume, implicitly, that the actions of Agent are observable. If this assumption is not satisfied, bonding and monitoring are no longer sufficient and it is necessary introduce a third mechanism: incentives. Hence, the crucial role played by risk governance in a PPP contract emerges recognizing the dependency of an optimal risk sharing on negotiated risk governance that reflects the dynamism of the model.

CONCLUSIONS AND RECOMMENDATIONS

The innovative nature of PPPs is risk sharing, not only in terms of recognizing the importance of risk but also how to share risks. PPPs allow contractual transfer of risks from the public to private sector and this is considered the rationale for an optimal allocation of risks. The allocation of risks

to the party best able to manage them is based on a risk catalogue. However, that catalogue does not consider the ability of those managing risks to also bear them and does not recognize the dynamism of risk conditions during the 20-30 years' contract period. Hence, the risk catalogue as conventionally specified is much too simplistic and underdeveloped in its static perception of risk and it should be recognized as such by the public sector commissioners of PPP contracts. It is both naïve and unprofessional of the public sector to treat risk transfer as simply a one-off 'tick box' exercise.

This critical literature review has therefore identified a gap in research concerning the adoption of a dynamic model of risk sharing based on the allocation of risks to the party best able to both **manage and bear** them, not only between public and private sectors but also within the SPV. Moreover new actors are emerging within infrastructure financing (i.e. pension funds, infrastructure private equity funds, insurance funds, sovereign wealth funds, etc.). Starting from Incomplete Contracts Theory (ICT) the aim of this study is therefore to investigate the sharing of risks, both between public and private sectors and within the SPV, by adopting a **holistic approach to risk sharing based on a new paradigm: managing and bearing risks within a dynamic model of negotiated risk governance**. This utilizes the four pillars of an efficient allocation of risks in PPPs and their identification and analysis will constitute the original contribution to knowledge through comparative case studies within a holistic approach to risk sharing which allows the four research questions to be addressed. The main empirical focus of this study is on Energy from Waste (EfW) PPPs in Italy and the UK. Comparative case studies will include the Turin Waste Incinerator in Italy and the Greater Manchester Waste PFI in the UK. Negotiated risk governance within a dynamic risk scenario is made necessary by the involvement of municipalities and community stakeholders in EfW PPPs and comparative analysis in both countries will be based on utilization of ICT.

Table 2: Risk Catalogue based on 11 categories

Risks	Risk Categories	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Project Completion Risk	Default		v		v										
Operating Revenue	Demand	v		v	v	v	v		v		v	v	v	v	v
Design and construction	Design														
Different working methods															
Late design change		v				v		v			v	v	v	v	v
Responsibilities and risk distribution															
Interest Rate Risk	Financial														
Foreign Exchange Exposure Risk															
Inflation Risk															
Credit Risk															
Residual value															
Availability of finance		v	v	v	v	v	v	v	v	v	v	v	v	v	v
Financial attraction of projects to investors															
Influential economic events															
Lack of tradition of private provision of public services															
Higher maintenance cost															
Environmental Risk	Force Majeure		v	v	v	v			v	v				v	v
Geotechnical conditions															
Authority distribution between partners	Legal		v	v		v		v	v	v		v	v	v	v
Excessive contract variation															
Project approvals and permits															
Land acquisition/site	Operating	v	v	v	v	v	v	v	v	v			v	v	v

availability																
Supply Risk																
Product Risk																
Operations & Maintenance Risk																
Construction time delay																
Operation cost overrun																
Unproven engineering techniques																
Nationalisation/expropriation	Political		v	v	v	v	v	v	v	v	v	v	v	v	v	v
Political opposition																
Unstable government																
Industrial regulation change	Regulatory															
Tax regulation change		v			v	v			v	v		v	v	v		
Legislation change																
Low operating productivity	Services															
Poor quality of workmanship																
Staff crises																
Third party tort liability						v					v					
Lack of commitment from public/private partner																
Lack of experience in PPP/PFI arrangement																
Technology Risk	Technological	v													v	v
Obsolescence Risk																

Sources: personal elaboration (each box is filled when a classification includes at least one of the risks belonging the related category, letters A to N refers to the following references: [A] Treasury Taskforce 1997, [B] Tinsley 2000, [C] Kumaraswamy and Zhang 2001, [D] Grimsey and Lewis 2002, 2004, [E] Li 2003, [F] Thomas et al. 2003, [G] Shen et al. 2006, [H] Estache et al. 2007, [I] Ng and Loosemore 2007, [J] Medda 2007, [K] Zou et al. 2008, [L] Xu et al. 2010, [M] Marques and Berg 2011, [N] Martins, Marques and Cruz 2011).

Table 3: Risk sharing between public and private sector

Risk Categories	Risks	A	B	C	D	E	F
Default	Project Completion Risk	Private	Private	Private		Private	Share
Demand	Operating Revenue	Share	Private	Private		Private	Share
Design	Design and construction	Private	Private	Private	Private	Private	
	Different working methods	Private	Private	Private	Private	Private	
	Late design change			Private	Private	Public	
	Responsibilities and risk distribution			Share			
Financial	Interest Rate Risk		Share	Private		Share	Share
	Foreign Exchange Exposure Risk		Public				Share
	Inflation Risk		Share	Private	Share	Share	Share
	Credit Risk	Private	Private	Private	Private		Share
	Residual value	Private					Share
	Availability of finance	Private		Private			Share
	Financial attraction of projects to investors			Private			Share
	Influential economic events			Private			Share
	Lack of tradition of private provision of public services			Private			Share
	Higher maintenance cost	Private		Private			

Force Majeure	Environmental Risk	Share		Share	Share	Share	Share
	Geotechnical conditions	Share		Private	Private	Private	Share
Legal	Authority distribution between partners			Share			Share
	Excessive contract variation			Share	Public		Share
	Project approvals and permits	Share		Share	Private	Share	Share
Operating	Land acquisition/site availability	Share		Public	Public	Private	Share
	Supply Risk		Public	Private	Private		Share
	Product Risk	Private	Private	Private	Private	Private	
	Operations & Maintenance Risk	Private		Private			
	Construction time delay			Private	Private	Public	Share
	Operation cost overrun	Private		Private		Private	Share
	Unproven engineering techniques	Private	Private	Private			
Political	Nationalisation/expropriation		Public	Public		Private	Public
	Political opposition			Public			Share
	Unstable government			Public	Public		
Regulatory	Industrial regulation change			Private			
	Tax regulation change			Private			Share
	Legislation change	Share	Share	Share	Share	Private	Share
Services	Low operating productivity	Private	Private	Private			
	Poor quality of workmanship	Private	Private	Private		Private	
	Staff crises		Private	Private	Private		
	Third party tort liability			Private	Public		
	Lack of commitment from public/private partner			Share			Share
	Lack of experience in PPP/PFI arrangement			Share			
Technological	Technology Risk						Share
	Obsolescence Risk						Share

Sources: adapted from Ke et al., 2010 (note: letters A to F refer to the following references: [A] Arndt 1998, [B] Wang and Tiong 2000, [C] Li 2003, [D] Lam et al. 2007, [E] Ng and Loosemore 2007, [F] Ke et al. 2010).

REFERENCES

- Aldhfayan, F S (2008) Analysis On The Role Of Standardized Project Management On Project Performance. Research Paper, Project Management Institute.
- An, Y and Cheung, K (2010) Project financing: deal or no deal. *Journal of Financial Economics*, 19(2), 72-7.
- Aon Benfield (2011) Reinsurance Market Outlook: Value Creating Capital. Chicago.
- Arndt, R H (1998) Risk allocation in the Melbourne City Link Project. *Journal of Project Finance*, 4(3), 11-25.
- Arthur Andersen Enterprises and London School Of Economics (2000) *Value for money drivers in the private finance initiative*. London UK: Arthur Andersen Enterprise LSE.
- Augenblick, M and Custer, B S (1990) The Build, Operate, and Transfer ("BOT") Approach to Infrastructure Projects in Developing Countries. Working Papers Series (498), Policy, Research and External Affairs, The World Bank.
- Bailey, S J, Valkama, P and Anttiroiko, A V (2010) *Innovations in Financing Public Services. Country Case Studies*. Basingstoke: Palgrave Macmillan.
- Ben David, I and Raz, T (2001) An integrated approach for risk response development in project planning. *Journal of the Operational Research Society*, 52, 14-25.

- Benkovic, S, Jednak, S, Milosavljevic, M, Joksimovic, N Z and Kragulj, D (2011) Risks of project financing of infrastructure projects in Serbia. *African Journal of Business Management*, **5**(7), 2828-36.
- Berle, A A and Means, G C (1933) *The Modern Corporation and Private Property*. New York: The Macmillan Company.
- Bishop, S and Waring, J (2012) The Negotiated Order at the Front Line of Public Private Partnerships. *IRSPM Conference*, 11-13 April 2012, University of Rome Tor Vergata.
- Bodnar, G M and Comer, B (1996) *Project Finance Teaching Note*. Pennsylvania: The Wharton School.
- Brealey, R A, Cooper, I A and Habib, M A (1996) Using project finance to fund infrastructure investments. *Journal of Applied Corporate Finance*, **9**(3), 25-39.
- Burger, P, Tyson, J, Karpowicz, I and Coelho, M D (2009) The Effects of the Financial Crisis on Public-Private Partnerships. Working Paper Series, International Monetary Fund.
- Chesson, A and Maitland-Smith, F (2006) Including Finance Lease Liabilities in Public Sector Net Debt: PFI & Other. Office for National Statistics.
- Chung, D (2012) Optimising Risk-Sharing: The Contracting Approach. *IRSPM Conference*, 11-13 April 2012, University of Rome Tor Vergata.
- Cooper, D F, Grey, S, Raymond, G and Walker, P (2005) *Project Risk Management Guidelines: Managing Risk in Large Projects and Complex Procurement*. Chichester UK: John Wiley & Sons Ltd.
- Cox, S H and Pedersen, H W (2000) Catastrophe Risk Bonds. *North American Actuarial Journal*, **4**(4), 56-82.
- Danis, D K (2001) Twenty-five years of corporate governance research. . . and counting. *Review of Financial Economics*, **10**, 191-212.
- Daube, D, Vollrath S and Alfen H W (2008) A comparison of Project Finance and the Forfeiting Model as financing forms for PPP projects in Germany. *International Journal of Project Management*, **26**, 376-87.
- Davies, S and Fairbrother, P (2003) Private Finance Initiative (PFI) and Public Private Partnerships (PPPs): Definitions and Sources. Working Paper Series (39), School of Social Sciences.
- Delmon, J (2009) *Private Sector Investment in Infrastructure: Project Finance, PPP Projects and Risk*. 2 ed. UK: The World Bank and Kluwer Law International.
- Estache, A, Juan, E and Trujillo, L (2007) Public-Private Partnership in Transport. Policy Research Working Paper Series (4436), The World Bank.
- Esty, B C (2003) *The Economic Motivations for Using Project Finance*. Boston, Massachusetts USA: Harvard Business School.
- Esty, B C (2002) Returns on project-financed investments: Evolution and managerial implications. *Journal of Applied Corporate Finance*, **15**(1), 71-86.
- Esty, B C and Megginson, W L (2003) Creditor Rights, Enforcement, and Debt Ownership Structure: Evidence from the Global Syndicated Loan Market. *Journal of Financial and Quantitative Analysis*, **38**(1), 37-59.
- Faulkner, K (2004) Public-private partnerships, In Ghobadian, A, Galleary, D, O'Regan, N and Viney, H (ed.) *Public-Private Partnerships: Policy and Experience*. Basingstoke UK and New York US: Palgrave Macmillan, 65-70.
- Finnerty, J D (1996) *Project financing: Asset-based financial engineering*. New York USA: John Wiley and Sons Ltd.

- Froot, K A (2001) The market for catastrophe risk: a clinical examination. *Journal of Financial Economics*, 60, 529-71.
- Froud, J (2003) The private finance initiative: risk, uncertainty and the state. *Accounting, Organizations & Society*, 28(6), 567-89.
- Gatti, S (2006) *Manual project finance. How to design, structure and finance a successful operation* (Original title: Manuale del project finance. Come disegnare, strutturare e finanziare un'operazione di successo). Milano IT: Bancaria Editrice.
- Gatti, S (2008) *Project Finance in Theory and Practice: Designing, Structuring, and Financing Private and Public Projects*. Burlington: Academic Press Advanced Series, Elsevier Inc.
- Gemson, J, Gautami, K V and Thillai Rajan, A (2012) Impact of private equity investments in infrastructure projects. *Utilities Policy*, 21, 59-65.
- Gidman, P, Blore, I, Lorentzen, J and Schuttenbelt, P (1995) *Public Private Partnerships in Urban Infrastructure Services*. UMP Working Paper Series (4), Nairobi EAK: The World Bank.
- Grimsey, D and Graham, R (1997) PFI in the NHS. *Engineering, Construction and Architectural Management*, 4(3), 215-31.
- Grimsey, D and Lewis, M (2002) Evaluating the risks of public private partnerships for infrastructure projects. *International Journal of Project Management*, 12(2), 68-74.
- Grimsey, D and Lewis, M (2004) *Public-Private Partnerships. The Worldwide Revolution in Infrastructure Provision and Project Finance*. Cheltenham UK: Edward Elgar.
- Grimsey, D and Lewis, M (2005) Are Public Private Partnerships value for money? Evaluating alternative approaches and comparing academic and practitioner views. *Accounting Forum*, 29, 345-78.
- Grimsey, D and Lewis, M (2005) Public Private Partnerships and Public Procurement. *Agenda*, 14(2), 171-88.
- Grossman, S and Hart, O (1986) The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy*, 94, 691-719.
- Hall, D (2008). PPPs in the EU - a critical appraisal. *ASPE Conference*, October 2008, St. Petersburg.
- Hall, D (2009) *A crisis for public-private partnerships (PPPs)?*. Public Services International Research Unit.
- Hart, O and Moore, J (1998) Default And Renegotiation: A Dynamic Model Of Debt. *The Quarterly Journal of Economics*, MIT Press, 113(1), 1-41.
- Hayford, O (2006) Successfully allocating risk and negotiating a PPP Contract. *6th Annual National Public Private Partnership Summit*, 16-17 May 2006, Sydney.
- Hellowell, M and Vecchi, V (2012) What return for risk? The price of equity capital in public-private partnerships. *IRSPM Conference*, 11-13 April 2012, University of Rome Tor Vergata.
- Hodge, G and Greve, C (2005) *The Challenge of Public-Private Partnerships: Learning from International Experience*. Cheltenham UK: Edward Elgar Publishing Ltd.
- House of Commons (2010) *Financing PFI projects in the credit crisis and the Treasury's response*. London: The Stationary Office Limited, Committee of Public Accounts.
- Hwang, B G, Zhao, X and Gay, M J S (2012) Public private partnership projects in Singapore: Factors, critical risks and preferred risk allocation from the perspective of contractors. *International Journal of Project Management* (<http://dx.doi.org/10.1016/j.ijproman.2012.08.003>).

- 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), 352-61.
- Jensen, M C and Meckling, W H (1976) Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, 3(4), 305-60.
- Jin, X H (2010) Determinants of efficient risk allocation in privately financed public infrastructure projects in Australia. *ASCE Journal of Construction, Engineering and Management*, 136(2), 138-50.
- 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), 707-21.
- Jin, X H and Zhang, G (2011) Modelling optimal risk allocation in PPP projects using artificial neural networks. *International Journal of Project Management*, 29, 591-603.
- Ke, Y, Wang, Sq, Chan, A P C and Lam, P T I (2010) Preferred risk allocation in China's public-private partnership (PPP) projects. *International Journal of Project Management*, 28, 482-92.
- Kensinger J W and Martin J D (1988) Project finance: raising money the old-fashioned way. *Journal of Applied Corporate Finance*, 1(3), 69-81.
- Klein, B R, Crawford, G and Alchian, A A (1978) Vertical Integration, Appropriable Rents, and the Competitive Contracting Process. *Journal of Law and Economics*, 21(2), 297-326.
- Kumaraswamy, M M and Zhang, X (2001). Governmental role in BOT-led infrastructure development. *International Journal of Project Management*, 19(4), 195-205.
- Kunreuther, H, Hogarth, R and Meszaros, J (1993) Insurer ambiguity and market failure. *Journal of Risk and Uncertainty*, 7, 71-87.
- Lam, K C, Wang, D, Lee, P T K and Tsang, Y T (2007) Modeling risk allocation decision in construction contracts. *International Journal of Project Management*, 25(5), 485-93.
- Lewellen, W (1971) A pure financial rationale for the conglomerate merger. *Journal of Finance*, 26, 521-37.
- Li, B, Akintoye, A, Edwards, P and Hardcastle, C (2005) The allocation of risk in PPP/PFI construction projects in the UK. *International Journal Project Management*, 23(1), 25-35.
- Li, B (2003) Risk management of public/private partnership projects. Unpublished PhD thesis, School of the Built and Natural Environment, Glasgow Caledonian University.
- Loosemore, M, Raftery, J, Reily, C and Higgon, D (2007) *Risk Management in Projects*. 2 ed. New York USA: Taylor and Francis.
- Marques, R and Berg, S (2011) Risks, Contracts and Private Sector Participation in Infrastructure. *Journal of Construction Engineering and Management*, 137(11), 925-32.
- Martins, A C, Marques, R C and Cruz, C O (2011) Public-Private Partnerships for wind power generation: The Portuguese case. *Energy Policy*, 39, 94-104.
- Medda, F (2007) A game theory approach for the allocation of risks in transport public private partnerships. *International Journal of Project Management*, 25, 213-18.
- Myers, S C (1977) Determinants of Corporate Borrowing. *Journal of Financial Economics*, 5, 147-75.
- Myers, S C and Majluf, N S (1984) Corporate financing and investment decisions when firms have information investors do not have. *Journal of Financial Economics*, 13, 187-221.
- Nevitt, P K and Fabozzi, F J (2000) *Project Financing*. 7 ed. London UK: Euro Money Books.

- Ng, A and Loosemore, M (2007) Risk allocation in the private provision of public infrastructure. *International Journal of Project Management*, 25(1), 66-76.
- Nisar, T (2007) Risk management in public-private partnership contracts. *Public Organization Review*, 7(1), 1-19.
- Pratt, J W and Zeckhauser, R (1985) *Principals and agents: The structure of business*. Boston, Massachusetts USA: Harvard Business School Press.
- PricewaterhouseCoopers (2008) *Infrastructure finance-surviving the credit crunch*. Public Sector Research Centre.
- Project Management Institute (2004) *A guide to the project management body of knowledge*. Pennsylvania USA: Project Management Institute.
- Quiggin, J (2004) Risk, Ppps and the Public Sector Comparator. *Australian Accounting Review*, 14(2), 51-61.
- Savas, E S (2000) *Privatization And Public-Private Partnerships*. New York USA: Chatham House.
- Shen, L Y, Platten, A and Deng, X (2006) Role of Public-private partnerships to manage risks in public sector projects in Hong Kong. *International Journal of Project Management*, 24(7), 587-94.
- Shen-Fa, W and Xiao-Ping, W (2009) The rule and method of risk allocation in project finance. *Procedia Earth and Planetary Science*, 1, 1757-63.
- Singaravelloo, K (2010) PPP: The Right Marriage between Local Government and the Private Sector in Malaysia?. *International Journal of Institutions and Economies*, 2(2), 142-66.
- Takashima, R, Yagi, K and Takamori, H (2010) Government guarantees and risk sharing in public-private partnerships. *Review of Financial Economics*, 19, 78-83.
- 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.
- Tinsley, R (2000) *Advanced project finance: structuring the risk*. London UK: Euro Money Books.
- Treasury Taskforce (1997) *Partnerships for Prosperity*. London UK: HM Treasury.
- Wang, S Q and Tiong, R L K (2000) Case study of government initiatives for PRC's BOT power plant projects. *International Journal of Project Management*, 18(1), 69-78.
- Williamson, O E (1975) *Markets and hierarchies, analysis and antitrust implications: A study in the economics of internal organization*. New York USA: Free Press.
- Williamson, O E (1985) *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. New York USA: Free Press.
- Xu, Y, Yeung, J F Y, Chan, A P C, Chan, D W M, Wang, S Q and Ke, Y (2010) Developing a risk assessment model for PPP projects in China – a fuzzy synthetic evaluation approach. *Automation in Construction*, 19(7), 929-43.
- Yescombe, E R (2007) *Public Private Partnerships: Principles of Policy and Finance*. 1 ed., Oxford: Elsevier Ltd.
- Zou, P X W, Wang, S and Fang, D (2008) A life-cycle risk management framework for PPP infrastructure projects. *Journal of Financial Management of Property and Construction*, 13(2), 123-42.

PUBLIC PRIVATE PARTNERSHIPS: ACHIEVING BETTER VALUE-FOR-MONEY OUTCOMES IN THE OPERATIONAL PHASE THROUGH IMPROVED PARTNERSHIP, RISK AND PERFORMANCE MANAGEMENT PRACTICES

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Under Public Private Partnership (PPP) arrangements, real benefits, in terms of value-for-money outcomes, are expected to flow to communities. The public sector partner is ultimately responsible for ensuring that contracted services provided by private consortia are carried out and that specified delivery standards are met. Contracts, however, do not protect governments from every adverse eventuality. Partnerships involve managing social interactions between people in administering contractual provisions. Not all operational risks can be transferred to consortia; governments should actively manage their risk positions. Governments should take necessary and timely action to resolve service provider under-performance whenever it occurs. Using literature review, and adopting a public sector perspective, a range of partnership, risk and performance management issues are identified that may affect the achievement of value-for-money PPP operational outcomes. These issues are developed into a generic conceptual integrating model intended to assist government decision-makers to allocate and make better use of public sector resources during the operational phase of PPP projects.

Keywords: government, partnering, performance, procurement, risk.

INTRODUCTION

The procurement of public services, assets and projects through the use of PPP is claimed to be an extension of the liberalisation agenda of 'New Public Management' (Grimsey and Lewis 2004: 52). PPP began to emerge as a serious alternative to the more conventional methods of public procurement during the 1990's, becoming popular in countries such as Chile, Ireland, Mexico, and the United Kingdom (International Monetary Fund 2004: 3), at least in part due to increasing demands on the provision of public services, and the ever-increasing financial burden of maintaining and replacing ageing public infrastructure and other assets.

PPP is championed by governments on the grounds of purported political/economic benefits that include reducing (or avoiding the need for) public sector budget deficits. The avoidance or minimisation of public debt remains a primary reason for the Private Finance Initiative (PFI) projects in the United Kingdom, for example, where its absence from local authority balance sheets (or adherence to recommended limits) satisfies the stringent accountability demands of central government. Other benefits of PPP include transferring service delivery (including service delivery risk) to consortia so that the public sector can focus on delivering its core services to the community (Commonwealth Department of Administration and Finance 2006: 2; Shen, Platten and Deng 2006) e.g. public health and education initiatives (Partnerships Victoria 2001: 5), and potentially obtaining large cost savings throughout the project lifecycle (Commonwealth Department of Administration and Finance 2006: 2).

In practice, however, neither health nor education services provision has been entirely exempt from attempts at privatisation, and the 'core services' argument is thus substantially weakened; although the power/influence of health and education sector unions should not be underestimated in some countries, e.g. the United Kingdom. More likely, but less acknowledged reasons might

be found in political strategies to reign in public sector staffing expansion and cost as well as potential efficiencies derived from private sector technical and management expertise (Ahadzi and Bowles 2004; Asian Development Bank 2008: 3-5). The latter is also a somewhat weak argument, since it is likely that, if the public sector were to retain responsibility for project delivery, it would also employ suitably qualified and experienced personnel to do so. Thus the desire to contain public sector staffing costs (including the long term future liability of funding employee benefits such as superannuation) is likely to be the compelling 'hidden' driver for PPP.

PPP projects are also perceived by government to be an attractive option due to the use of the 'payment for performance' principle, whereby payment by the public sector to its private partner is dependent upon the latter achieving specified (and hopefully enforceable) standards (Garvin and Bosso 2008). In other types of PPP projects, such as toll roads, the 'user pays' approach secures direct payment to the private partner in the form of toll charges or fares. These arrangements may be subject to royalty payments from consortia to government, and making periodic increases in such charges (according to annual inflation rates or sector indexes) and fares subject to the final approval of government.

Although this method of procurement is seen to be effective and desirable by its supporters, it is not without criticism. Failures can result (in the case of economic infrastructure projects, for example) from poor allocation of risk (The Asian Development Bank 2008: 2) or inadequate contract monitoring and enforcement systems (National Audit Office 2009: 20), which may culminate in inefficient service user charges and the exposure of taxpayers to unintended project risks, whilst shifting profits to project "promoters" (Ergas 2009). Human factors such as an insufficient skill base and poor relationship management can also lead to project failures (Yuan *et al* 2009; Koppenjan 2005).

The intended outcome of this research is the development of an integrated operational model that may assist government decision-makers to allocate and make better use of public sector resources during operational phases of PPP projects. The rationale for such a model is as follows:

- A review of stakeholder management highlights a need for an operational model that embraces "critical success factors" (Yang, Shen and Ho 2009) for partnership management;
- Although government agencies are legally bound to adhere to operational risk management practices, risk considerations could be applied more broadly (Victorian Department of Treasury and Finance 2007: 3; National Audit Office 2009) including PPP projects; and
- Performance monitoring within the public sector can be difficult to manage. Issues may arise from a lack of management know-how (Domberger and Fernandez 1999) and from limited exposure in administering PPP contractual provisions. This extends to managing relationships as well as identifying and managing public sector operating risks.

The PPP model focuses upon generic considerations that may have significant and/or long-term consequences for achieving strategic objectives using an integrated partnership, risk and performance management approach. This includes:

- Establishing and maintaining effective partnership relations between governments and service delivery providers;
- Identifying and managing public sector risks (both threat and opportunity risk); and
- Modifying (improving) and then maintaining service delivery performance standards of operators, and where appropriate, the oversight role of government or its delegates.

The paper describes the research method; offers relevant definitions and provides a brief summary of issues identified through literature review. It then proposes their integration into a conceptual management model for public sector partners in PPP; and briefly discusses the implications of such a model.

RESEARCH METHODOLOGY AND METHODS

The underlying research methodology is phenomenology, and divides into two main phases using qualitative mixed methods commencing with literature review to facilitate the initial conceptualisation of the proposed model. Semi-structured interviews are then used to gather the data required for model development. A second iteration of the model will be presented to an expert focus group for scrutiny and comment, and feedback from this group will be used to refine the model. Figure 1 illustrates the broad design for the research process.

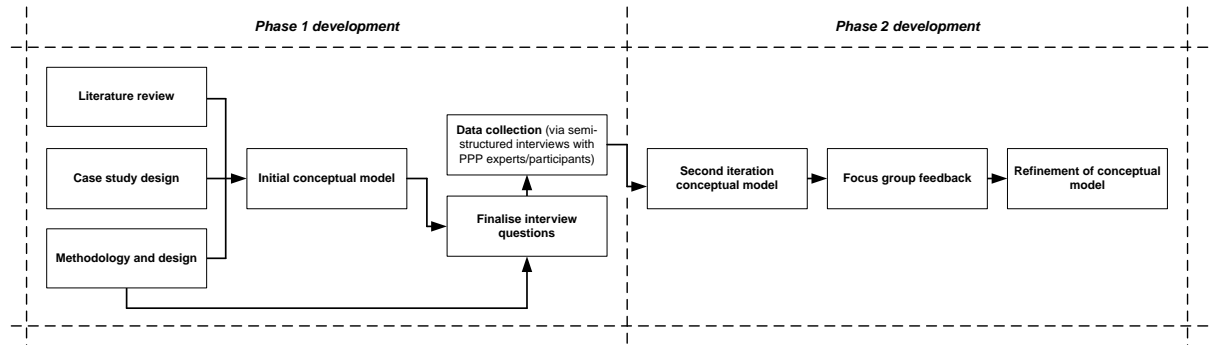


Figure 1: Research process design

This paper reports on the first phase of the research, and deals with the formulation of the initial conceptual integrating model through the issues captured and summarised through literature review.

PARTNERSHIP MANAGEMENT

Partnership management is defined as “a relationship involving the sharing of power, work, support and/or information with others for the achievement of joint goals and/or mutual benefits” (Kernaghan in Trafford and Proctor 2006). The partnership issues pertaining to PPP are sourced from the extant literature and identified as follows:

- **Organisational culture.** Un-cooperative working environments can lead to operational difficulties between PPP partners. Poor relationships and unsatisfactory performance are acknowledged to go “hand in hand” (National Audit Office 2009: 54). This suggests for instance, that poorly motivated employees are less likely to strive to meet performance targets.
- **Management commitment and support.** Without appropriate support from management, small concerns can develop unnecessarily into serious issues. Therefore appropriate concerns and/or problems should be escalated to management for evaluation and/or treatment. Supportive management may also be decisive for resolving difficulties (Pinto and Slevin 1987) and thereby avoiding disputes. From a public sector perspective, for example, senior management may decide to support additional resourcing including employing more staff or allocating more time to review and then report upon complex service delivery outcomes.
- **Employee capability and expertise.** A lack of capability or expertise can lead to tensions between public and private sector partners and, if not remedied, could lead to service delivery underperformance. Service delivery and the quality of public sector contract management skills including monitoring performance targets ought to be effective if governments are to achieve Value-for-Money (VfM) outcomes (Edwards *et al* 2004: 63). It is claimed that there are cases of insufficient corporate experience among government PPP employees and a lack of understanding of commercial principles (Organisation for Economic Co-operation and Development 2007: 20). Furthermore, poor co-ordination skills have the potential to impact on the government’s ability to successfully manage PPP outcomes (Yuan *et al* 2009).

- Clear and open communication. A lack of communication or miscommunication flowing from decision-making can lead to misunderstanding between PPP partners. If left unchecked, this could result in communication break-downs which may reduce the level of trust that partners have in each others' motives and impact on operational productivity.
- Relationship continuity. A lack of relationship continuity between PPP partners can impact upon the successful achievement of planned outcomes. Building relationships can be important as personal influence can be used to obtain information and resolve day-to-day issues without having to resort to more formal means. Moreover, staff departures may result in vital knowledge being lost due to relationship discontinuity (Arthur Andersen and Enterprise LSE 2000: 38). This discontinuity may lead to the loss of vital knowledge and affect open communication between the public and private parties.
- Conflict management. Conflict between public and private sector PPP partners may be inevitable (Edwards *et al* 2004: 55). Broadly speaking, disagreements can arise over timeframes, costs and quality issues (Leung *et al* 2004) as well as project priorities, human resources issues (Thamhain and Wilemon 1975) and the interpretation of contract requirements due to individual or organisational biases or preferences (Cambridge Economic Policy Associates 2005: 34-35).

RISK MANAGEMENT

Risk management can be used by decision-makers to recognise, scrutinise, assess, treat and then monitor those risks that could impinge upon the realisation of defined goals from strategic, operational, financial and/or compliance-related issues (Victorian Auditor-General 2007: 1). It is a systematic approach that clearly contributes to the "demonstrable achievement of objectives and improvement of performance" (ISO 31000, 2009: 7). The risk management issues pertaining to PPPs are identified as:

- Implementation of transition plan. Unforeseen project/integration challenges could arise during transition between the end of the PPP construction phase and operational commencement. These could occur, for example, when the completion of scheduled tasks/deliverables are delayed typically resulting from resourcing constraints and/or technical complications. These types of issues can impact on service delivery performance and detract from achieving VfM outcomes.
- Contract variation. Amendments to PPP agreements can arise from technical obsolescence, new legal and/or political requirements, changes in service user demand, service provider under-performance (Partnerships Victoria 2001: 135, 161; Edwards *et al* 2004: 122) and from decisions to modify the length of agreements. The government retains the right to step-in if the quality of services provided by the operator fails to meet its obligations (Partnerships Victoria 2001: 161). This could arise from a breach of contract such as default or due to an emergency situation where circumstances may be beyond the capability of consortia to deal with the situation effectively (Partnerships Victoria 2001: 148, 161). Financiers may impose similar caveats on their loans to the private consortium.
- Change of consortium members. New members could potentially expose the public sector partner to new risks (New South Wales Treasury 2005: 47).
- Contract termination. A purported key objective of contract management is to ensure that private sector obligations are met for the full contract term (Partnerships Victoria 2001: 172). Although considered as a last resort, contract termination can be enforced if the service provider repeatedly fails to meet its contractual responsibilities (Partnerships Victoria 2001: 172, 25). In such situations, long-term government funding commitments and priorities may be put at risk unless an alternative service provider is found.

- End of concession hand-over. The usability (condition) of PPP assets over their entire lifecycles can become a serious issue for government (Edwards *et al* 2004: 123) if they are not properly managed or physically maintained. Assets could thus deteriorate prematurely and be rendered ‘unfit for purpose’. This can reduce VfM outcomes particularly if the public sector has to absorb the cost of major repairs or replacements soon after the project hand-over stage (expiry of concession) is complete. The failure to transfer knowledge and skills from the private party to government in a timely manner may result in the latter having to pay fees to external advisers for longer than necessary and may reduce opportunities for broadening public sector knowledge that could drive down costs and increase skill levels over the long-term, or be applied to other PPP projects.
- Reputation damage. Unanticipated events (Joyner 2007; Hodge and Greve 2005: 110) during PPP operations can have unexpected consequences for the public sector. Even though its private sector partner is responsible for delivering services, there is potential for negative media attention (Karlsen 2002) to be misdirected to the government by ill-informed service users or other stakeholders when things go wrong. The government may need to be proactive in order to protect its reputation through strategic awareness raising initiatives or other means of direct action. The government’s reputation can also be damaged if governance, probity and compliance frameworks are not properly adhered to by its employees.

PERFORMANCE MANAGEMENT

Performance management is characterised by “the use of inter-related strategies and activities to improve the performance of individuals, teams and organisations” (Management Advisory Committee 2001: 14). For PPPs, performance management issues identified relate to:

- Performance management systems modification. Poorly designed performance management systems (or ineffective application of these systems) could make it difficult for public sector PPP contract managers when assessing service delivery performance i.e. determining whether contracted obligations of service providers have been met. This may also lead to difficulties in establishing if there is likely to be sustainability of contract (Partnerships Victoria 2003: 47).
- KPI modification. The need for Key Performance Indicator modification may arise due to a number of reasons. They include that KPIs may not be ‘fit for purpose’ (Mandri-Perrott 2010: 152; Brenninkmeijer in Urio 2010: 93), there may be too many (or too few) KPIs that need to be evaluated as part of service delivery arrangements (Cambridge Economic Policy Associates 2005: 36), changes to service delivery requirements, and a lack of KPI clarity (Edwards *et al* 2004: 45; Cambridge Economic Policy Associates 2005: 36). Modifications should therefore be relevant, measurable, repeatable and achievable.
- Availability and integrity of performance data and metrics. Performance data allow informed judgement and decisions to be made about operational progress and such data are linked to the prior construction of appropriate KPIs. Performance metrics provide the means of measuring performance. If KPIs are poorly designed, the data obtained from evaluating performance against these measures will be of limited or no value. Moreover, performance outputs cannot be effectively managed if data is not accurately or honestly reported, or the metrics are not effectively applied.
- Performance monitoring and adjustment. An effective way for the government to hold its private sector partner accountable for performance is through the continuous application of contract administration. This is important because if performance is not well managed, it can put VfM outcomes at risk. Without a strong understanding of the service delivery environment (e.g. lack of sector performance data as a reference to the establishment of

KPIs), government contract managers may find it difficult to accurately evaluate operational performance (Edwards *et al* 2004: 49).

- Penalties and abatements. KPIs can be used as a mechanism to calculate the level of payment that will be made by the government to its private sector partner, commensurate with the operator's performance (Mandri-Perrott 2010: 152). If the desired levels of performance are not achieved, a warning notice or penalty points may be issued. The accumulation of penalty points will typically lead to an abatement being applied although abatement can be enforced without consideration of points depending on the seriousness of the performance shortfall. However, evidence shows that few abatement penalties have been applied in practice for under-performance (The National Audit Office 2009: 56). In practice, the level of deductions/abatements applied to PPP contracts (up to 20% in some Brazilian contracts (anecdotal opinion offered to authors)) may transfer excessive or disproportionate operational risks to private operators which may compromise the feasibility of the project or lead to perverse incentives (e.g. where failing is cheaper than meeting the performance criteria, despite the penalties).

CONCEPTUAL PPP MANAGEMENT MODEL

The concept for a PPP management model, applicable to the operational phase, embraces the range of issues and sub-issues that relate to each of three management perspectives – partnership, risk and performance management. VfM achievement can be pursued (by the public partner) by considering the extent to which these factors impact upon the attainment of desired outcomes. Thus the potential significance of the operational model is two-fold. Firstly, it establishes issues that may hinder or prevent the achievement of VfM outcomes, and secondly, it offers high-level guidance on factors that may contribute to VfM realisation, identifies project documents (an evidence base) that could be used as a foundation for developing improvement plans as well as outlining possible treatment actions.

Figure 2 shows the initial concept diagrammatically, with each perspective incorporating its relevant management issues. This represents the static starting point. However, the expanded model is intended to be more dynamic in application.

Achievement of Value-for-Money PPP outcomes		
Partnership management	Risk management	Performance management
Organisational culture	Implementation of transition plan	Performance management systems modification
Management commitment and support	Contract variation	KPI modification
Employee capability and expertise	Change of consortium members	Availability and integrity of performance data and metrics
Clear and open communication	Contract termination	Performance monitoring and adjustment
Relationship continuity	End of concession hand-over	Penalties and abatements
Conflict management	Reputation damage	

Figure 2: Issues affecting the PPP public sector operational management model

Each management perspective, in turn, is positioned as the 'target' discipline (situated in the central column of the corresponding relationship chart). This column contains the issues and sub-issues that have been identified for active consideration/management. For reasons of space in this paper, Figure 3 (and the ensuing discussion) illustrates this solely for the risk management perspective and for only some of the relevant sub-issues. The operational model then links issues from the remaining two management perspectives (left and right hand columns in Figure 3) with the sub-issues of the central target perspective for in-depth consideration/evaluation. In terms of

impact, each sub-issue is classified as being either ‘external’, ‘internal’ or ‘both’. External considerations focus upon the accountabilities of service providers – that is, how consortia performance may be improved through public sector intervention. Internal focus relates to the responsibilities of government in holding consortia accountable for delivering contracted services as well as attempting to improve the capability of its employees, systems and/or processes e.g. improving the efficiency and effectiveness of employees who work in inter-facing contract management roles. ‘Both’ means that external and internal considerations are necessary.

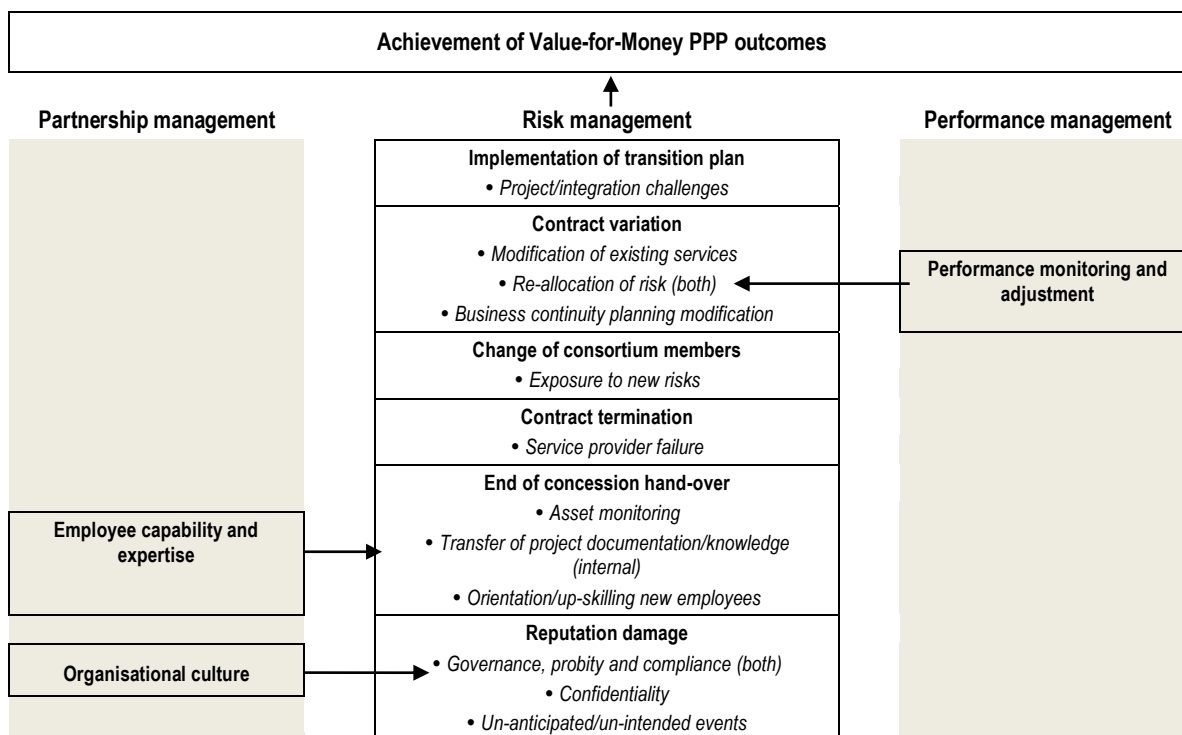


Figure 3: Selected risk-centric issues in the PPP public sector operational management model

Typical risk management factors identified that may contribute towards achieving VfM outcomes include: ensuring that service delivery is aligned/re-aligned with original PPP business case objectives; monitoring the effectiveness of contract amendments (and taking any necessary corrective action); resolving identified risks that may prevent business case objectives from being met; and the active consideration of opportunity risks for implementation that could lead to improved VfM outcomes, all of which may be supported by an evidence base that may also include, for example: risk registers, contract management/administration manuals, asset management plans, service usage (volume) reports, failure event reports/output exception reports etc.

With regard to the selected example issues identified in Figure 3, the following should be considered:

- **Re-allocation of risk.** Risk may be re-allocated (i.e. government take-back or sub-contracting) if, for example, the private sector partner consistently under-performs in delivering a specific service but its performance is satisfactory in meeting all other service standards. From an internal point of view, risk registers should be formally reviewed and updated biannually e.g. to assess the skills of staff that are involved in scenario planning. From an external perspective, trend analysis (reported quarterly) should be undertaken to monitor service delivery performance of service providers and used as a basis for identifying emerging risks. Trend analysis should thus feed into the formal process for reviewing risk registers with relevant findings incorporated into regular performance reporting. Further actions should include the active six-monthly review, testing and update of business continuity plans, with all business continuity planning and risk management policies, frameworks and procedures being reviewed and updated annually; biennial compliance audits undertaken to assess the effectiveness of the contract

management team in managing the contract; and six-monthly reviews of identified opportunity risks that may lead to potential service efficiencies that may reduce (the severity of the risk) or eliminate the need to re-allocate the risk.

- **Transfer of project documentation/knowledge.** Timely and thorough transfer of documentation and knowledge is essential to ensure smooth project transition (to government, its nominee or a preferred new bidder) and un-interrupted service delivery (for service users) during hand-over. Timing of transfer will depend upon the size and complexity of the project but typically, plans should be developed up to two years before the effective concession expiry date and aligned with government transition plans, business continuity plans and service provider short-fall plans. Hand-over packages should be prepared quarterly and include the condition of assets (e.g. so government can undertake medium to long-term technical assessments on how the impact of obsolescence/legacy systems will be managed); an agreed methodology for transferring project/operational knowledge from the private sector to government or its nominees; and the actual transfer/reinforcement of knowledge between the partners (undertaken quarterly). For the public sector, transition planning may include the development of personnel plans (comprising for instance of incentive schemes for attracting and retaining high calibre employees, clear role and responsibility definition, skills appraisals and training plans – depending on the seniority of positions that need to be filled). This process should commence at least six months in advance of hand-over.
- **Governance, probity and compliance.** Although it is unlikely that governance, probity and compliance policies and frameworks will prevent all occurrences of wrong-doing, negligence and/or fraud, they may act as a deterrent and be used to inform government employees about their own accountabilities and responsibilities. Policies and frameworks should be reviewed and updated annually, with changes clearly communicated to staff. All key government employees connected to the project should sign (as per 12 month cycle) a declaration of conflict of interest as well as disclosing any acceptance of a gift, benefit or hospitality received from consortia representatives (or other acceptances of offers made by parties outside of government). PPP consortia should attest to government that its own employees have made similar declarations.

In conjunction with the use of standard operating policies and procedures, it is anticipated that the model conceptualised here will prove to be a useful tool for developing operational improvement plans including maximising employee learning opportunities that lead to improved VfM outcomes. It has been designed to provide public sector decision-makers with a conceptual understanding of partnership, risk and performance management challenges and provides a reasonable level of detail to aid deeper contemplation of the issues. Sound corporate and managerial judgement are likely to be influential factors in the successful application of the model, as well as users' ability to adapt it to the specifics as they relate to each PPP operating perspective. Further refinement of the model should demonstrate this. In the current research, this is intended to be undertaken by iteratively exposing each perspective, and its associated issues, to a focus group of experts in the field of PPP. Refinement of the issues will then be incorporated into the model for further consideration by the focus group until a final version is accepted. Depending upon the prevailing PPP climate, it may then be possible to customise and beta test the model on a live project.

CONCLUSION

This paper describes the progress of current research. It establishes partnership, risk and performance management as essential elements within a PPP operating environment and provides key definitions and issues for each management perspective. The identified issues are developed into a generic conceptual integrating model for assisting government decision-makers to allocate and make better use of public sector resources during operational phases of PPP projects. The model incorporates a range of factors that may hinder or prevent the achievement of VfM outcomes, and offers guidance on factors that may contribute to VfM realisation, the identification

of project documents that could be used as an evidential foundation for developing improvement plans as well as outlining possible treatment actions. Managerial judgement and user ability are likely to be core to successful application of the model, which will be refined through focus group exposure in the next phase of the research.

REFERENCES

- Ahadzi, M, Bowles, G (2004) Public–private partnerships and contract negotiations: an empirical study. *Construction Management and Economics*, 22(9), 967-978
- Arthur Andersen and Enterprise LSE (2000) *Value for Money Drivers in the Private Finance Initiative*. Arthur Andersen
- Asian Development Bank (2008) *Pacific Private Sector Policy Brief: Public-Private Partnerships*. Asian Development Bank, Issue No.1, April 2008
- Cambridge Economic Policy Associates (2005) *Public Private Partnerships in Scotland: Evaluation of Performance*. Final Report, Cambridge Economic Policy Associates Ltd
- Commonwealth Department of Administration and Finance (2006) *Introductory Guide to Public Private Partnerships*. Australian Government Printing Service
- Domberger, S, Fernandez, P (1999) Public-Private Partnerships for Service Delivery, *Business Strategy Review*, 10(4) 29-39
- Edwards, P, Shaoul, J, Stafford, A, Arblaster, L (2004) *Evaluating the operation of PFI in roads and hospitals*. Research Report No. 84, The Association of Chartered Certified Accountants
- Ergas, H (2009) *Cronyism on the sly*. The Australian, <http://www.theaustralian.com.au/news/opinion/cronyism-on-the-sly/story-e6fmg6zo-1225792583411> [date last accessed: 20.07.10]
- Garvin, M J, Bosso, D (2008) Assessing the Effectiveness of Infrastructure Public--Private Partnership Programs and Projects. *Public Works Management & Policy*, 13(2) 162-178
- Grimsey, D, Lewis, M K (2004) *Public Private Partnerships: The Worldwide Revolution in Infrastructure Provision and Project Finance*. Cheltenham, UK: Edward Elgar Publishing
- Hodge, G, Greve, C, (Eds) (2005) *The Challenge of Public-Private Partnerships*. Cheltenham, UK: Edward Elgar
- International Monetary Fund (2004) *Public Private Partnerships*. International Monetary Fund, Washington
- ISO (2009) International Standard ISO/FDIS 31000: Risk management — Principles and guidelines. SAI Global
- Joyner, K (2007) Dynamic evolution in public-private partnerships: The role of key actors in managing multiple stakeholders. *Managerial Law*, 49(5/6) 206-217
- Karlsen, J T (2002) Project Stakeholder Management. *Engineering Management Journal*, 14(4)19
- Koppenjan, J F M (2005) The Formation of Public-Private Partnerships: Lessons from Nine Transport Infrastructure Projects in The Netherlands. *Public Administration*, 83(1) 135-157
- Lewis, M (2001) *Risk Management in Public Private Partnerships*. University of South Australia, http://www.unisa.edu.au/workinglinks/docs/wl_paper_mervyn_lewis.pdf [date last accessed: 20.08.09]
- Management Advisory Committee (2001) *Performance Management in the Australian Public Service: A Strategic Framework*. Australian Government Printing Service
- Mandri-Perrott, C (2010) *Private Sector Participation in Light Rail-Light Metro Transit Initiatives*. Public-Private Infrastructure Advisory Facility, The World Bank

- National Audit Office (UK) (2009) *Private Finance Projects*. The Stationery Office
- New South Wales Treasury (2005) *New Schools Privately Financed Project: Post Implementation Review*, Office of Financial Management, Government Printer, New South Wales
- Organisation for Economic Co-operation and Development (2007) *OECD Principles for Private Sector Participation in Infrastructure*. Organisation for Economic Co-operation and Development
- Partnerships Victoria (2003) *Partnerships Victoria Guidance Material: Contract Management Guide – June 2003*. Partnerships Victoria
- Partnerships Victoria (2001) *Partnerships Victoria: Risk Allocation and Contractual Issues*. Victorian Government Printing Office
- Pinto, J K, Slevin, D P (1987) Critical Factors in Successful Project Implementation. *IEEE Transactions on Engineering Management*, 34(1) 22-27
- Shen, L, Platten, Deng, X P (2006) Role of public private partnerships to manage risks in public sector projects in Hong Kong. *International Journal of Project Management*, 24(7) 587-594
- Thamhain, H J, Wilemon, D L (1975) Conflict Management in Project Life Cycles. *Sloan Management Review*, 16(3) 31-50
- Trafford, S, Proctor, T (2006) Successful joint venture partnerships: public-private partnerships. *International Journal of Public Sector Management*, 19(2) 117-129
- Urio, P, (Ed) (2010) *Public-Private Partnerships Success and Failure Factors for In-Transition Countries*. Maryland: University Press of America
- Victorian Auditor-General (2007) *Managing Risk Across the Public Sector: Toward Good Practice*. Victorian Government Printing Office
- Victorian Department of Treasury and Finance (2007) *Victorian Government Risk Management Framework*, Victorian Government Printing Office
- Yang, J, Shen, Q, Ho, M (2009) An overview of previous studies in stakeholder management and its implications for the construction industry, *Journal of Facilities Management*, 7(2) 159-175
- Yuan, J, Yajun Zeng, A, Skibniewski, M J, Li, Q (2009) Selection of performance objectives and key performance indicators in public-private partnership projects to achieve value for money. *Construction Management and Economics*, 27(3) 253-270

PROCUREMENT TOOLS FOR PUBLIC SECTOR INFRASTRUCTURE IN A FLUCTUATING MARKET ECONOMY

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Public Private Partnerships (PPP) and Private Finance Initiatives (PFI) have been used within the UK to procure public sector infrastructure projects since the early 1980's (Mirjam & Dewulf, 2006) and since then have been the subject of various debates in many different arenas among people who appear to either love them or hate them for a variety of reasons but most notably being issues around value for money (VFM). Whilst the main aim of the research is to investigate the cost effectiveness of PPP and PFI/PF2 as procurement tools for public sector capital build of infrastructure projects; inherent within that study is the examination of the value for money aspects of such investments. VFM cannot be considered within isolation the achievement of VFM permeates throughout the entire process and is a subjective concept which is to be achieved by all parties to the deal who are faced with many different issues in a PPP PFI transaction when faced with a fluctuating market economy including socio-economic, legal and political influences which effect such procurements. The research methodology is based on an empirical study to examine, investigate and question the aims and objectives of the research and collate the data to be used to test the hypothesis "That PPP PFI and PF2 are viable and cost effective procurement tools for public sector infrastructure in a fluctuating market economy." The methodology for the research includes mixed qualitative and quantitative strategies for data collection including action based case study analysis which inherently includes an element of ethnographical observation; the case study is analysed in collaboration with the iterative process of literature reviews based within ground theory principles. The research is then to be statistically tested using evidence collated from questionnaires which will be issued to a purposive sample of personnel involved within the procurements of PPP, PFI and PF2 deals. The initial analysis of the data collated seems to indicate that whilst there are many critics of PPP and PFI procuring authorities are continuing to require the availability of such mechanisms to drive forward their infrastructure projects and whilst VFM will always be a subjective and recurring debate within this arena, maybe the new Treasury review will of the definition/formula will address that. Since the research began in 2005 the PFI form of contract has been replaced by PF2. On that basis any reference throughout this paper to PFI refers to contracts entered into and debates held prior to the launch of PF2 in December 2012. Any reference to PF2 refers to debates around PF2.

Keywords: PPP, PFI, PF2, VFM, Public Procurement.

INTRODUCTION

It is now well established that PFI and PPP enjoyed a period of growth within our society during the early 1990's (HM Treasury, 2006) (Deloitte, 2006) and were seen to be a growing trend as a mechanism to renew, rebuild and redevelop the UK's public infrastructure (HM Treasury, July 2003). The impact of the global economic crisis (2008-2013) saw a shift in the UK political arena from a Labour led government (from the May 2010 elections) to a Conservative Liberal Democratic coalition government which believed that for the UK economy to survive the crisis it needed to control its level of borrowing and therefore stepped back from the use of PFI to investigate its use, its problems and VFM issues which were the subject of much criticism from Jesse Norman M.P, 2012 and others as discussed in detail within HM Treasury "A new approach to public private partnerships" publication issued in December 2012, this document sets out the

reforms which PF2 has been introduced to address; including a more streamlined procurement process, greater transparency on whole life cost of the PF2 deal details of which are kept on central government balance sheets, the abolition of the PFI credit regime with the implementation of PFI financing now being sourced from the individual government department budgets, a shift in risk transfer to the appropriate party and more flexibility in debt financing structures.

The research investigates and analyses the traditional and changing routes along which PPP's and PFI travelled and then explores what role each party to the PPP PFI deal played before the launch of PF2, the research has required an element of flexibility to now include a review and analysis of PF2 and whether the changes within that contract document have a significant impact on historically based VFM issues in particular as PF2 has been designed in consultation with 139 different interested entities to iron out the VFM concerns (HM Treasury, 2012). In carrying out such an examination it is important to address the very different economic interests that each party has within a market economy and what is understood generally to be the definition of VFM, arguably it is a subjective concept which would be very difficult to mean the same thing to all parties.

With increasing pressure upon the Public Sector to reduce budgets whilst the Private Sector struggles to maintain profitability it is arguable that the commercial distinction and gain of entering into a PF2 deal is becoming somewhat blurred. To advance the research in this area the concept of VFM and its different testing regimes are examined to ascertain how and why it is possible to determine that the use of PPP and PF2 is positive for the UK when operating within a fluctuating market economy.

KEY RESEARCH AIMS AND OBJECTIVES

The following key aims, objectives and questions arising from the study have been identified to test the hypothesis:

1. An examination and critical analysis of the development of PPP, PFI to PF2 and VFM in the UK and critical analysis of each element :
 - to analyse their progression over a period of time; and
 - to analyse whether the introduction of the corporate LEP co structure extends the commercial aims of PPP and PFI and how that effects VFM.
2. Consideration of the Procurement Process and Political Strategies to assess the impact on VFM:
 - to analyse whether the impact of international, national and local economic policies, social strategies and legal obligations derived from either statute or case law assist or fetter the maximisation of VFM in the procurement of capital build projects by public sector; and
 - A review and evaluation of the definition and principles of VFM and MEAT to analyse the different ways both criteria are measured.
3. Examination of the requirements of all key participants in a PPP PFI/ PF2 deal
 - to ascertain and analyse the context of issues of profitability for private sector whilst considering central and local government strategies in the application and assessment of these principles giving an appraisal of the main economic driving forces of the parties to PPP and PFI deals.
4. Conclusion
 - are PPP and PF2 economically viable as procurement tools for public sector?

- In order to collate the data to address the questions and test the hypothesis the following research methodology and research methods have been selected to progress this research.

RESEARCH METHODOLOGY

The design of the research methodology for this thesis was borne from the ideals of epistemology based on the premise that a number of factors combine to give a whole (Knight & Ruddock, 2008). In this case the procurement of a PPP PFI transaction requires a variety of parties to work collaboratively to achieve a number of individual goals with one of the goals being a collective goal and in order to achieve the collective goal many commercial aspects have to balance. Therefore in selecting the best way or ways to undertake this research on the basis that it has to achieve two distinct functions as an applied research topic it must fulfill practical objectives (Fellows & Liu, 1997) and also an academic function in advancing knowledge in the area. The research has been conducted empirically through observation and examination using a mixed method of quantitative and qualitative strategies (Fellows & Liu, 1997) which have included an action based case study analysis over the life of a PPP PFI procurement (8 years) in conjunction with an iterative process of literature reviews based in grounded theory (Knight & Ruddock, 2008). The use of a hypothesis also allowed for the parameters of the research to be defined and statistical testing to be undertaken upon the collation of responses to identified questions from a purposive sample of participants within the PPP and PFI/PF2 arena (Farrell, 2010). In approaching the research in this way a variety of data is collected from which the subjective elements of the research can be objectively measured and questioned.

It is anticipated that the research will lead to possible predictions for the future use of PPP PFI/ PF2 within a changing economy which best achieves VFM from the perspective of the local authority whilst providing a framework for practitioners in terms of guidance and approach to assessing VFM as both a practical tool for application and an advancement in knowledge across the disciplines forming part of this study.

CASE STUDY

Case Study A was chosen as the main source of data collection.

The case study was undertaken as an action based case study over a period of 8 years from the Authority's development of its initial business case and its successful submission to HM Treasury for consideration to be within wave 3 of the BSF programme throughout the procurement process upto financial close and beyond into service delivery and contract management thereafter. The total cost of the project for this Authority for the 25 year period of the PFI contract was £1.26bn this figure contains the capital expenditure cost of the build and the operational expenditure costs as at financial close. This figure does not include the cost of the procurement process nor does it include the additional cost of forming the LEP co. PPP structure or on-going costs for variations to the contract.

In undertaking the observations and in participating in the process the author was mindful of the research questions to be addressed and the hypothesis being tested and on that basis a summary of the findings relating to those specific areas are outlined below:

Issue 1: Which PPP Corporate Structure would be best suited for this project?

On the 26th February 2006 Case Study A determined through its constitutional processes that it would proceed with the BSF programme as encouraged by DfES and Treasury through the corporate PPP structure of a LEP.co (Local Education Partnership Company, Limited by Shareholding). The rationale for this decision was by reference to the following advantages and disadvantages:

The main advantages to the Authority were detailed to be as follows:

1. It would take considerable amount of time and effort to persuade the DfES and PfS to consider an alternative to the LEP based on any arguments put forward by the Council.
2. This would result in a delay to the delivery of the Councils project and result in costs consequences of the time incurred in relation to that delay and proffering any arguments.
3. The private sector market was familiar with the LEP route for BSF projects.
4. Market perception of the Council's BSF project is key to its successful delivery and therefore it is in the Councils best interests not to alienate the market from its project by utilising an unfamiliar route; unless there are compelling reasons to do so.
5. Through the Council's shareholding in and directorship of the LEP, the Council will have greater access to financial and management information relating to the LEP and its subsidiaries.
6. The Council's minority protection rights provide the Council with a degree of influence over the LEP and its subsidiaries and their performance.
7. The Council could achieve a return on its investment in the LEP (although this will be relative to its investment)

The main disadvantages of using the LEP route for the Authority were detailed to be as follows:

1. The administration costs of setting up the LEP and appointing a director to the Board.
2. The Council appointed director will need to comply with his or her obligations under the Companies Acts and with their common law fiduciary duties.
3. The director will need an indemnity from the Council so there is a risk that the Council could become liable for the acts of the Director. However provided that the director acts within its duties and is not negligent. The director (and therefore the Council) will not be liable.
4. The Council as a shareholder in the LEP is exposed to liability for any claims which may be brought against the LEP. However, the Council's liability is limited to its investment in the LEP, and the LEP's principal contractual liabilities are owed to the Council under the SPA, the Design and build contract and the facilities management contract, its exposure in turn is limited to its investment in the companies.
5. The Council will be required to make an equity contribution in the LEP; and
6. The LEP structure brings with it another layer of complexity in what is already a major contractual project.

The final recommendation was that the advantages of the LEP far outweighed the disadvantages. This view it was expressed to be heavily influenced by the approach of DfES and PfS which is very strongly in favour of Local Authorities utilising the LEP structure.

Issue 2. Which form of Contract PFI v Traditional

In investigating the contract structures which were to be used many different solutions were discussed to fulfil the project aims, to rebuild 11 new secondary schools and each to have a facilities management contract:

All PFI and no PFI and many different combination solutions in between each scenario having detailed benefits, detriments and cost implications.

Eventually the decision made was that the project would be divided into 3 phases each phase having a combination of PFI and D & B contract structures; giving in total 8 PFI schools and 3 traditionally procured D & B contracts having the benefit of a bespoke Facilities Management agreement which replicated the PFI Agreement.

The rationale for this was to ensure that the D & B schools could have the same payment mechanism strategy and contractor incentivisation scheme of performance deductions if the contractual requirements weren't achieved throughout the services period and more significantly to that the Authority would not create for the future a two tier secondary school estate in which some schools had been maintained to a high standard and where some schools were allowed to fall into disrepair because of different budgetary demands which might be placed on the Authority in an uncertain financial future.

For accounting purposes the PFI procurement would be treated as off balance sheet and the PPP D&B with underlying FM contract would be treated as on balance sheet.

Issue 3. How would the project be procured?

When the case study first advertised its project in the Official Journal of the European Union the procurement process was programmed in accordance with the Competitive Negotiated Procedure primarily because this was the prevailing legislative course of procurement. However, subsequent to the issue of the contract notice and in line with Treasury Guidance the project had to move tracks from proceeding along that structure to follow the Competitive Dialogue Process. Table 1 shows the differences of those processes:

Table 1: Public Procurement (Contracts) Regulations 2006 legislative differences between each process

Negotiated Procedure	Competitive Dialogue Procedure
<p>The Negotiated Procedure requires prior publication of a contract notice. Can be used exceptionally when the nature of the work or works to be carried out, the goods to be purchased or hired or the services to be provided under the contract or the risks attaching to them are such as not to permit prior overall pricing.</p> <p>Contract Notice to be issued to identify: Whether the procedure will take place in successive stages, the time limit to request documents and the administrative details of where, how and what language the documents should be returned to the contracting authority in. Evaluation/ Award criteria should be notified in the contract notice including details of minimum thresholds of achievements in terms of financial standing and technical ability in conjunction with the minimum number of tenderers the authority will take through to negotiate.</p>	<p>The Competitive Dialogue Procedure requires prior publication of a contract notice and is used where a contracting authority wishes to award a particularly complex contract and considers that the open and restricted procedure will not allow the award of the contract.</p> <p>A particularly complex contract is defined as a contract where a contracting authority is not objectively able to define the technical means of satisfying its needs or objectives; specify either the legal or financial make up of a project or both.</p> <p>Contract Notice to be issued to identify: Whether the procedure will take place in successive stages, the contracting authority shall specify its needs and requirements and define those needs and requirements. In conjunction with informing prospective tenderers of the time frame in which to respond, where to send requests for information and how and the languages required for issuing the tenders in. It must also specify the minimum number of participants and that the contracting authority expects a minimum threshold of achievement in terms of financial standing and technical ability along with the evaluation and award criteria and any sub-criteria used by the contracting authority.</p>

Not to provide information in a discriminatory manner and to award on the basis of the Most Economically Advantageous Tender, which does not necessarily mean lowest price.

Not to provide information in a discriminatory manner, to ensure transparency and fair dealing throughout the process and the only discussions allowed at Preferred Bidder stage is that relating to clarification of aspects of the tender and confirmation of commitments provided this does not distort competition or cause discrimination; award on the basis of the Most Economically Advantageous Tender, which does not necessarily mean lowest price.

Source: the table taken from A.Vodden and D.Davenport:: A comparative review and evaluation of the Negotiated and Competitive Dialogue procedure as effective procurement routes to deliver PFI projects in the UK.

In undertaking the procurement process the Authority was able to rely upon the guidance of its advisors in relation to the interpretation of the legislative parameters, previous PFI procurement experience in terms of its programme and project management and strict and identifiable milestone timelines to achieve its outcomes.

Issue 4. How would the procurement process, the subsequent contract management team and the LEP be monitored for the requisite period of time?

Throughout the procurement process the authority's strategy, financial and business planning always included the retention of the full time procurement team which after service availability of the new build the procurement team would then become the contract management team with call-off ability for external advisors for issues which were likely to arise during the course of the on-going contractual period.

SUMMARY ANALYSIS OF CASE STUDY A

Whilst the above gives only a very whistle stop tour of Case Study A during the procurement process in summary both during the process and at the conclusion of the project the case study were held to be an exemplar Authority by PfS (now the Education Funding Authority). The authority completed the rebuild of the entire secondary school estate of 11 secondary schools to award winning standards and delivered the procurement process and strategy efficiently gaining recognition from PfS for excellence in performance bringing the project in procurement terms, in on time (in fact 6 weeks earlier than anticipated).

The case study showed that irrespective of the traditional or PFI route there were different VFM issues which needed to be addressed and different risk profiles and analyses which needed to be undertaken each different element within their own right creating an impact on VFM considerations in both the long term and short term periods.

LITERATURE SYNTHESIS

The literature reviewed from primary, secondary and tertiary sources had the result of providing the historical background and the developments over the last 40 years made in relation to the public sector's use of PPP PFI projects to achieve capital infrastructure projects it also highlighted the myriad of debates which have been held politically, academically and otherwise along with providing an insight into the different economic aspects and social perspectives which have been debated in terms of their use culminating in the issue of the new PF2 documents. Thus:

Issue 1. Which PPP Corporate Structure would be best suited for this project?

PPP's to achieve their objective can appear in many guises both in form and function giving them the flexibility to adapt to the changing needs of each individual project they are formed to address . (Mirjam & Dewulf, 2006) (Cirrell, Bennett, & Hann, 2000) (HM Treasury, 2012).

The legal formation of the PPP can be on the basis of an informal one-off deal with a formal partnership being governed via a simple partnership agreement to the establishment of a complex commercial structure and corporate entity such as either a Private Limited Company by Share Capital or by Private Limited Company by Guarantee (Braun, 2003), (Mirjam & Dewulf, 2006); the latter being established usually as a company with charitable objects which does not intend to make a profitable gain from the incorporation, however the corporate governance documents will set out exactly what the parties are able to do how they must conduct themselves to achieve the purpose of the company in conjunction with the respective legislative parameters established for commercial entities, charities and local authorities which have historically been governed under enabling legislation and more recently the Localism Act 2012.

Once established as a corporate entity the PPP becomes a person within its own right and with aims and objectives which its shareholders, directors or trustees must ensure it achieves with each having a distinct duty to ensure that each party acts in the best interests of this new entity putting their other interests aside. However, it is important to remember what those other interests are which each of the parties have an obligation to perform outside of the remit of the PPP; because ultimately it is the parameters and influences from those external pressures which will form the foundations of what it is the PPP when established is to achieve and it will be those influencing people who will determine its success or failure and the correlation between the achievement of value for money.

Fundamentally, the decision over which PPP structure to adopt is that of the contracting authority who will as part of its business case preparation both for internal due diligence requirements and for HM Treasury, if a PFI procurement is being undertaken, be required to ascertain which structure best suits its needs and offers value for money (Cirrell, Bennett, & Hann, 2000). However if the PPP is being formed to carry out a PFI project then there are certain conditions which both HM Treasury and financial institutions require (HM Stationery Office with permission from HMT, 2000) (HM Treasury: Cabinet Office, 2011) and on these occasions the contracting authority has very little power to decide the corporate structure adopted in particular in the case of the building schools for the future programme. HM Treasury had been instrumental in encouraging the use of the (LEP Co) (Craven, 2011).

Giving consideration to the issues raised within this literature review and then cross referencing the issues raised within the Case Study A as detailed above it can be seen that whilst it is for the Authority to determine which structure it should use it is very heavily influenced by central government as to which avenue it actually follows.

Interestingly the LEP was to be established to perform 3 functions which were stated to be to “provide” or “procure” the services which would be set out within the contractual documents negotiated with the local authority, namely the Strategic Partnering Agreement, to provide any additional services agreed which would fall within the parameters of their exclusivity and to work with their supply chains to ensure efficiency savings (HM Stationery Office with permission from HMT, 2000). The additional ethos to this procurement strategy was that the LEP would act as a long term strategic partner to work with the local authority to innovate and implement strategic solutions for the benefit of their boroughs. In determining the efficiency of the LEP or the issue of VFM with this formation there are 2 distinct considerations. The first relates to the legal structure and what that offers and the second is the cost and financial considerations which impact upon the formation of the LEP and its on-going function for what may be 15 years.

On the face of the guidance from Treasury it would not appear that the LEP structure could be a structure which has a VFM benefit. Arguably the only way it could be determined at this stage to be a VFM solution to each of the parties forming the entity is if it could generate either a profit or a significant saving over its 10 to 15 year projected lifetime.

Issue 2. Which form of Contract PFI v Traditional

The start of the PPP PFI procurement process for a local authority is to determine that the use of PFI is appropriate by proceeding through a set rigorous assessments internally and then those

established by Treasury and the National Audit Office to prove that procuring a project on the basis of PFI represents value for money to the contracts to which the authority commits (HM Stationery Office with permission from HMT, 2000) (HM Treasury, 2012). The cost of procurement must also be borne in mind both in terms of in-house teams and external advisors which are required as a matter of course not only to advise on technical solutions but also on the financial implications and the legal contractual position. The quality of advisors being of paramount importance in terms of the experience of commercial deals of this kind must also be factored into any equation and when considering that the whole life cost of these deals often creeps into £billions it is not unrealistic to expect £million advisor costs as evidenced within the case study undertaken.

As discussed in an earlier part of this thesis part of the remit of HM Treasury is to act as Gatekeeper in relation to providing approvals to progress through the PFI process (Cirrell, Bennett, & Hann, 2000) and as Treasury sets out within its 2003 report 'PFI: Meeting the investment challenge' chp.3 that the only consideration which enables a PFI project to advance is the requirement to prove that the PFI procurement offers a value for money solution based on an objective test and where the project is able to achieve the Government's requirement for "efficiency, equity and transparency". It provides that there are only certain categories of project which would benefit from a PFI based agreement; fundamentally they are high value projects valued to be in excess of £20m, which have the ability to be the subject of a long-term contract with infrastructure which has an ability to underpin the concessionary element of the deal. As stated previously when a contracting authority determines it has a capital build/ infrastructure project which it wishes to pursue by virtue of a public private partnership it has a number of legislative and policy hurdles it must jump prior to starting along the procurement route.

One of the initial considerations to be assessed by a contracting is the cost implication of pursuing the project and the overall value for money (VFM) of using either the PFI route or whether Conventional contracting would be better for the Authority. Public Sector VFM testing is defined within the Green Book being Treasury's government accounting bible as "the optimum combination of whole-life cost and quality to meet the user requirements" (HM Treasury, 2006) and is measured robustly to ensure that there is no bias in relation to the use of PFI as opposed to Conventional Contracting. The VFM test is an on-going process to ensure that PFI is only used where it does offer value for money as against a conventional procurement.

The cost considerations must satisfy three different elements of the process; the first, the actual capital build and value attached to the contract as this determines the threshold criteria for the purposes of the 2006 Regulations, and the advertising process to be followed irrespective of whether the contract is conventionally procured as a design and build contract or that of a PFI; the second being the Value for Money (VFM) testing which is required in accordance with Treasury Guidance and Local Government Act compliance, and; the third and final analysis gives Treasury the information it requires in the form of an authority's Outline Business Case to allow Treasury to determine whether the PFI process is appropriate for that project. The general rule of thumb from Treasury is that complicated capital build projects of a value over £20millionGBP would probably benefit from PFI as being the most appropriate way forward for an authority to pursue a capital infrastructure project (Treasury 2003).

Thus the choice of contract must balance out all of the cost consequences including the transfer of risk, the whole life cost and so forth.

Issue 3. How would the project be procured?

There are many debates which are on-going in relation to the time which is taken in relation to procurement of PPP PFI deals (Cirrell, Bennett, & Hann, 2000) (Craven, 2011); the negative issues relate primarily to the cost consequences not just simply for the Private Sector but also for the Public Sector participants (Cirrell 2008) (HM Treasury, 2012). It has not been unknown for procurements to last for 6 years and in addressing this problem Treasury have sought to reduce time scales and going forward they are projecting that procurements should be undertaken within a 2 year period; not to achieve this without Treasury approval could result in the Authority losing

the benefit of the Treasury finance (HM Treasury, 2012). This practice has yet to be tested and it will be interesting to see if there is a dramatic reduction in time taken for procurements. However, in terms of how should we procure in the UK we are subject to the Public Procurement Regulations 2006 as amended in 2011 and significantly amidst much UK and EU government debate Competitive Dialogue is the method of choice for most PFI procurements. The literature review undertaken analyses the many debates and influences which impact upon this process; in summary the review leads to the conclusion that whilst competitive dialogue is time consuming and costly, in the main the public sector participants in the process believe that this is the preferred method to achieve a truly competitive solution to their requirements.

Issue 4. How would the procurement process, the subsequent contract management team and the LEP be monitored for the requisite period of time?

As stated within the case study undertaken the on-going management from an authority perspective was to be a continuing commitment over the period to the 25 year contract. This approach to that element of the PFI deal ensures that VFM issues and partnership issues are addressed in a timely manner and leads to better formed relationships. Again there are many academic papers which debate this process in the realms of project and construction project managements.

In terms of monitoring of the LEP or other SPV structure the involvement of the Authority on the board of directors is one area where the benefit of the LEP to the Authority is one where an additional layer of transparency of dealings is available to the Authority which probably wouldn't otherwise be afforded. In actively participating in the Board and Management Meetings ensures that the forum and Authority is informed about issues and can influence the discussions and in part through the ability to vote proportionately to the shareholding can influence the outcome as set out within the Partnership Agreements.

This element has a significant impact on the assessment of VFM decisions going forward within the contract structure and within the substantive PhD is discussed further.

QUESTIONNAIRE DEVELOPMENT

Having cognisance of the key aims, objective and questions which arise from the aims of the study in testing the hypothesis in order to develop the questionnaire it is also necessary to give consideration to the different elements of data collection undertaken; in the case of this research the Case Study and Literature Review and from those data collection methods ascertain what issues need to be addressed as a form of statistical analysis to either affirm or reject the hypothesis. Consideration at this stage should also be given to the cause and effect of both environmental and contextual influences which might have arisen within the study such as any research bias or the effect of the subject intervening variables upon the independent and dependent variables to the hypothesis and how they can be addressed within the questionnaire. The sample population within which the questionnaire will be distributed will be taken from public and private sector personnel who have experience in PPP and PFI procurement, this will also include public sector and private sector financial, technical and legal advisors, unions, financial institutions, central government personnel, local government personnel including Headmasters, School Governors, Diocese and Charity Commission in order to ensure the key issues which impact upon VFM for all sectors within an economic context are addressed to give clarity and confidence in the results.

CONCLUSION

Whilst there have been many studies and a number of previous works undertaken in this area the main criticism which is raised is that the previous works do not have full insight or access to primary data which can be used as a comparator to data held nationally this is based on issues of

commercial sensitivity. This research is able in part to have access to such comparative raw data and seeks to test the hypothesis by bringing together the data collected through the various mechanisms and finally test it objectively through statistical analysis of questionnaire responses. It is anticipated that the results will both affirm the hypothesis but also show areas where the hypothesis can strongly be rejected. The subject of VFM is such a broad reaching area and subjective that it will be impossible to ascertain a one fit suits all solution.

REFERENCES

- Braun, P. (2003). Strict compliance versus commercial reality: the practical application of EC procurement law to the UK's private finance initiative. *European Law Journal*, 9 (5), 575-598.
- Cirrell, S., Bennett, J., & Hann, R. (2000). *The PFI and Major Strategic Procurement in Local Government*. London: Sweet and Maxwell.
- Craven, R. (2011). Procurement Procedures under the Private Finance Initiative: the operation of the new legal framework. *Nottingham University; 5th Public Procurement Research Conference*. Nottingham University.
- Deloitte. (2006). *Closing the Infrastructure Gap: The Role of Public Private Partnerships*. London: Deloitte.
- HM Stationery Office with permission from HMT. (2000). *Public Private Partnerships: The Government's Approach*. London: The Stationary Office.
- HM Treasury. (2006). *PFI- Strengthening Long Term Partnerships*. London: HMTreasury.
- HM Treasury. (2012). *A new approach to public private partnerships*. London: HMT.
- HM Treasury. (July 2003). *PFI: Meeting the investment challenge*. London: HM Treasury.
- HM Treasury: Cabinet Office. (2011). *Major Project approval and assurance guidance*. London: Treasury.
- Mirjam, B.-S., & Dewulf, G. (2006). *Strategig Issues in Public-Private Partnerships- An International Perspective* (1st ed.). Oxford: Blackwell.

ANTICIPATING & MANAGING RISKS OF AN INTEGRATED INFRASTRUCTURE SYSTEM

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The economic crisis has highlighted shortcomings in the primary delivery systems of (transport) infrastructure. Public Private Partnerships (PPPs), while a preferred infrastructure delivery model, introducing private finance, has been no exception. New delivery – business models need to be investigated. The present “thought piece” introduces the concept of value creation through integration on a functional and/or cross-sectoral level. The initial analysis of estimated trends in key risk probability present an indication of potential value generation and also of future research needs.

Keywords: Concept of value creation, Infrastructure delivery, Risk analysis.

INTRODUCTION

Public Private Partnerships (PPPs), as project finance and delivery schemes, have been used in many countries to deliver infrastructure capital projects. The study, research and discussions with respect to their viability and stakeholder value creation during the past two decades has been in respect to the ever growing need for capacity deployment, the availability of private finance and the need to bring forward development schedules that would not have been possible within the public budget (EIB, 2005). The length of the contractual arrangement reflected the time needed to achieve acceptable returns and was also seen as a stabilizing factor that would absorb future uncertainties stemming from the “universe” and the complexity of the contractual arrangement. The economic crisis highlighted the shortcomings. Risk averse behaviour demonstrated by lenders and project sponsors is evidence of poor value creation demonstrated in the current arrangements, which were based on “predict & provide” with predictions not materializing.

However, infrastructures are crucial for Europe's economic future. Motivating public and private funds in infrastructure investment are an important part of stimulus and recovery plans at EU and Member State levels, as a way of supporting aggregate demand while ensuring a long term return on money spent. Addressing investments in Europe's infrastructure targets a true integration, with seamless connections between all its component parts. Roads, rail, ports, airports networks and other transport connections, electricity and gas grids, as well as broadband networks are vital for the functioning of an integrated economic area and for social and territorial cohesion.

Presumably, integration of infrastructure and the shift from project to system leads to greater value creation and better risk containment. The present “thought piece” embarks from this “stand point” to address improvements identified in a “systems’ approach” to delivering infrastructure as opposed to a regular “project approach”. Key in this address is the analysis of the impact this approach may have on risks and whether an improvement, in terms of lesser risk or ability to create a portfolio with better risk mitigation strategies is created leading to improved value for all stakeholders.

A background of transport integration and its need for further integration is offered in the section on background. Following this, key risks associated with transport infrastructure projects stemming from literature are identified. Their discussion and analysis in a system situation is, then, analysed and discussed. Conclusion and further needs for research are offered at the end.

BACKGROUND

The most recent EC Transport White Paper, published in 2011 (EC, 2011), furthers concepts of integration put forward in the 2001 White Paper (CEC, 2001) and originally introduced in 1997 (EC, 1997), when defining “intermodality”. Preston (2012) in his respective review identifies that five over the ten goals stated for a competitive and resource efficient transport system are directly related to transport integration. Emphasis is placed in physical integration (eg. Performance optimization of multimodal logistic chains, extension/completion of High Speed Rail network, development of a TEN -T core network and plans to connect all core airports and seaports to the rail network). An integrated information, management and payment system is also foreseen.

The above relates to infrastructure development such that would structure and influence transport behaviour rather than follow the usual “predict and provide” approach, which has been the norm over the last 2-3 decades, as the potential to raise funds was readily available by attracting private funds on relatively low risk terms. The economic and financial crisis has put a strain on funding availability and enhanced risk adverse behaviour. The proposal for the “Connecting Europe Facility” (CEF) aims “to streamline and facilitate EU support to infrastructures by optimising the portfolio of instruments available, standardising the operational rules for using them, and capitalise on possible synergies across the energy, transport and ICT sectors”. The CEF “proposal develops a common financing framework for all sectors, including co-ordinated annual work programmes, a common Committee, flexibility between sectoral budgets, increased performance indicators and conditionalities and the shared use of infrastructure specific financial instruments”.

So how far could infrastructure integration go?

“Integration” (and even “sustainability”), as a principle in transport policy, is frequently advocated, but rarely defined. May (1993) and Hine (2002) consider the potential for integration in transport planning and delivery in six areas; Integration between authorities; measures involving different modes; measures involving infrastructure provision, management and pricing; transport measures and land use planning policies; transport measures and policies for the environment; and transport measures and policies for education, health and wealth creation.

Along the same lines, Potter and Skinner (2000), identify function or model integration, transport and planning integration, social integration and environmental, economic and transport policy integration. Hull (2005) assessed the level of holistic integration by forming a “ladder of integration” with physical and operational integration of transport services as level (1) to integration of policies in all accompanied sectors as level (8). The latter was considered with respect to acknowledging the interdependencies between land-use, economics, the environment, sustainability and social objectives such as health, education, affordability and inclusion.

In any case, the basic concept behind Transport Integration is the demonstrated fact that an integrated approach, in which infrastructure provision, management of existing infrastructure, and pricing of use of that infrastructure are co-ordinated, can significantly reduce the scale of transport problems as there is benefit to be gained from an integrated approach, when compared with the piecemeal implementation of individual measures. In short, integration may be considered to be a prerequisite in achieving optimal use of resources (also endorsed as a flagship initiative “Resource efficient Europe”). However, there is evidence that system (market) structure influences the potential outcome, as transport exhibits a number of market failures of which the most important are wasteful competition, network failures and the presence of externalities (particularly related to congestion) (cf. Preston et al., 1999). More specifically, whilst improved integration between transport modes helps people and goods to move more easily and reduces the costs and inconveniences of transportation, it does not guarantee improved pay-offs to the individual transport operator. To this end, there is evidence (cf. Potter, 2010; The World Bank, 2004; Wang and Yang, 2005) and theory (Rouboutsos and Kapros, 2008) that the aspect of “integration” – or rather “avoidance of integration” – on a functional and model level is used by operators to restrict or minimize competition. In this context the recent White Paper rightfully focuses on regulation and not market self-adjustment as the primary means of intervention.

However, the above analysis/approach overlooks a number of issues:

- (1) Integration in transport policy has been always considered with respect to transport planning related sectors (or sectors that would influence transport design, development and behaviour). Therefore, emphasis was placed on health, education, urban planning etc. Today (and in the future) transport design, development and behaviour are influenced by developments with respect to energy and ICT. It is therefore, reasonable to consider integration with respect to these sectors (preliminary and in addition to the existing ones).
- (2) While regulating the market protects public and private benefits from strategic behaviour it also limits the potential to create /seek “value” in integration (cf. Hibbs (2000) supporting the downside of integration)
- (3) Lenders and project sponsors due to the economic and financial crisis are demonstrating risk averse behaviours and seeking significant premiums. This behaviour impacts negatively existing infrastructure delivery arrangements and future undertakings. Integration may be used to create a “bundling” of projects (and not only of project phases, as is the case of the “traditional” PPPs) and through this create the required “additional” value for stakeholders to off-set risk averse behaviour.

With the scope of integration, which would lead to seamless transport for the user, efficiencies of scale for the transport operator and the effectiveness of investments for the public authority and sponsors/lenders new “value” may be generated, especially with respect to the piecemeal approach followed until recently. This approach ultimately leads to new business models, which are required to be cross-cutting so as to be able to generate and capture value for a wider set of stakeholders. For example co-development of transport, energy and ICT infrastructure or financing of entire corridors [one design, one funding, one management] or multi-modal infrastructure developments should be the norm in order to maintain the greater possible value creation base.

Thus the Prevailing Concept proposes a shift in the focus of finance from the “project” to the “system” and value creation/capture for the stakeholders of the “system” with pay-offs achieved through the “bundled system” value created. At the same time, more stakeholders are involved with possibly and potentially diverse utilities.

KEY RISKS IN TRANSPORT PROJECT DELIVERY

At the core of any contractual arrangement is the transfer of appropriate risks from one party to the other. Similarly, at heart, PPPs are a risk-sharing problem between (at least) two risk-averse agents – a public and a private one – (or three if financiers are to be included), constrained by bounded rationality, which stems from: (i) the uniqueness of the undertaking; (ii) the considerable investment incurred; and (iii) the resulting length of the contractual agreement, which stretches a few decades into an unforeseeable future (Wei-hua et al, 2006; Roumboutsos and Anagnostopoulos, 2008).

PPP projects in the transport sector could be considerably even more risky due to (i) the size of the investment, (ii) the respective length of the agreement and (iii) its complexity. In addition, transport projects are inherently immobile, capital-intensive and often require large sunk investments whereby their recuperation may span over a long period, in many cases in the order of 30 or more years (Grimsey and Lewis, 2002). Furthermore, transport infrastructure projects are proven to be (Flyvbjerg et al, 2002; 2004) characterised by enormous cost overruns, which are transport mode specific and due, possibly, to optimism bias in the ex-ante evaluation phase in an effort to secure project approval. Furthermore, revenue-related risks are significant in transport projects and reflect the uncertainty in predicted traffic volumes and the willingness of users to pay for services rendered. When considering the long payback period required and the fact that traffic volumes are correlated to regional and international market structure, economic growth and land-use patterns then addressing the investment risk becomes crucial.

Moreover, Evenhuis and Vickerman (2010) note that asset specificity confers to hold-up risks for both the public and private sector. Once constructed by the private sector the asset cannot be used otherwise to generate revenues, but, simultaneously, the private sector as “owner” of the asset (say in a concession contract) creates for himself a “temporary monopoly”. In this case, the management of the asset is entirely regulated upfront through the PPP contract leaving little room for adjustments or transport policy interventions. However, the very issue of asset ownership rights is at the heart of a very complex and interrelated set of risks specific to the transport sector. These issues concern ownership, planning, network integration and pricing and have a different impact depending on the project type, the transport sub-sector and the locality directly correlated to demand and respective revenues (cf. Roumboutsos et al, 2012; Lemp and Kockelman, 2009). The various “market”, “revenue”, “demand”, “traffic” etc. risks reported in literature are not but describing the source of risk “triggers”. Therefore, various listings exist in literature (cf. Roumboutsos et al, 2012). The present analysis adopts for further investigation the risks presented in table 1.

KEY RISKS IN A SYSTEM DELIVERY

The concept of integration may endorse many levels. For the scope of the current analysis two levels/ forms of integration are analysed: transport functional integration and cross-sector integration. The first, i.e. functional integration, refers to an integrated transport system – project. Examples of such projects are transport hubs and their access networks; transport corridors etc. In principal, these projects secure network flows and address transport system bottlenecks. The second, referring to cross-sector integration, concerns integration of investments from other supporting sectors and, predominately, from the energy and ICT sectors. This creates a “portfolio” of infrastructure investments, and puts forward a holistic approach and a platform for the adoption of upstream and downstream innovation.

The risks identified above are discussed with respect to their estimated trend in probability of occurrence and potential severity under both aspects of integration.

Bid Cancellation – pre investment risk

This is a risk many projects face when initiating. As this would be a new approach, the probability of bid cancellation would most probably be higher. As costs for bid preparation escalate under a “system” approach, contracting authorities should prepare the tendering process articulately so as to avoid /minimise this probability.

Land use and acquisition risk

Land use is improved and fully exploited under a “system” approach both for functional and cross-sector integration. Its planning is a pre-requisite in following this approach. Therefore, it is estimated that, even if strategic behaviour may demonstrate, early planning should lead to the reduction of this risk.

Financial close

The greater size of these projects concerns greater absolute value investments, which may have difficulties in finance close risk in terms of securing the funds required. However, the risk diversity that a system approach bears in relation to a project approach makes securitization more probable. It may also improve creditworthiness allowing for Structured Finance as emphasis is given to the robustness of the business transaction and the value it may bring (Coval et al, 2008). It must be considered, however, that the complexity of such transactions is very high and careful designed plans must be developed beforehand. “Regulators” may be needed to safeguard both debt issuers as well as investors.

Table 1: Key risks associated with transport PPPs

PHASE	Risk category	Description
PROJECT DEVELOPMENT	Bid Cancellation – pre investment risk	Bid cancellation, non recuperation of pre-investment costs risk
	Land use and acquisition risk	Site availability risk – surveys and studies pre-investment risk
	Financial close risk	Project financing risk – negotiation stalemate with financing parties, inability to form successful lender syndication.
	Specifications risk	Technical and legal specifications risks, as they affect construction cost overruns and/or changes in infrastructure/construction/environmental legislation.
	Innovation/ technology Freeze risk	The innovation and the ability to include innovation after the “freeze” of the design
CONSTRUCTION	Failure to meet performance criteria risk - Time	Delays in completion and/or certification of constructed sections risk.
	Failure to meet performance criteria risk – Quality	Quality shortfall/defects in construction/commissioning tests failure risks.
	Construction Cost overruns risk	Volatility of material costs, overhead cost estimation risk, legal risk of technical specifications changes.
	Permit risk	Delays in project approvals and permits
	Innovation construction risk	The risk of adopting innovation in construction and including innovation design
OPERATION	Operating cost overrun risk	Labor regulation volatility risk; taxation regulatory and legal risks; maintenance materials and labor cost overruns.
	Failure to meet performance criteria risk – Quality	Non meeting of contractual operation standards risk
	Innovation risk	Risk of innovation failure
	Political risk	Government delays in granting or renewing approvals; government stability and willingness to honor/manage contract.
	Demand risk – Revenue (Background)	Traffic growth risk, as it is linked to macroeconomic factors, social and political environment.
	Demand risk – Revenue (Legal & Regulatory)	Legal environment and regulatory framework risks; e.g. change in transport taxation laws, vehicle ownership and fuel regulations.
	Demand risk – Revenue (Pricing)	Government Unwillingness to honour tariff adjustments; Pricing policy; willingness to pay.
	Demand risk – Competition/ governance	Unforeseen competition risk due to change in (transport) policy; Changing in priorities of governing bodies.
	Demand risk – Network	Delays in integration to the central transport network risk, as they affect demand/traffic growth.
TRANSFER	Asset residual value risk	Technical (out-dated) obsolescence, residual transfer value
PROJECT LIFE CYCLE	Financial risk	Interest rate volatility. Market event and funding shortage risks
	Inflation risk	Inflation volatility and growth risk, as it affects costs during development/construction and revenues during operation.
	Currency risk	Volatility of foreign currencies exchange, if applicable.
	Force majeure events (nature)	Force majeure events (floods, earthquakes, riots, strikes, weather changes, geotechnical conditions, etc).
	Social - project acceptance risk	User stance as it affects the project’s development and operation. This could refer to passive opposition (boycotting the project) to active (e.g. refusal to pay tolls during operation, demonstrations preventing construction, claims in court against project etc.)
	Governance Risks	Risks in third party relations or issues related to buyouts etc., which impact the ability to “govern” the project and provide the transport service.

Specifications risk

No differentiation should arrive with respect to this risk. It could even be considered that, overall, this risk may be reduced as an integrated design is put forward to manage all aspects, so as future changes are minimised. Again, the size of the endeavour may be a source of additional risk.

Innovation/ technology Freeze risk

This is a risk facing all technology-based designs and projects. While addressing a system should be much different than addressing a project, the holistic approach may be a reason of improvement.

Failure to meet performance criteria risk – Time, Quality and Cost

Transport projects are usually considered Megaprojects as their budget usually exceeds the defined budget level. Hence, the prospect of failure with respect to construction performance is apparent but not different than for “regular” projects.

Permit Risks

The multi-module of the “system” approach may increase “permit risks”, in terms of the number of permits that may be required. At the same time, permits may be fewer than required if separate projects were considered.

Innovation construction risk

Developing a system approach allows for the removal of barriers in adopting innovation. The favourable outcome is generated by overcoming the fragmented nature of construction.

Operating cost overrun risk

This risk is anticipated to be reduced as economies of scale may prevail both in the actual operation of services but also stemming from reduced transaction costs that would have been incurred if interfaces existed between the various modules of the overall project. Caution should be taken for the appearance of diseconomies of scale, which are equally likely if only “bundling” is the objective.

Failure to meet performance criteria risk – Quality

This risk should follow suit the operational cost risk. Better coordination between interfaces would reduce operational cost overrun risk and performance criteria risk, or at least lead to “no change”.

Innovation risk

As interfaces are reduced and capabilities may be transferred from one mode to the other and one sector to the other cross-fertilization is expected to improve, reducing the risk of innovation failure.

Political risk

In order to go ahead with such projects, it is important to obtain full political support. Therefore, significant political debate is expected prior to their initiation. Once initiated, these projects, most probably, will become “too big to fail”. This could be equally risky.

Demand risk – Revenue (Background)

This may be considered the most characteristic risk with respect to transport projects as it reflects on forecasts and their vulnerability with respect to various influences, including macro-economic

factors that may not be foreseen, as in the case of the current economic crisis. However, support in seamless transport (as in the case of functional integration) or revenues from other streams of revenue, which may not be immediately or to the same extent influenced, significantly contains this risk.

Demand risk – Revenue (Legal & Regulatory)

Addressing the entire system either in terms of functional integration (i.e. transport system integration) or cross-sectoral integration leads to better regulatory interventions before the implementation of the investment. Hence, this overall risk is considered to reduce due to better initial planning.

Demand risk – Revenue (Pricing)

System integration should lead to some level of pricing or tariff integration. However, pricing of the various services and connecting this to the initial investment is not a simple task, as governing economics of the various sectors are different. Hence, pricing becomes a challenge, which is greater in the cross-sectoral integration than in the functional integration. The latter has been widely, but not conclusively, addressed in literature.

Demand risk – Competition/governance

The effects of changing priorities are more pronounced in smaller project environments, where policy and other changes are introduced without considering holistically market conditions. Hence, this risk is expected to reduce.

Demand risk – Network

Network demand risk is the result of fragmentation of the transport effort, which is employed to introduce competition in the market. That is, a service may be sub-divided (fragmented) in smaller “independent” project-contracts in order to achieve economies of scale, or scope or reduce the hold-up risk in governance. However, this approach has been, on the one hand, also used by operators to safeguard against competition and, on the other, has led to limitations in traffic flow reducing the value of the endeavor. Carpintero (2010) identifies this as one of the principle problems in the Hungarian toll motorways, as they lead to boarder crossings with long waiting times, which cancel any gains from using improved carriageways. Chung *et al.* (2010) show how this approach has led to a disintegrated toll road network in Australia. Developing integrated solutions has an anticipated positive impact on this risk.

Asset residual value risk

The proposed approach is expected to improve residual value and, hence, reduce this risk.

Financial, inflation and currency risks

These risks are related to the general macroeconomic environment the project is situated in. Projects that are developed cross-boarder (eg a transport corridor) or cross-sectoral may be able to better handle volatilities in this domain.

Force majeure events

Force majeure events are acts of nature and as such cannot be assessed further. However, the challenge of climate change prepares us for the anticipation of greater frequency and severity of events of this nature. A holistic approach to project development is expected to minimise impact and protect against extreme environmental conditions.

Table 2: Key risks associated with transport PPPs

PHASE	Risk category	Functional Integration	Cross-Sector Integration
PROJECT DEVELOPMENT	Bid Cancellation – pre investment risk	↗	↗
	Land use and acquisition risk	↘↘	↘↘↘
	Financial close risk	↘	↘↘
	Specifications risk	↔	↔
	Innovation/ technology Freeze risk	↔	↔
CONSTRUCTION	Failure to meet performance criteria risk - Time	↔	↔
	Failure to meet performance criteria risk – Quality	↔	↔
	Construction Cost overruns risk	↔	↔
	Permit risk	↗ or ↘	↗ or ↘
	Innovation construction risk	↗	↗
OPERATION	Operating cost overrun risk	↘	↘
	Failure to meet performance criteria risk – Quality	↔	↔
	Innovation risk	↘	↘
	Political risk	↗ or ↘	↗ or ↘
	Demand risk – Revenue (Background)	↘	↘
	Demand risk – Revenue (Legal & Regulatory)	↘	↘
	Demand risk – Revenue (Pricing)	↗	↗↗
	Demand risk – Competition/governance	↘	↘
	Demand risk – Network	↘↘	↘↘
TRANSFER	Asset residual value risk	↘	↘
PROJECT LIFE CYCLE	Financial risk	↔	↔
	Inflation risk	↔	↔
	Currency risk	↔	↔
	Force majeure events	↔	↔
	Social - project acceptance risk	↘	↘
	Governance Risks	↗	↗↗

Social - project acceptance risk

Integrated infrastructure and respective service delivery is expected to lead to improved value for the end users. Its success lies in developing structures that on a functional aspect improve seamless transport of goods and people and on a cross-sectoral aspect improve services while protecting resources, addressing the issue of aging population, land use, climate change etc. This should provide an overall service that is more acceptable to society.

Governance risks

One of the reasons leading to project “fragmentation” has been the need to induce competition and reduce the hold-up risk. This is the result of fragmentation of the transport effort (or missions), which is employed to introduce competition in the market. Simultaneously, the procurement conditions and the nature of the downstream market has created strong international market players, who have benefited from internalizing benefits of processes introduced to minimize costs and capitalize on previous experience. These agents have already conceived the value of cross-sector integration and have developed their business in various sectors and sub-sectors. This becomes a significant source of risk, with respect to the development of strategic behavior and exploitation of asymmetric information.

CONCLUSION AND FUTURE RESEARCH NEEDS

The qualitative analysis presented in this conceptual paper indicates that risks probability is improved in a “system approach” to infrastructure development as opposed to the approach of individual modular projects put forward to deliver the entire service. More specifically of the twenty-six (26) key risks identified in transport projects, ten (10) seem to have reduced probability of occurrence; ten (10) were estimated to remain unchanged; for two (2) there could be no conclusive estimate. However, four (4) risks are anticipated to increase in probability of occurrence and probably severity as well.

The key risk to be considered figures under “governance” due to the potential strategic behaviour to be possibly demonstrated by agents, who are able to operate (and thus internalise benefits) cross-model and cross-sector. Such agents are already present in the international infrastructure delivery scene and a need to regulate their operations is already apparent.

As estimates and analysis made in this conceptual work are not conclusive further research is needed, especially as in the transport sector (and more so in a “systems’ approach”), there is no uniform format address risk (Monteiro, 2003) and more elaborate scenarios need to be devised.

REFERENCES

- Carpintero, S (2010) Toll Roads in Central and Eastern Europe: Promises and Performance. *Transport Reviews*, 30 (3), 337-359.
- Chung, D, Hensher D A, Rose, J M (2010) Toward the betterment of risk allocation: Investigating risk perceptions of Australian stakeholder groups to public-private-partnership tollroad projects. *Research in Transportation Economics*, 30, 43-58.
- Commission of European Communities (1997) COM(1997)243 - Intermodality and intermodal freight transport in the European Union - A systems approach to freight transport - Strategies and actions to enhance efficiency, services and sustainability. Brussels (Belgium).
- Commission of European Communities (2001) White Paper: European Transport Policy for 2010: time to decide. COM(2001)370. Brussels: CEC.
- Coval et al. (2008) Economics of Structured Finance, Working Paper, Harvard Business School.
- European Commission (2011b) White Paper. Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system. COM(2011) 144. Brussels: EC.
- Europea Investment Bank (EIB) (2005). *Evaluation of PPP Projects Financed by the EIB*. EIB Publications.
- Evenhuis and Vickerman (2010) Transport pricing and Public-Private Partnerships in theory: Issues and Suggestions. *Research in Transportation Economics*, 30, 6-14.

- Flyvbjerg, B, Skamris Holm M K and Buhl, S (2002) Underestimating Costs in Public Works Projects: Error or Lie? *Journal of the American Planning Association*, 68(3), 279 – 295.
- Flyvbjerg, B, Skamris Holm M K and Buhl, S L (2004) 'What Causes Cost Overrun in Transport Infrastructure Projects?', *Transport Reviews*, 24(1), 3-18.
- Grimsey, D and Lewis, M K (2002) Evaluating the risks for public private partnerships for infrastructure projects. *International Journal of Project management*, 20, 107-118.
- Hibbs, J (2000) *Transport Policy: The Myth of Integrated Planning*. London: Institute of Economic Affairs.
- Hine, P, (2002). *Integrating Transport and Development*. Royal Institute of Chartered Surveyors, London.
- Lemp, J D and Kockelman, K M (2009) Understanding and Accommodating Risk and Uncertainty in Toll Road Projects A Review of the Literature. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2132, Transportation Research Board of the National Academies, Washington, D.C., 106–112.
- May, T (1993) How to achieve integration, In: *Integrated Urban Planning and Transport Policies*, The Cambridge Conference on Urban Transport, 29–30 June 1993, Christ College, Cambridge.
- Monteiro, F (2003) *The Concession Process in the Portuguese Port Sector*, Unpublished Masters Thesis, IST, Technical University of Lisbon.
- Preston, J, Whelan, G and Wardman, M (1999) An Analysis of the Potential for Ontrack Competition in the British Passenger Rail Industry. *Journal of Transport Economics and Policy*, 33(1), 77-94.
- Preston, J. (2012) *Integration of Seamless Transport*. Discussion Paper 2012-01, OECD/ITF
- Potter, S. (2010) Transport Integration – an impossible dream? In: *Universities Transport Study Group Annual Conference*, University of Plymouth.
- Potter, S and Skinner, M J (2000) On transport integration: a contribution to better understanding. *Futures*, 32, 275–287.
- Roumboutsos, A and Kapros, S (2008) A game theory approach to urban public transport integration. *Transport Policy*, 15(4), 209-215.
- Roumboutsos A and Anagnostopoulos, K (2008) Public Private Partnership projects in Greece: Risk ranking and preferred risk allocation. *Construction Management and Economics*, 26 (7), 751-763.
- Roumboutsos A, Pellegrino, R, Vanellander, T and Macario, R (2012) Risks and Risk Allocation in Transport PPP projects: a literature review In: *Roumboutsos A. and Carbonara, N. COST Action TU1001, Public Private Partnerships: Trends & Theory*, 2011 Discussion Papers, ISBN 978-88-97781-04-2. 2012
- Wang, J Y T and Yang, H (2005) A game-theoretic analysis of competition in a deregulated bus market', *Transportation Research Part E*, 41(4), 329–355.
- Wei-hua, Y, and Da-shuang, D (2006) Concession Decision Model of BOT Projects Based on a Real Options Approach. *International Conference on Management Science and Engineering, (ICMSE '06)*.
- World Bank (2004) *Cities on the move: a World Bank urban transport strategy review*. Washington: World Bank.

THE APPLICATION AND IMPLEMENTATION OF LEAN DELIVERY METHODS IN PPP PROJECTS

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Lean Project Delivery (LPD) seeks to align interests, objectives, and practices through a team based approach where the primary team members are the owner, design professionals, prime contractor, and key subcontractors (trades partners). LPD is a project centric delivery in which the owner, engineers, and contractors sign a single contract for achieving project goals. LPD encompasses a number of Lean techniques where “Lean techniques” is a broad term that utilises a variety of tools, strategies and technologies to increase levels of integration and cooperation on construction projects while improving quality, shortening project duration and reducing costs. Lean Project Delivery (LPD), Integrated Project Delivery (IPD) and Integrated Lean Project Delivery (ILPD) are different terms being used to represent Lean delivery method. These terms all focus on the concept of creating a project / team centric approach to achieve project goals. This paper aims at exploring and describing lean techniques and the set of non-traditional project delivery approaches of achieving value for money in Public Private Partnership (PPP) projects through a systematic thorough literature review and case studies. It was revealed that the application of the lean project delivery to construction projects delivers a better integration of the individual management components to maximise project benefits. Therefore, LPD is suggested as a means of ensuring greater quality, lower costs, and quicker time to market for future projects.

Keywords: Lean techniques, design and build, value, lean project delivery, integrated project delivery.

INTRODUCTION

There has been a continuous urge by the construction professionals seeking to apply better technologies and processes to improve project delivery, but there is a retarded rate in change due to lack of unified strategy. Lean concept was adopted from the manufacturing industry since the adoption of lean philosophy has made the manufacturing industry become globally competitive with improved performance (Shad and ward 2007; Achange et al. 2006; de Treville and Anatonakis 2006). Lean construction applies specific techniques in a new construction project delivery approach. Lean techniques describe a set of non-traditional project delivery approaches to managing the host of collaborative relationships that exist on a project. Lean project delivery method is based on collaboration between designers and constructors from a project’s inception (Wodalski et al. 2011). It makes use of relational contract principles to join all of the strengths and capabilities of the owner, designers, and constructors and focus them on one goal: the efficient delivery of the project as a whole (Ballard and Howell 2005).

Project delivery method has been defined by the Associated General Contractor (AGC) (2004) as “The comprehensive process of assigning the contractual responsibilities for designing and constructing a project. A delivery method identifies the primary parties taking contractual responsibility for the performance of the work”. The aim of this paper is to explore and describe lean techniques and the sets of non-traditional project delivery approaches of achieving value for money in PPP projects. Therefore, a brief introduction of the PPP arrangement in construction projects will be presented as well as the traditional project delivery system design- build. This paper will be centred on the design build contractual agreement and the contractual provisions contained in IPD agreement for lean construction, for better understanding of how value for money is achieved in PPP projects.

PUBLIC PRIVATE PARTNERSHIP AND LPD

The term Public Private Partnership (PPP) has been used to describe a vast range of contemporary political and financial functions as well as the working arrangements within projects and organisations in several areas and industrial sectors globally. It involves bringing in creative skills and management efficiency from business practice and reducing government risk involvement in the provision of public services by using private companies for an effective approach to enhance project productivity (Cui and Lindly 2010).

There are several types of PPP arrangement that have been used on many projects; this includes the Build-Operate-Transfer (BOT) and its variants such as Build-Transfer-Operate (BTO), Design-Build-Finance-Operate (DBFO), Build-Own-Operate (BOO), Design-Build-Operate-Maintain (DBOM), and several others (Yang et al. 2010). However, the five major types of PPP arrangements for delivering transportation projects are: Private Contract Services Approach, Alternative Project Delivery Approach, Multimodal Partnerships, Joint Development and the long-term Lease or Concession Agreements. There are several combinations based on the phases in which the private partner takes responsibility under the alternative project delivery approach. These combinations according to Yang et al. (2010), include the Design-Bid-Build (DBB), Construction Manager-at-Risk (CM at Risk), Design-Build (DB), Design-Build with a Warranty (DBW), Design-Build-Operate-Maintain (DBOM), Design-Build-Finance-Operate (DBFO), Build-Operate-Transfer (BOT), Build-Own-Operate (BOO).

Lean Project Delivery (LPD) seeks to align interests, objectives, and practices through a team based approach where the primary team members are the owner, design professionals, prime contractor, and key subcontractors (trades partners). LPD is a project centric delivery in which the owner, engineers, and contractors sign a single contract for achieving project goals (Wodalski et al. 2011). Lean Project Delivery (LPD), Integrated Project Delivery (IPD) and Integrated Lean Project Delivery (ILPD) are different terms being used to represent lean delivery method. The allocation of project risk to the party that is best equipped to manage the risk instead of just passing the risk to the next contractor in line is one of the key ways that PPPs shift delivery toward LPD (Federal Highway Administration 2010).

THE SHIFT TOWARDS LEAN PROJECT DELIVERY METHOD

There are several methods of traditional project delivery approaches: this includes the Design-Bid-Build (DBB), Design-Build (DB), Construction Management (CM) (agency or at-risk) etc. The emergence of the DB came into play due to the deficiencies of the DBB. DB has been selected by both public and private clients to save cost, reduce schedules and encourage design innovation (DBIA 2005).

Owners started to realise that project costs were higher than they needed to be with the DBB method as a result of the extra contingency money added by the contractor to cover for those unforeseen conditions like design changes and late project deliveries. Another challenge of DBB is the lack of collaboration among subcontractors in the form of resistant to taking responsibility for work coordination with other subcontractor (Bearup et al. 2007).

DB enabled the general contractor to manage the complete project, usually including the designers. DB projects tend to shift more risk and liability to the general contractor and may reduce the degree of owner participation (Gannon et al. 2012; Bearup et al. 2007; Elwardani et al. 2006). It is therefore evident that the DB was an improvement over the DBB. However, the DB did not solve all the challenges encountered, despite the wide range of options available including construction management option, many owners remain unsatisfied: thus, the introduction of a different project delivery opportunity which seeks to address some of the root causes that potentially limit the effectiveness of other models. The proposed method involves a contractual combination of “lean project delivery” and an integrated team. The Integrated Agreement for Lean Project Delivery offers improved project performance both from the owner’s perspective (reduced cost and time, improved quality and safety) and from the viewpoint of the designers and

contractors (increased profit and profit velocity, improved safety, and employee satisfaction) (Lichting 2006) .

Different terms are being used interchangeably in Lean delivery; namely, Lean Project Delivery (LPD) (Lichting 2005), Integrated Project Delivery (IPD) (Post 2010; Darrington, 2011) and Integrated Lean Project Delivery (ILPD) (Walker 2009). These terms all focus on the concept of creating a project centric / team centric approach to achieve project goals. The application of lean construction techniques can result in risk reduction, collaborative innovation and schedule acceleration. The difference in the traditional approach and the integrated approach is represented in Table 1.

The four general problems with the traditional approach identified in lean construction literature are that in the traditional contract there are contracting limits cooperation and innovation, pressure for local optimisation at the expense of the project as a whole, good ideas are held back, and an inability to coordinate (Matthews and Howell 2005) .

Integrated Project Delivery (IPD) is a project delivery approach that integrates people, systems, business structures and practices into a process that collaboratively harnesses the talents and insights of all participants to reduce waste and optimise efficiency throughout the design, fabrication and construction phases (AIA 2007). It can be applied to a variety of contractual arrangements. Integrated Project Delivery encourages early contribution of knowledge and makes use of principles such as: mutual respect, mutual benefit, trust, early goal definition, team success tied to project success, enhanced communication, clearly defined open standards, shared risks and reward, appropriate technology, value based decision making, high performance, and leadership.

IPD adopts a relational value based contracting approach. This approach stresses relationships, collaboration and mutual goals. Collaboration and innovation are encouraged between the various team members throughout the design and construction process through a mutual financial stake in the project outcome.

The key project participants' interests are aligned with defined project objectives rather than individual responsibilities and the consequences of failure commonly emphasised in more traditional contracts (O'Connor 2009). Becerik-Gerber and Ghassemi (2011) presented the fundamental differences between the IPD and the traditional delivery methods in terms of the contracts, project team relationship and compensation structures. There are several advantages of the IPD; these advantages are not only for the owners but for all the parties involved in the design and construction process. It eliminates the redundancy of design as efficiencies in the design are maximised and reduces future conflicts. Additionally, Sive (2009) (as cited in Becerik-Gerber and Ghassemi 2011) argues that for IPD to be realised in its purest form, all its characteristics must be combined in a project. These characteristics are: early involvement of key participants, jointly developed project goals, shared risk/reward among key participants, joint and collaborative decision making, a multi-party contract and reduced liability exposure (AIA 2007).

Table 1: Comparison of Traditional Approach and Integrated Approach - Characteristics

Traditional Project Delivery		Integrated Project Delivery
Fragmented, assembled on “just-as-needed” or “minimum necessary” basis, strongly hierarchical, controlled	Teams	An integrated team entity composed of key project stakeholders, assembled early in the process, open, collaborative
Linear, distinct, segregated; knowledge gathered “just-as-needed;” information hoarded; silos of knowledge and expertise	Process	Concurrent and multi-level; early contributions of knowledge and expertise; information openly shared; stakeholder trust and respect
Individually managed, transferred to the greatest extent possible	Risk	Collectively managed, appropriately shared
Individually pursued; minimum effort for maximum return; (usually) first-cost based	Compensation / Reward	Team success tied to project success; value-based
Paper-based, 2 dimensional; Analog	Communications / Technology	Digitally based, virtual; Building Information Modeling (3, 4 and 5 dimensional)
Encourage unilateral effort; allocate and transfer risk; no sharing	Agreements	Encourage, foster, promote and support multi-lateral open sharing and collaboration; risk sharing

Source: (American Institute of Architects (AIA) National and AIA California Council, 2007)

LEAN INTEGRATED PROJECT DELIVERY IMPLEMENTATION THROUGH DESIGN-BUILD CONTRACT

Darrington (2011) suggested that design-build contracts can be useful means for the implementation of Lean Integrated Project Delivery. Various methodologies and contracts have been formed by The American Institute of Architects to back up the integrated project delivery. This provides the framework for a collaborative environment in which the parties operate in furtherance of cost and performance goals that the parties jointly establish (AIA 2005). The IPD agreement is influenced by lean construction. Lean construction is the application of lean thinking to the design and construction process creating improved project delivery to meet client needs and improve profitability for constructors (Howell 1999).

Becker et al. (2012) presented the similarities and differences in the contractual form of agreements of design-build and lean construction with a structured framework for intensive review. These similarities and differences are based on the contract topics contained in the lean construction agreement and the design-build agreement. This comparison and the contract-based framework as shown in Figure 1 are presented for the purpose of promoting deeper dialogue and knowledge generation regarding lean construction.

PPPS, LEAN TECHNIQUES AND INNOVATION IN CONSTRUCTION PROJECTS

One of the characteristics of the construction industry which inhibit innovation is the traditional competitive bidding in which functional responsibilities are separated (Leiringer 2001). According to Asad et al. (2005), it is generally recognised that the promotion of innovation across the supply chain can offer the clients and service providers in the construction industry key benefits in terms of adaptability, financial growth and improved service delivery. Hence as clients demand more value for money in an increasingly competitive and challenging economic climate, the ability of construction firms to survive and grow will depend very much on their ability to

successfully create, manage and exploit appropriate innovation (Barrett and Sexton 2006). In this regard, it is very significant that Leiringer (2001) argues that PPP can be a useful tool for overcoming some of the proven inhibitors of innovation in construction. This is because, according to Leiringer (2006), PPPs are believed to provide tangible incentives for stakeholders as well as a conducive business environment to promote innovation. PPPs are therefore seen as one of the ways of promoting lean construction, which is no doubt one of the emerging innovations in sustainable construction. On the other hand, the lean approach facilitates the allocation of project risks to the party best able to manage them, which is one of the key features of PPPs.

More specifically, a recent report by Papadopoulos (2012) on PPP projects in the UK National Health Service (NHS) has revealed that lean techniques helped to establish trust among PPP partners to facilitate dispute resolution. The report added that the benefits of LPD such as increased interaction and communication between project participants, making processes more efficient through waste reduction, etc. helped to develop collaborative relationships and speed up the resolution of conflicts among the PPP partners.

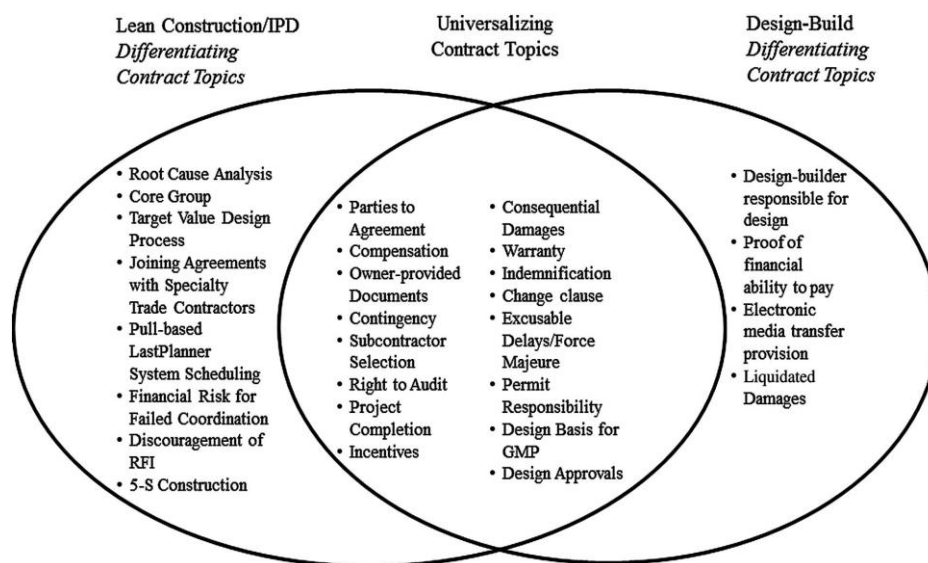


Figure 1: Comparative analysis of contractual topics contained in representative lean construction and design-build contract agreements (Source: Becker et al. 2012)

LEAN CONSTRUCTION TECHNIQUES FOR ACHEIVING VALUE IN PPP PROJECTS

The lean construction techniques have been categorised into: incremental and transformative techniques. Adopting lean practices requires behavioural change amongst all participants, from top-level management to bottom-level worker; this can be achieved by both regularly practicing lean and orienting new participants through discussions. Wodalski et al. (2011) examines the benefits of lean techniques in the delivery of transportation projects and suggested that the implementation of lean techniques with a lean project delivery (LPD) can promote the achievement of higher quality, faster completion and more efficient delivery for future projects.

The provision of value added to the consumer and public at large has been considered as one of the advantages of PPP. Subsequently, many researches have posed the research question of how value for money and risk transfer can be achieved and operationalised (Broadbent, 2003). However, studies that highlight the possibility of lean techniques in achieving value in PPP projects are few. This makes it difficult to describe to what extent the lean techniques have been employed at present in PPP projects. Additional value can be achieved in PPP projects if there is an effective implementation structure and if the objectives of the parties can be met within the partnership using lean techniques. Emmitt et al. (2004) stated that work in lean has focused on the management of value in construction projects by using process tools to identify and minimise

uncertainty and improve work flow in production. Craving for value maximisation starts from the initial team composition. The following section discusses the aforementioned lean techniques. This study does not intend to give any new or more precise usage of lean techniques or either explores the level of usage of lean techniques employed in PPP projects but to present a generic description of some lean techniques which have been applied in PPP projects. The view is that it will be of great importance to present or emphasise the applicability of lean approach to increase/promote the awareness of the use of lean techniques in project value enhancement.

Collaborative planning

Collaborative Planning is the process of involving all stakeholders in a project at the same time in order to ensure that all participants are on the same level. In this manner, the design team and owner, the general contractor, sub-contractors and suppliers gather as a team to form a master plan, and then to develop a detailed analysis of the activities planned for the first quota of the project. This is similar to partnering, the International Partnering Institute (IPI) (2010) defined “patterning as a collaborative process that works to develop a “culture” of partnership between the organisations and teams that must work together to achieve the successful delivery of construction projects.” A collaborative partnership model for facility owners during design and construction has also been developed. Collaborative planning has been introduced in an endeavour to discontinue the traditional hierarchical and ‘bureaucratic’ processes, to involve new groups and networks, new ‘partnerships’ (Healey, 2003). Collaborative relationship and partnership have been described in the literature as preferential situations which are beneficial to all parties involved (Jamming, 1996; Bowen, 2000).

Value stream mapping

Value Stream Mapping (VSM) is a special type of flowcharting tool that is valuable for the development of Lean processes. The technique is used to visualise product flows through various processing steps. The tool also illustrates information flows that result from the process as well as information used to control flow through the process (Rother et al. 2009). To create a lean process, one needs to have a full understanding of the construction process, including production processes, material flows, and information flows. VSM is a two part process, first depicting the “current state” of the process, and second a possible “future state” (Jacobs et al. 2010). The concept of value needs to be understood early in a project during the design phase. The process of determining value will be a learning process between the client and the design professionals as it is a new concept. Value stream mapping is a lean thinking analogue tool for depicting production processes and for understanding and improving conditions for reducing variability and waste (Rother and Shook 2000).

Last planner / collaborative scheduling

The use of lean methods and Last Planner is promoted in the Integrated Form of Agreement that was first published in 2005. The Last Planner System of Production was developed by Ballard based on Koskela’s work (Ballard 2000). An essential behaviour for lean construction is promise keeping. The parties to construction make promises to carry out assignments, and once these promises are kept, the outcome is increased productivity, predictable work flow, reduced waste, and projects can be completed more rapidly. “Last Planner” technique reveals that the use of formal and flexible production planning procedures is the first step to keep the production environment stable. It emphasises the use of the Daily Production Plans, Constraint Analyses, Lookahead, and the Percentage of Planned and Concluded items (PPC) as tools for immediate implementation on any jobsite (Ballard, et al. 1994). The use of Last Planner will create commitments at a personal level where individuals would be responsible for specific work items and allow for any variances to the schedule to be analysed because a specific reason for not completing the work would be identifiable. This allows individual tasks to be tracked, the PPC of each task to be easily measured and any problem could be addressed immediately instead of reoccurring throughout the project.

The notion behind the Last Planner is that the project team works together to help identify and remove those constraints that are keeping teams from achieving all of their tasks in a given week. The Last Planner functions with the use of “should, can, will, did.” The “should” part comes from the master schedule which generally identifies when certain tasks should be performed. “Can” identifies those tasks which are ready to be performed. “Will” represents the tasks that each partner will be performing during the week, and “did” represents the tasks that were successfully completed during the week. The understanding on how each task is completed and continuous evaluation of the project is made possible by the “should, can, will, did” cycle. The true outcome from the Last Planner method is that it allows commitments to be measured throughout the project. This is extremely useful in measuring reasons why work was not completed. The process can reveal poor planning, poor execution, unreasonable promises, and numerous other reasons that work is not completed on time. By identifying these problem areas during the project instead of after, allows for a proactive approach to developing solutions.

Just-in-time delivery (JIT) and supply chain management

Just-in-time delivery is an inventory strategy that reduces in-process inventory and reduces carrying costs. The principle is to deliver the right material, at the right time, at the right place; in the exact amount needed (Ohno 1988). The best tools to address this problem are Just-in-time Delivery (JIT) and Supply Chain Management, which are very closely related to each other. JIT coordination of the supply chain is required to manage the flow of workers, materials, parts, components, and subsystems procured to and from a site during construction (Davies et al. 2009). There have been shift from traditional arms-length relationship to relationships based on trust and cooperation (collaborative relationship). This has been presented by several literature. The fragmented nature of construction industry regarding the supply market and the adversarial relationship of participants has been traced to lack of integration between design and construction, and the way problems are addressed in a contractual manner between supply chain actors. Supply chain collaboration has been defined by Cao et al. (2010) as “a long term partnership process where supply chain partners with common goals work closely together to achieve mutual advantages that are greater than the firms would achieve individually”. Admittedly, many researches have been carried out on supply chain management in the aspect of the benefit of cooperation on project performance in terms of time, cost, buildability, quality and innovation (Hines et al. 2000; Bennett and Jayes 1995; Thipparat, 2011). Integrated supply chain management (ISCM) often referred to as lean thinking or supply, has been regarded as best practice (Hines et al. 2000; Womack and Jones 1996).

Daily huddle meeting

A daily start-up meeting is carried out to achieve the full involvement of employee in issues regarding the project and solving problems. The team presents brief of what they have been working on since the last meeting and brings to attention any problem that hinders the achievement of target (Schwaber 1995). The huddle meeting increases employee’s job satisfaction, since it encourages two way communications. Two-way communication is the key of the daily huddle meeting process in order to achieve employee involvement. It empowers workers to respond to problems straight away.

Pull schedule

Pull techniques have been applied to construction for managing work flow. It was first developed in manufacturing. A primary technique of the new production management thinking is pull. The main objective of a “pull-driven” approach is to produce finished products as optimally as possible in terms of quality, time, and cost, so as to satisfy customer demand (Ballard 1999). Pulling is a technique for matching up the various elements needed to actually perform work. “Pull” technique has been shown to improve performance of a construction process. A successful lean pull technique has been reported in a pipe-spool construction process (Tommelein 1998). The pull technique assumes that all participants in the project supply chain are willing and able to respond to each other's needs in order to optimise overall project performance, not just their own.

This requires rethinking of contractual relations and providing appropriate incentives. The benefits and the obstacles of applying pull techniques have been reviewed in extant literature and a question has been posed about its application in the design of a construction project (Ballard 1999). The benefits reported when properly implemented include: earlier project completion, smaller buffers and increased productivity (Tommelein 1998).

TRANSFORMATIVE TECHNIQUES

Target costing

Target costing is a management practice that drives design to deliver customer values, and develops design within project constraints. It is also referred to as target value design (Ballard 2007). It is intended to reduce the overall cost of a product over its life-cycle. Target costing draws on many disciplines, including engineering, research, design and production management. The target costing approach makes cost an input into the design process instead of an outcome. Target costing begins in the design phase of a project. In target costing, the cost is defined before the design is complete. As a result, the cost requirements are closely interlinked with the project requirements. The cardinal rule of target costing is that the target cost must never be exceeded (Cooper et al. 1997).

CASE STUDIES

Case studies of public projects have been carried out in order to gain more insight about the application of lean techniques. Various lean techniques that have been used in case studies include process mapping, 5-S strategies, value stream mapping, pull operations, standard work, improved supply chain logistics, JIT and Last Planner etc. to achieve projects benefits such as greater quality, lower costs, and quicker completion time. The case study examples in this study were selected based on relevance, unit of analysis (which in this case is public projects) and the most popular lean techniques. For example Last planner is the most developed lean techniques and JIT is commonly used on many projects.

Heathrow Airport (case study)

Many lean techniques were adopted during the Heathrow Airport terminal 5 project in the United Kingdom in order to finish the project on time and within budget. The supply chains and value streams were mapped to determine the quantities of materials and resources required for the civil phase of the project from the initial stage. There was high security measure during the construction work as Heathrow was a known terrorist target (Wodalski 2011). Construction traffic was restricted to 7:00 AM – 9:00 AM and 4:00 PM- 6:00 PM due to public involvement in the project. This led to limiting onsite storage of inventory to one day or less, and system of materials supply was classified into three categories:

- Made to stock – Suppliers produced based on forecasted market demand;
- Made to order – Suppliers produced standard products upon receipt of an order; and
- Engineered-to-order – Engineering must be completed prior to producing the order.

This classification was essential as coordination of the supply system was indispensable. The resulting production management system was coordinated by daily production control meetings and weekly forecast meetings. These were used to pull materials from engineering through fabrication and delivery to site installation. The identified potential problems on the job site and overlapping activities were addressed by discussions during the weekly meetings. Actions agreed to at the meetings were recorded in minutes and were reviewed the following week. According to (Ballard et al. 2007), the end results of the civil phase of the project show that there was an 8%-9% overall savings from planned expenses and all major milestones were achieved on or ahead of

schedule. This case study was an example of JIT techniques, although many other lean techniques were applied during the project.

Proyecto de Adecuación de la Refinería Cardón (PARC) (case study) (source: Ballard et al. 1996)

The Proyecto de Adecuación de la Refinería Cardón (PARC) was a case study example of Last Planner implementation on a project. This project was a 2.1 billion dollar refinery expansion that included approximately 300 national subcontractors, three major EPC (engineering, procurement and construction) contractors, and consumed 50 million field hours (Ballard, et al., 1996). The project was reported to be the first major construction project on which Bechtel implemented Lean strategies such as the Last Planner and demonstrated the potential effectiveness of a Lean tool on a construction project.

Three questions were asked by the author to improve productivity on the project:

1. How well is the project supplying the basic elements of work (information, materials, tools, equipment, etc.) to the crews?
2. What is the method used by the crew to perform the work?
3. How well does the accomplishment of the work itself fill the needs of the workers?

The improvement strategy focused on improving reliability in order to improve performance, thereby, making the predictability of work flow on the project more easily determined.

CONCLUSIONS

This paper has identified the set of lean project delivery approaches which could be used to enhance value and improve collaboration in PPP projects. PPP procurement has been seen as an effective way to achieve value for money (VFM) in public infrastructure projects. The several types of PPP arrangements that have been used on many projects have also been explored although; these are not described in detail. The lean techniques for achieving value for money in PPP projects are not limited to those described in this paper. From the case study examples and the literature review, it was revealed that the application of the lean project delivery to construction projects delivers a better integration of the individual management components to maximise project benefits. This suggests the need for the adoption of LPD as a means of ensuring greater quality, lower costs, and quicker time to market for future projects. This study recommends more use of lean construction techniques for project value enhancements in PPP projects as the adoption of these techniques can result in risk reduction, collaborative innovation and schedule acceleration. However, LPD has emerged since 1990 and it is being presently used in project delivery but the concept is relatively new compared to the holistic approach of project delivery. This study will contribute to the awareness of the adoption of LPD in PPP projects as there are relatively few studies that have examined or evaluated the use of lean techniques specifically in PPP projects. Therefore, this study tries to bridge this gap by describing lean techniques in general and presenting case study examples of where it has been applied in public projects. Further studies can be done to evaluate the level of usage of lean techniques in PPP projects and quantify the benefits of adopting LPD in PPP projects.

REFERENCES

- Achanga, P., Shehab, E., Roy, R., & Nelder, G. (2006). Critical success factors for lean implementation within SMEs. *Journal of Manufacturing Technology Management*, 17(4), 460-471
- America Institute of Architects (AIA) (2007). "Integrated Project Delivery: A Guide,"
- American Institute of Architects (National) and American Institute of Architects California Council

- American Institute of Architects (AIA) (2005). *Construction Manager at-Risk State Statute Compendium*. AIA Government Affairs, American Institute of Architects, Washington, DC, 125–129.
- Asad, S, Fuller, P, Pan, W and Dainty, A R J (2005) Learning to innovate in construction: a case study. In: Khosrowshahi, F (Ed.), *21st Annual ARCOM Conference*, 7-9 September 2005, SOAS, University of London. Association of Researchers in Construction Management, Vol. 2, 1215-24
- Associated General Contractors (2004) *Project Delivery Systems for Construction*. Associated General Contractors of America, Arlington, VA.
- Ballard, Glenn [et al.] (2007). *Roadmap for Lean Implementation at the Project Level*. Construction Industry Institute, Austin, TX.
- Ballard, G. and Howell, G. (2005) Relational Contracting and Lean Construction. *Lean Construction Journal* 2(1), 1-4.
- Ballard, G. (2000) *The last planner system of production control*. Ph.D. thesis, Univ. of Birmingham, Birmingham, UK
- Ballard, G. (1999). Can Pull Techniques be used in Design Management? Presented at the Conference on Concurrent Engineering in Construction, August 26-27, 1999, Helsinki, Finland.
- Ballard G, Howell G and Casten M (1996) "PARC: A Case Study," Proceedings of the 4th Annual Conference of the International Group for Lean Construction, Birmingham, UK .
- Barrett, P. and Sexton, M. (2006) Innovation in small, project-based construction firms, *British Journal of Management*, 17, 331–346
- Bearup, W, Kenig, M, and O'Donnell, J (2007) "Alternative Delivery Methods, A Primer." *Proceedings, ACI-NA Project Delivery Summit II*, Airport Board
- Members and Commissioners Annual Conference. Chicago, IL: Airports Council International-North America
- Becker, T. C., Shane, J. S., Jalselskis, E. J. (2012). Comparative analysis of lean construction with design-build using a framework of contractual forms of agreement. *Journal of Architectural Engineering*. (18) 2, 187-191
- Becerik-Gerber B and Ghassemi R (2011) Transitioning to integrated project delivery: potential barriers and lessons learned. *Lean Construction Journal* pp32-52
http://www.leanconstruction.org/lcj/2011/LCJ_11_sp3.pdf accessed 28/11/12
- Bennett, J & Jayes, S (1995) *Trusting the team: the best practice guide to partnering in construction*. Reading: Reading Construction Forum
- Bowen, K (2000) Co-ordinating an innovation in supply chain management. *European Journal of Operational Research*, Vol. 123, pp. 568-84.
- Broadbent, J and Laughlin, R (2003), Public private partnerships: an introduction. *Accounting, Auditing & Accountability Journal*, 16 (3) pp. 332 – 341
- Cao, M, Vonderembse, M, Zhang, Q and Pagu-Nathan, T S (2010) Supply chain collaboration: conceptualisation and instrument development". *International Journal of Production Research*, 48 (22) 6613-6635
- Cullen, P F and Hickman, R J (2012) Conflicts between contract law and relational contracting. *Lean construction Journal* pp 49-60 www.leanconstructionjournal.org accessed 24/05/12
- Cui, Q and Lindly, J K (2010) Evaluation of public private partnership proposals, University Transportation Center of Alabama, report no 08402, june 2010.
http://ntl.bts.gov/lib/33000/33100/33140/08402_Final_Report_6-2-10.pdf accessed 08/10/12

- Darrington, J (2011) Using a design-build contract for lean integrated project delivery. *Lean Construction Journal* pp 85-91 www.leanconstructionjournal.org accessed 24/05/12
- de Treville, S, & Antonakis, J (2006) Could lean production job design be intrinsically motivating? contextual, configurational, and levels-of-analysis issues. *Journal of Operations Management*, 24(2), 99-123
- Emmitt, S, Sander, D and Christoffersen, A K (2005) The Value Universe: Defining a Value Based Approach to Lean Construction. *Proceedings of the 13th Annual Conference of the International Group for Lean Construction*, Sydney.
- El Wardani, M., Messner, J., Horman, M. (2006). Comparing procurement methods for design-build projects. *Journal of Construction Engineering and Management*, 132(3), 230–238.
- Federal Highway Administration (2010) *P3 Defined: Innovative program delivery*. <http://www.fhwa.dot.gov/ipd/p3/defined/index.htm> accessed 25/03/12
- Gannon, T, Feng, P and Sitzabee, W (2012) Reliable schedule forecasting in federal design-build facility procurement. *Lean Construction Journal* pp01-14 www.leanconstructionjournal.org accessed 24/05/12
- Halpin, D W (2006) *Construction management*, 3rd ed. New York: John Wiley and Sons, Inc.
- Harrington-Hughes, K. (2002). TCRP Research Results Digest 53: International Transit Studies Program Report on the Spring 2001 Mission—Design-Build, *Transit Infrastructure Projects in Asia and Australia*. Transportation Research Board of the National Academies, Washington, DC.
- Hines, P, Lamming, R, Jones, D, Cousins, P and Rich, N (2000), *Value stream management: strategy and excellence in the supply chain*, London: Financial Times Prentice Hall
- Holti, R, Nicolini, D & Smalley, M (2000) *Building down barriers: the handbook of supply chain essentials*. London : CIRIA International Partnering Institute (2010) *A working model for collaborative partnering*. http://www.partneringinstitute.org/PDF/A_Working_Model_for_Collaborative_Partnering_Special_Report_May_2010.pdf accessed 30/08/2012
- Jacobs, F R and Chase, R B (2010) *Operations and supply management: the Core*, 2nd Ed. New York: McGraw-Hill Irwin
- Kessler, F (2005) Managing your money: Project delivery methods. *MassTransit*, April 2005, 26–39. <http://www.nossaman.com/showarticle.aspx?show=913> (accessed 25/05/2012).
- Lamming, R (1996) Squaring lean supply with supply chain management. *International Journal of Operations & Production Management*, 16 (2) 183-196.
- Leiringer, R. (2001). The Scope for Innovative Thinking in Public-Private Partnerships. *Proc. of the Ninth International Group for Lean Construction Conference*, National University of Singapore, Singapore, August 6-8. pp. 475-487.
- Leiringer, R. (2006) Technological innovation in PPPs: incentives, opportunities and actions, *Construction Management and Economics*, 24(3), 301-308
- Lichtig, W A (2005) Sutter health: developing a contracting model to support lean project delivery. *Lean Construction Journal*, Vol. 2. pp. 105-112.
- Lichtig, W A (2006) The integrated agreement for lean project delivery. *American Bar Association of Construction Lawyer*, Vol. 26, No. 3.
- Lichtig, W A (2006) The intergrated agreement for lean project delivery. *Construction Lawyer*, Volume 26, No. 3, Summer 2006 <http://www.documents.dgs.ca.gov/opsc/Publications/Newsletters/Links/LPD.pdf> accessed 25/05/12
- Matthews, O and Howell, G. (2005) Integrated project delivery: an example of Relational contracting, *Lean Constr. J.*, 2(1) (2005).

- O'Connor, P. J (2009) Integrated Project Delivery: collaboration through new contractForms. available at <http://www.cecm.org/contents/file/194> accessed 29/10/12
- Ohno, T (1998) Toyota Production System: Beyond Large-Scale Production. Portland, OR : Productivity Press
- Papadopoulos, T (2012) Public–Private Partnerships from a Systems Perspective: A Case in the English National Health Service, *Systems Research and Behavioral Science*, 29, 420–435
- Post, N M (2010) "Integrated-Project-Delivery Boosters Ignore Many Flashing Red Lights - Building Teams Can Collaborate Without Complex Multiparty Contracts, say IPD Skeptics." *Engineering News Record*, May 10, 2010. pp. 22-25.
- Scherrer-Rathje, M, Boyle, T A, and Deflorin, P (2009) Lean, take two! Reflections from the second attempt at lean implementation. *Business Horizon* 52, 79-88
- Rother, M, Shook, J (2000) Learning to see. Brookline, Massachusetts, USA, 100pp.
- Shah, R, and Ward, P T (2007) Defining and developing measures of lean production. *Journal of Operations Management*, 25(4), 785-805.
- Thipparat, T (2011) Evaluation of construction green supply chain management. International Conference on Innovation, Management and Service IPEDR vol.14 (2011) IACSIT Press, Singapore
- Tommelein, I (1998) Pull-driven scheduling for pipe-spool installation: simulation of a lean construction technique. *Journal of Construction Engineering and Management*, 124 (4) 279-288.
- Walewski, J, Gibson, G E, Jasper, J (2001). Project delivery methods and contracting approaches available for implementation by the Texas Department of Transportation.FHWA/TX-0-2129-1. Texas Department of Transportation, Austin, TX.
- Walker, B (2009). Integrated lean project delivery healthcare's lifeline in 2009? *Healthcare Design*, May 2009. pp. 52-59.
- Wodalski, M.J., Tompson, B.P., White, G. and Hanna, A.S (2011). Applying lean techniques in the delivery of transportation infrastructure construction projects. National Center for Freight Infrastructure Research and Education. http://www.wistrans.org/cfire/documents/CFIRE_03-11_Final_Report.pdf accessed 24/05/12
- Yang, J, Yang, C, and Kao, C. (2010). Evaluating schedule delay causes for private participating public construction works under the Build-Operate-Transfer model. *International Journal of Project Management* 28 (2010) 569–579

SUSTAINABLE SOCIAL HOUSING PROVISION: PUBLIC-PRIVATE PARTNERSHIPS AS A VIABLE OPTION

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Governments and non-profit organisations in developed and developing countries have taken up the challenge of providing adequate housing through social housing provision. Social housing is housing unit provided by government and/or non-profit organisations for the less-privileged at below market price. Social housing is sustainable if considerations are given in its provision to the carrying capacity of the natural environment, avoid pollution, reduce energy consumption and ensuring that the present needs are adequately met without compromising the rights of the future generations to meet their housing needs. It is generally known that governments have not been able to meet the need for social housing despite various efforts that have been made. The need to address the shortfalls through alternative funding means particularly Public Private Partnership has been recognised. Hence, the aim of this research is to examine Public- Private Partnership (PPP) as a viable option in view of its overriding benefits over other funding strategies for the provision of sustainable social housing. A conceptual content analysis approach is adopted to review some relevant literature, for determining benefits of PPP if compared with a sole public funding for the provision of sustainable social housing. Findings have shown that government can no longer play a dominant role in sustainable social housing provision because of huge and competing financial needs of other sectors like transportation, health, education etc coupled with poor economic growth. In addition, housing needs of the low-income households particularly in developing countries cannot be effectively met by non-profit organisations alone due to limited resources. It is postulated that strong political will, solid legal and institutional frameworks and effective teamwork are required for PPP to succeed for the provision of social housing. In addition, efficiency, affordability, sustainability, adequacy of funding issues are key ingredients coupled with appropriate level of risks sharing and value for money for sustainable social housing provision through PPP initiative.

Keywords: Affordability, Housing, Public-Private Partnerships, Sustainable social housing, Value for money.

INTRODUCTION:

Housing is important and central to the quality of life in every community of the world. It helps in fulfilling people's aspirations, supports economic development and enhances the value of the environment. Housing is of two categories, which are market and social (non-market) housing (Drudy and Punch, 2002). While private individuals and organisations, for profit making provide market housing, governments and not-for-profit organisations, for non-profit or social motives provide social/non-market housing (Hills, 2007). The provision of housing through a market system, which started in the UK before the First World War, has created adequacy, standard, funding, affordability, and sustainability issues. Many people, therefore, cannot currently access affordable housing because market economy creates inequalities in affordability, distribution and consumption of housing including high prices, cost of construction, taxes, legal charges and high profit margins as well as insecurity of tenure (Beng-Huat, 1996; Oduwaye et al., 2003; Wadhwa 2009). The inability of the market housing to meet housing needs for many years has currently led to a general decline in the level of housing provision in many countries with severe housing shortages, which for economic reasons, the private sector could not tackle effectively, especially in the short term, and which for political reasons the public sector could not ignore (Stone, 2003).

In this study, literature evidence reveals that the desire to meet housing needs has been an enormous task for governments, private developers and non-profit organisations for many years in different countries. For example, governments and non-profit organisations in many countries started providing social housing when it was noticed that market housing could not meet housing needs (Berry et al, 2001; MacLennan, 2008; Powel, 2010). In addition, Governments in the UK, New Zealand, Australia, Netherlands and USA among others, have embarked on several public assisted programmes such as rent subsidies, mortgage finance, housing benefits and sites and services schemes aimed at meeting housing needs (Burkey, 2005).

Social Housing has been defined as a form of housing provided by governments/local authorities or non-profit organisations using public and/or private funds, for the benefit of low-income households, based on degree of need, and made available at below market price with the delivery of social service or not-for-profit motives on short or long term basis (Oyebanji, 2012). As earlier mentioned, the motive behind social housing provision is based on the desire to address the several issues associated with housing provision through the market like, high costs, non-affordability, inadequate standard, poor funding and lack of political will to provide adequate housing (Gauldies, 1974 cited in Malpass, 2001). Literature evidence shows that governments have also embarked on public assisted programmes like rent subsidy; rent voucher; housing benefit; mortgage funding or right to buy to meet housing needs.

However, despite the stakeholders' efforts to properly address the issues of market housing through the provision of social housing and other public assisted programmes, affordability, and sustainability are still stunting the efforts. In addition, the various public assisted programmes for making social housing affordable are possibly constrained by the excess of demand over the supply (Robb, 2012). This scenario might be due to increasing population growth, global economic recession and inadequate funding (Burkey, 2005). Notable scholars like Berry et al. (2001); King (2003); MacLennan (2008); Wadhawa (2009) argued that the inadequate supply notwithstanding, social housing provision by governments and non-profit organisations is still important for making it available, affordable and sustainable.

It is against this background that consideration is given, in this study, to the possibility of adopting Public-Private Partnership (PPP) in sustainable social housing provision (SSHP). In the light of the recurring issues of SSHP earlier mentioned and the need to adequately address them, this study further seeks to examine the concept of Public-Private Partnership (PPP) in terms of its role, characteristics and to ascertain how it can be used for effective implementation of SSHP. Similarly, arguments against PPP are not overlooked in this study. However, it can be gathered from the literature that PPP is a viable option which governments are using for the delivery of public projects.

This study therefore, uses a quantitative content analysis of published papers as part of an on-going PhD research in its mid-stage on "The Development of a Public-Private Partnership Framework for Sustainable Social Housing Provision in the UK". This study constitutes some major aspects of the on-going PhD research, the objectives of which are in consonance with the general theme of this conference.

BARRIERS TO THE IMPLEMENTATION OF SSHP

Authoritative sources such as Schmuecker (2011); Peachey (2011); Berry and Williams (2011); Robb (2012) argued that housing needs have not been met in many countries. The literature reviewed further shows that there are barriers that might be stunting the progress of SSHP. Some of these barriers are shown in Table 1.

Table 1: Barriers to the Implementation of SSHP

Main Barriers Supporting Documents (%)	Total No of Documents In-Support.	Ranking Based on the No of
Poor Public Awareness	25	21
Inadequate Funding	20	16
Poor Legal Framework	20	16
Poor Institutional Framework	15	12
Poor Skill Development	15	12
Lack of Appropriate Technology	7	6
Poor Social Cohesion	6	5
Poor Infrastructure Development	5	4
Poor Development Plan	4	3
Inadequate Supply	2	2
Poor Land Use Plan	1	1
Lack of Stakeholders' Involvement	1	1
Poor Safety Measure	1	1

As shown in Table 1, each of the barriers represents a group of related barriers gathered from the literature reviewed. However, it can be deduced from this study that ‘affordability’ and ‘sustainability’ are the upshots of the barriers. They constitute the major recurring and groups of issues that could be hindering the implementation of SSHP.

For instance, Quan and Hill (2008) cited in Bujang et al. (2010) viewed affordability of social housing from the perspective of purchase, rental or income affordability. An affordable housing can be assessed based on a 30/40 rule to show that a household must not spend more than 30% of its gross annual income on rent, especially for the last 40% of all income earners (Vidyattama et al. 2011; Australian Bureau of Statistics, 2012). Literature evidence has shown that low-income households in many countries are paying more than 30% of their gross annual incomes on housing. Shelter (2011) reports that in England, 22 boroughs in London have median rents costing more than 50% of median local full-time earnings while other boroughs have a median private rent for a two bedroom home costing more than 35% of median take home pay. It is estimated that about 200,000 and 100,000 low-income Victorian households in Australia are paying more than 30% and 50% of their gross annual earnings respectively in housing costs (Anglicare, 2007). The report of the Shelter England (2012) shows that, what is witnessed on daily basis as effect of the toll the housing crisis is taking on families across UK are the high levels of repossessions, rising homelessness, and people cutting back on food or delaying starting a family because of the cost of housing. In addition, a report of the European Union shows that one in six people in the UK (16.5%) are overburdened by housing costs (Shelter England, 2012).

Therefore, the main constituents of SSHP are: adequate funding; affordability; economic planning, design and construction; proper technology; use of alternative energy; efficient land use; use of environmental friendly materials including equity, safety measures; and social and cultural diversity etc (Zakaria, 2007; Winston, 2009; Abidin, 2009). In addition, Girling (2010) argues that SSHP is characterised by;

1. goals of increasing the gross density of development (compactness),
2. provision for a broad cross-section of people in each neighbourhood and increasing transportation options (diversity)
3. mixing residential areas with the commercial and civic, even business areas that serve them (completeness); and, in some cases,
4. allowing for land-use-change over time (flexibility).

In addition, inclusion of the ‘sustainability’ element within the social housing provision should fulfil the following:

1. Not just to find solutions to the affordability problem at present, but to make social housing 'affordable' in the long term (i.e. through the whole life cycle perspective); and,
2. Not just to find solutions that the present generation is facing, but also to meet the needs of the future generations, without compromising the current needs. This conforms to the definition developed by the Brundtland Report on 'Sustainable Development' released by the United Nations in 1987, which defines sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Parkin, 2000).

Given the characteristics of SSHP, fulfilling affordability and sustainability criteria could be an enormous task. For instance, Karuppannan and Sivam (2009) argued that sustainable housing has generally been constructed for the high end of the market. Sustainable housing may not be affordable for low-income households, as it is often more expensive than normal residential development (Karuppannan and Sivam, 2009). There could, therefore, be a mismatch between affordability and sustainable social housing (Karuppannan and Sivam, 2009). This mismatch needs to be resolved by governments through public assisted programmes to properly meet housing needs.

In addition, considering the aforementioned turmoil, (i.e. global financial crisis) and social problems, (i.e. high demand due to population increase), it is important not just to find solutions for the 'affordability' issue of social housing but to be strategic and find solutions for the long-term 'sustainability' of social housing provision. If not, fulfilling affordability issues could be met through, for example, the use of making social housing 'cheaper' by the use of 'cheap' materials, which in turn have a 'high' life cycle cost (Karuppannan and Sivam, 2009).

The general view on sustainability and social housing provision is for it to bridge the gap between housing needs (Finmark, 2010) and supplies in terms of economic (e.g. affordability, value for money, etc.), environmental (e.g. energy efficiency, fulfil climate change needs, etc.) and social perspectives (e.g. equity, social cohesion, etc.). According to Emsley et al. (2008), sustainable social housing can be affordable if governments or private organisations subsidise its cost to tenants or owner-occupiers are free from market forces. Clearly, in view of its requirements, if sustainable social housing sector is to meet the need for 'affordable' housing, additional public and private investments will be required (Wilson, 2010). Similarly, Pattinaja and Putuhena (2010) argued that it is necessary for governments and private organisations to meet housing needs whilst avoiding environmental degradation from generation to generation through 'Sustainable' Social Housing Provision (SSHP).

Governments, non-profit organisations and financial institutions that are the main stakeholders in social housing provision have become vulnerable due to the global financial crisis which further has adverse effect on the revenue generation from their various operations. The vulnerability status therefore, constrained the stakeholders from playing active role in SSHP. The traditional means of funding SSHP may no longer be effective as expected. This is in view of the recurring affordability and sustainability issues earlier mentioned. Given this scenario, it is not surprising to see why many countries have adopted collaborative arrangements between the Public and Private entity through the adoption of PPP as an alternative procurement option for delivering public projects. The scheme has received an overwhelming endorsement in the literature (Akintoye et al., 2005; Grimsey and Lewis, 2007; UN-HABITAT, 2011; Singh, 2012). PPP arrangement has allowed the public, private and financial institutions to pool their resources together in forming partnerships for the delivery of public infrastructure.

METHODOLOGY

The content analysis was adopted as a method for this study, which can be described as "a set of procedures for collecting and organising information in a standardised format that allows analysts to make inferences about the characteristics and meaning of written and other recorded material" (United States General Accounting Office, 1989). According to Elo and Kynga (2007), a 'content analysis' is a method that may be used with either qualitative or quantitative data and in an

inductive or deductive way. The content analysis was adopted for this research for its acceptability as a research tool by many researchers. For instance, it involves an analysis of the contents of published works to determine the concept of sustainable social housing and PPP. It has been found to be a convenient and an efficient means of extracting insights from already existing data sources and potentially applicable to at least part of almost every project (United States General Accounting Office, op cit). After establishing the existence of clear links to the goals of this study, the varied raw data from selected texts were condensed into a brief summary format. Thereafter, issues of SSHP were collated before determining how PPP can address them. However, the selection of documents for this study was based on the quality of the content; currency; relevance; importance; and types. A total of 53 published documents were selected for the study.

The internet search engines used to search for the relevant key words of this research are: Google; Google Scholar; IEEEExplore; Web of Knowledge and Ebscohost while the Websites consulted are those of Governments (gov.); Academic Institutions (ac.); Educational Organisations (edu.) and Private Organisations (org.) that have research bias. They are useful for this study on the basis of their wide subject areas of coverage; quality and measure of information; currency of information and bias in the areas of this research.

FINDINGS:

Required Success Factors in PPP

Different scholars and international organisations have identified many factors as important for a successful PPP arrangement in the delivery of public infrastructure and services (Akintoye et al. 2005; Sobuza 2010; Latheef 2011; The UN-HABITAT 2011). Some of these factors are: political will, legal and operating frameworks including proper partner's selection criteria. Details of these factors are as follows:

Political Will:

It is necessary that government should show a lot of commitment towards the adoption of PPP for the delivery of public infrastructure and services by bringing forward reforms to develop PPP market. For instance, UK government has been showing a clear commitment to PPPs since 1992 through various publications and definite steps towards actualising Public-Private Partnerships models for public projects procurement. These have been the approach in which the government saw PPPs as a way to develop a constructive relationship to renew Britain's infrastructure in key areas such as railways, urban regeneration, housing and childcare {Confederation of British Industry's (CBI), 2007}. The UK, Canada, USA, Australia, New Zealand and South Africa are some of the countries that have shown serious commitment to the delivery of public infrastructure and services such as roads, railways, hospitals and housing through PPPs.

Political will is critically important and a vital pre-requisite for successful PPPs since only the public sector can facilitate and regulate the overall legal, administrative and economic framework within which people, their organizations and the private sector can make their most effective contributions (UN-HABITAT, 2006). Government can exercise its constitutional power to give effective information and consultation for the involvement, collaboration, and encouragement of the private sector for the successful delivery of public infrastructure and services through PPP arrangement.

Legal Framework:

Effective legal framework like any other ones is among what an investor will look towards before entering into any form of partnership with the public sector. It gives an assurance of plain level of trust and specifies the rights and obligations of partners. For example, the main purpose of a legal framework is to minimise the likelihood of corruption and enables the building of an environment of trust between parties (Latheef, 2011). It is a vital precondition for the success of any PPP

approach. In making PPPs to be more transparent in the UK, the Treasury Office has issued three reports: Transforming Government Procurement; PFI: Strengthening long-term partnerships and the Value for money assessment guide while the National Audit Office as an independent body is responsible for scrutinising government spending, conducts regular investigations and also publishes reports on the performance of PPPs (CBI, 2007). A legal framework for PPPs, in this regard, must be practicable, enforceable in the law courts or modern day arbitration; transparent, unambiguous, fair and sustainable in nature in order to gain the confidence of the private sector (Palmer 2009). PPP rules must be simple, not to be either insufficient or too complex and provide sufficient security and incentives to investors in PPP arrangements (United Nations European Commission for Economic, 2008).

Operating Framework:

Operating framework is the guideline showing the parts to follow by the partners in the implementation of a PPP agreement. It is necessary to make the parts that partners will follow so clear and open to them. This is to give partners, particularly private investors, the necessary assurance that the PPP process would be properly managed. There should be clear evidence from the operating framework that the policy makers and the parties implementing the PPP project have an understanding of its nature and complexity. According to Palmer (2009), there is need for an organisational arrangement with clearly defined responsibilities and roles for departments and officials who are in-charge of PPP operations. Some other factors required for a success in PPPs operating framework are: shared vision; clear risks and rewards; consistent and coordinated leadership; effective communication and trust (Corrigan, et al., 2005).

Partners' Selection Criteria:

Another driver that facilitates the success of PPP is the criteria for the selection of partners. Every partner, particularly from private sector must be capable technically, financially and administratively; and be willing to perform; take responsibilities; display the required experience and skills and dynamic. PPP requires visionary partners, who will not compromise; ready to make sacrifices and using their skills and resources to develop projects that will transform the society and impact the masses only for fair rewards (UN-HABITAT 2011). The process of selecting partners should be carried out in a transparent, neutral and non-discriminatory manner that promotes competition and strikes a balance between the need to reduce the length of time and the cost of the bidding (UNITED NATIONS, 2008).

Figure 1 illustrates the concept of PPPs and shows that there are some common goals as well as individual objectives of both the public sector agency and the private sector entity (Khan, 2009 cited in Zamfir and Hotaran, 2011).

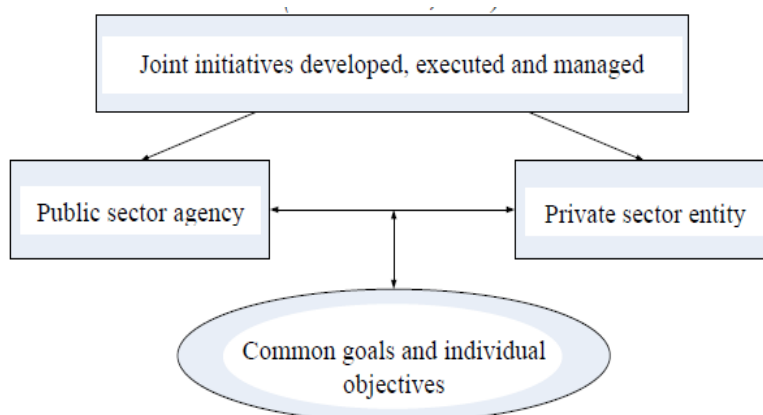


Figure 1: Concept of PPPs (Source: Khan, 2009; as cited in Zamfir and Hotaran 2011)

POTENTIALS OF PPP

Grimley (2009) argues that there is no ‘magic bullet’ solution to any nation’s housing problems and a combination of measures may be required to solve them. This argument is based on the fact that housing problems in many countries are huge and governments have been contending with them for several decades. However, it is believed that the issues impairing SSHP require resolute and appropriate efforts to solve. It is therefore, contended that a massive injection of resources through consolidated efforts in the form of partnership arrangements between the public sector and private sector entity may be needed for the delivery of sustainable social housing that will adequately meet housing needs. It is possible for the public and private sectors to come together to resolve the issues of affordability and sustainability that are impairing the implementation of social housing provision in many countries. There are evidences from the literature that PPP is widely accepted by Governments for many reasons. For example, authoritative sources such as Akintoye et al. (2005); Grimsey and Lewis (2007); Singh (2012) have argued that PPP is used to deliver public infrastructure based on the following qualities:

- It allows risk sharing and/or transfer to the partner that can better manage it.
- It relieves burden of public debt and gives budgetary benefits.
- It gives value for money.
- It paves way for a lot of social benefits to be enjoyed by the citizens and users of the public projects delivered under the scheme.
- It gives timely delivery of projects.
- It improves level of service delivery by enhancing standard of projects.
- It increases available funds for infrastructure project delivery and has the potential cost savings and
- It provides opportunity for the utilisation of private sector resources particularly the technical know-how, funds and wealth of experience.
- It offers a long-term operation of between 20 to 50 years.

Despite the wide application of PPPs world-wide, the shortcoming against the schemes have also been identified by scholars including projects and economic analysts. Medalve and Panikkar (2006) argued that governments with high indebtedness are often in a weak negotiation position when seeking a private partner for financial support. This may eventually weaken the power of the affected governments to be in control of public assets as they might have signed contracts with unfavourable conditions. The usual long duration of PPP contracts may even lead to a legal constraint and difficulty in cancelling such contracts (Medalve and Panikkar, 2006)

Zamfir and Hotaran (2011) argue that a counter argument for PPPs is the fact that some transformation technologies are too risky or costly to attract adequate private sector funding. Therefore, it is not in all cases that PPPs can guarantee adequate funding. Despite the gains offered by PPPs, Zamfir and Hotaran (op cit) observe that the progress of project execution could be much slower than expected, capital costs could be at a higher level and economic sustainability could be a challenge. Hamilton (2006) argued that lack of sufficient financial reserves could be the major reason why public authorities are making use of PPPs as a way to get finance for executing public projects. Miller et al (2009) cited in Arewa and Farrell (2011) claimed that PPP projects have a cost that is four times higher in New South Wales of Australia and five times higher in the Victoria region of the country if compared to alternative procurement methods.

The various arguments against PPPs notwithstanding, evidence suggests that, some types of public service projects like schools, roads, health, education and housing may be more suitable for PPP scheme than others (Pollack, 2000 and House of Commons Committee, 2001) cited in Arewa and Farrell (2011). The oppositions notwithstanding, the effects of the Global Financial Crisis

(GFC) on public's funding ability, poor revenue generation, urbanisation problems, world population increase, vulnerability of the private sector including financial institutions, and the recurring affordability and sustainability issues are factors that could make PPP a viable option for SSHP.

Figure 2 is showing potentials of PPP including how it can address barriers of SSHP as earlier shown in Table 1.

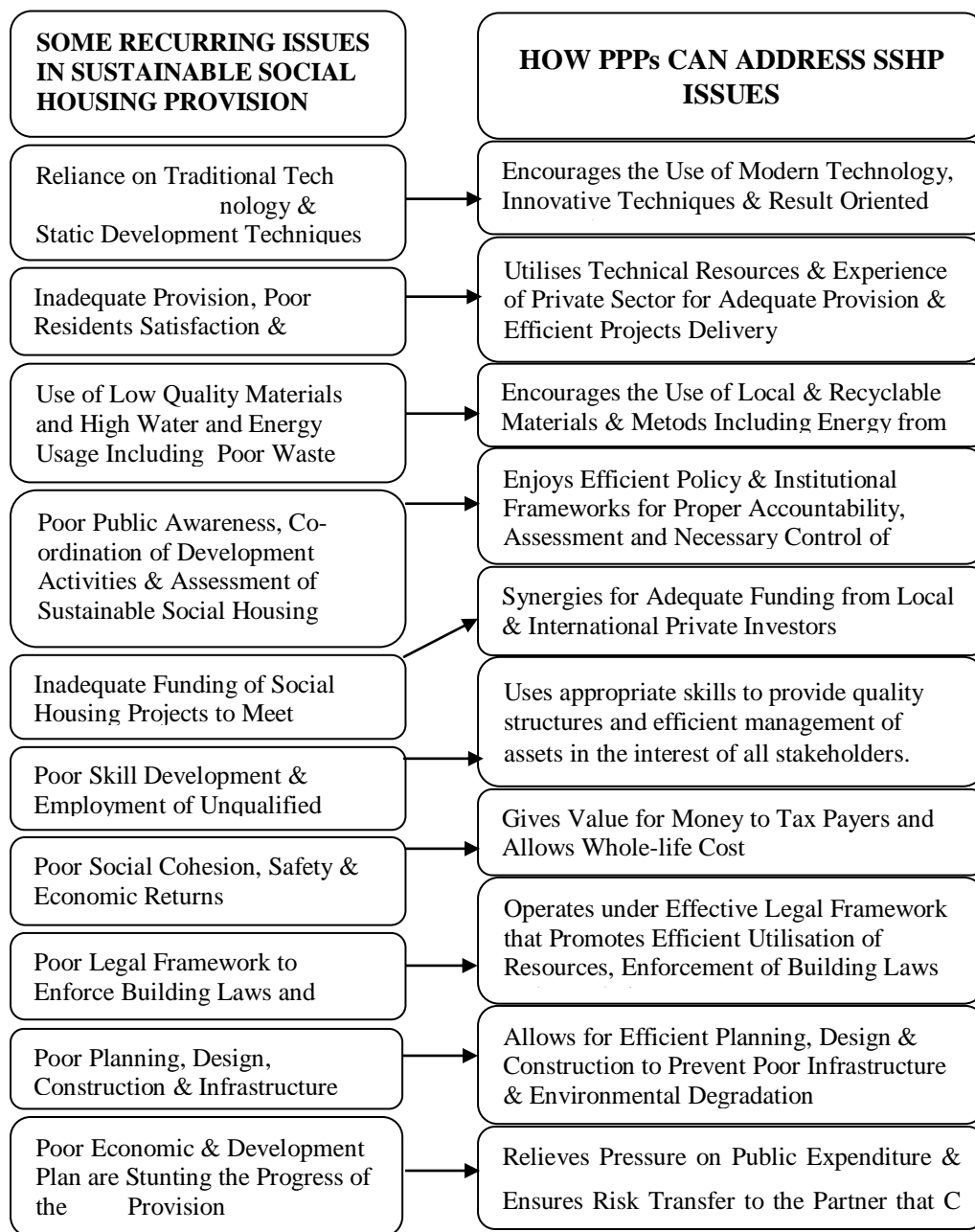


Figure 2: A Model suggesting how Public-Private Partnership can address some recurring issues in Sustainable Social Housing Provision

SUMMARY AND CONCLUSION

The literature reviewed revealed that the common scenario in many countries is the inability of governments to meet housing needs and play a dominant role in the provision of sustainable social housing. This can be attributed to the global financial crisis, poor economic generation, and population growth including huge and competing financial needs of other sectors like transportation, health, education, security etc. The situation may be a contributing factor to the

under-investment, which has stunted the growth of SSHP. Many scholars and government functionaries have also identified that the public and private sectors including financial institutions have individually become vulnerable and are therefore incapable of playing their expected roles in SSHP to adequately meet the housing needs.

The literature reviewed further revealed barriers to the implementation of SSHP. These barriers are poor: public awareness; legal framework; institutional framework; skill development; social cohesion; inadequate funding; and lack of appropriate technology. Others are poor: infrastructure development; development plan; land use plan; and safety measure as well as inadequate supply and lack of stakeholders' involvement in the decision making and implementation processes. The end results of these barriers are 'affordability' and 'sustainability' issues pervading SSHP in the society.

Similarly, a number of notable scholars and organisations (Akintoye et al. 2005; Sobuza 2010; Latheef 2011; The UN-HABITAT 2011) are of the views that: political will, legal and operating frameworks including proper partner's selection etc are, likely, the required criteria for the success of the application of PPP as a viable option for SSHP. Furthermore, authoritative sources such as Grimsey and Lewis (2007); Singh (2012) have shown that PPP may be considered as a viable option for the provision of sustainable social housing like other public projects. Additional information gathered from the literature, particularly in the UK, from the report of the HM Treasury (2012) and the argument of the Government of India (2010) among others, confirmed that PPP mechanisms are playing an increasingly important role in the public project delivery despite the current economic recession.

Despite the wide application of PPP in many countries, there are arguments against its reliability for project procurements compared with other alternatives. Some of these arguments are that PPP schemes cost higher, slower and that governments pay higher interest rates to private partners than expected. High indebted governments usually have weak negotiation power over private partners and private partners may have a regional bias in favour of urban population and class bias in favour of richer population while low-income population does not represent attractive markets.

The oppositions notwithstanding, there are abundant evidence to support that PPP can provide adequate funding for public projects like SSHP. It has helped governments to attract private sector finance from local and international investments (Asian Development Bank, 2006; Confederation of British Industry, 2007; Austin, 2008; UN-Habitat, 2011). It can therefore, attract expertise from the private sector for the delivery of SSHP as in the case of other public projects such as health, education, transportation and housing.

PPP is also considered for this study due to its long-term nature. Unlike other procurement methods, the long term nature of PPP (i.e. the duration of the PPP can be anything from 20 to 50 years), is very much suitable for SSHP due to its focus on whole life cycle considerations during the design and construction stages of projects; which in turn would help in achieving sustainability (Akintoye et al., op cit; Latheef, op cit; Singh, 2012). What may further make PPP suitable for SSHP is the ability to relieve the burden of public debt and provides budgetary benefits; improves the standards of projects; gives value for money and increases the provision levels including risk transfer and timely delivery (Grimsey and Lewis, op cit; UN-HABITAT, op cit). Consequently, PPP can help to make SSHP 'affordable' and 'sustainable'.

It is therefore, contended that there is the need for both the public and private sectors to combine their efforts by making partnership arrangements for the delivery of social housing that will be affordable and sustainable. The PPP model (Figure 1) can therefore, be considered as a possible confirmation of PPP as a viable option for addressing issues of SSHP, particularly affordability and sustainability for meeting housing needs.

REFERENCES

- Abdul-Aziz, A. R. and Kassima Jahn, P. S. 2010. Objectives, Success and Failure Factors Of Housing Public-Private Partners in Malaysia; Habitat International, Vol. 35, No. 1. Pp. 150
- Abidin, N. Z. 2009. Sustainable Construction in Malaysia –Developers’ Awareness, Journal of World Academy of Science, Engineering and Technology, 53, 2009.
- Abidin, Z.A. and Pasquire, C.L. 2005. Delivering Sustainability through Value Management: Concept and Performance Overview; Emirald Article; Journal of Engineering, Construction and Architectural Management, Vol. 12 Issue 2: pp.168-180.<http://dx.doi/10.1108/09699980510584502>. Site accessed on 24/03/2012.
- Akintoye, A. and Li, W 2005. An Overview of Public-Private Partnership, in Akintoye, A., Beck, M. and Hardcastle, C. (Eds.) Public-Private Partnerships: Managing Risks and Opportunities. New York: Wiley-Blackwell.
- Aluko, O. 2012. Effects of Land Use Act on Sustainable Housing Provision in Nigeria: The Lagos State Experience; Journal of Sustainable Development, Vol.5 No.1 January 2012 <http://www.ccsenet.org/Jsd> Site accessed on 20/09/2012
- Anglicare 2007. High Cost of Housing Placing Pressure on Low-Income Earners. Imagine, Quarterly Newsletter of Anglicare Victoria, June, 2007.www.anglicare.org.au Site Accessed on 28/01/2013.
- Arewa, A. and Farrell, P. 2011. The Private Finance Initiative: Why Value for Money Remains Elusive. Eds. Professor Akintoye, A., Dr L. C. and Dr Renukappa, S. CIB TG72/ARCOM. Doctoral Research Workshop, Public Private Partnerships. Organised by the School of Built and Natural Environment, University of Central Lancashire, Preston, UK. Held on Wednesday, 12th October 2011 at the University of Central Lancashire, Preston, UK
- Asian Development Bank. 2006. Facilitating Public-Private Partnership for Accelerated Infrastructure Development in India; Report of the Regional Workshops of Chief Sectaries on Public-Private Partnership.
- Austin, P. M. 2008. Public-Private Partnerships for Funding Affordable Housing Developments in New Zealand, Prepared For Waitakere City Council
- Australian Bureau of Statistics. 2012. Measures of Australia’s Progress: Summary of Indicators, 2012. <http://www.abs.gov.au>. Site accessed on 21/10/2012
- Bazeley, P. & R. Buber, J. G. L. R. E. 2004. Issues In Mixing Qualitative And Quantitative Approaches To Research. 141-156.
- Braintree District Council 2006. Affordable Housing: Supplementary Planning Document, Sustainable Appraisal
- Beng-Huat, Chua 1996: Private ownership of public housing in Singapore; Working Paper No. 63, Asia Research Centre, Murdoch University Australia. pp. 1-27
- Berry, J., McGreal S., Stevenson, S., and Young, J. 2001. Government intervention and impact on the housing market in Greater Dublin; Housing studies, vol. 16, No. 6, pp. 755-769.
- Briefing 2005. Overview of Public-Private Partnerships in The Uk.
- Berry, M. & Williams, P. 2011. Investgative Panel on a Socially Sustainable Housing System for Australia. 36.

- Brien, H. P. 1988. Framework for Development of Educational Multimedia, Being A Thesis Submitted In Partial Fulfilment of the Requirements for the Degree of Master of Science, In Information Technology Management from The Naval Postgraduate School, Virginia Military Institute, United States Navy, B. A. March, 1995
- Blumberg, B., Cooper, D. R. & Schindler. 2011. Business Research Methods; Mcgrawhill Education, Uk
- Bordage, G. 2009. Conceptual Frameworks to Illuminate and Magnify; Medical Education 2009; 43: 312-319 Blackwell Publishing Ltd 2009
- Boxmeer, B. Van and Beckhoven, E. Van. 2006 Public-Private Partnership In Urban Regeneration: A Comparison of Dutch and Spanish PPPs, International Journal of Housing Policy, 5(1), 1-16
- Brunnermeier, M K. 2008. Deciphering the Liquidity and Credit Crunch 2007-08, NBER Working Paper Series 14612 National Bureau of Economic Research, Cambridge <http://www.nber.org/papers/w14612>. Site Accessed On 26/09/2012
- Buckland, M., & Plaunt, C. 1997. Selecting Libraries, Selecting Documents, Selecting Data. In Proceedings of the International Symposium on Research, Development and Practice in Digital Libraries: ISDL '97 [<http://www.dl.ulis.ac.jp/isdl97/proceedings/chris/chris.html>] Accessed 09/07/2012
- Bujang, A. A., Zarin, H. A. and Jumadi, N. 2010. The relationship between demographic factors and housing affordability; Malaysian journal of real estate, vol. 5, No. 1
- Burkey, T. (2005): Social housing over the horizon: Creating a contemporary social housing system. National Housing Conference 2005 Perth October 27-28.
- Communities and Local Government. 2012. Rough Sleeping Statistics England - Autumn 2011 Experimental Statistics. <http://www.communities.gov.uk/publications/corporate/statistics/roughsleepingautumn2011> Site accessed on 25/09/2012
- Confederation of British Industry (CBI). 2007. Going Global, The World Of Public Private Partnerships
- Coolen, H. 2006. The Meaning of Dwelling: An Ecological Perspective; Housing, Theory and Society, Vol.23, No.4, Pp.185-201 www.cbi.org.uk. Site accessed on 09/07/2012
- Cooper, J. and Jones, Keith. 2009. Sustainability and Social Housing Maintenance, Phase 2- Interview Results
- Corrigan, M. B., Hambene, J., Hudnut III, W., Levitt, R. L., Stainback, J., Ward, R. and Witenstein, N. 2005. Ten Principles for Successful Public/Private Partnerships. Washington, D.C.: ULI—the Urban Land Institute, 2005. <http://www.uli.org/report/ten-principles-for-successful-publicprivate-partnerships%E2%80%A8/>; Site Accessed on 09/07/2012
- Creswell, J. W. 2003. Research Design: Qualitative, Quantitative and Mixed Methods Approaches. Thousand Oaks. Ca: Sage Publications
- Creswell, J. W. & Clark, P. 2007. Designing And Conducting Mixed Methods Research. Thousand Oaks, Ca: Sage.
- Dodson, M. and Smith, D.E. 2003. Governance for Sustainable Development: Strategic Issues and Principles for Indigenous Australian Communities; Centre for Aboriginal Economic Policy Research, The Australian National University.
- Doyle, L., Brady, A.-M. & Byrne, G. 2009. An Overview of Mixed Methods Research. Journal of in Nursing, 14.

- Drudy, P. J. & Punch, M. 2002. Housing and Inequality: Perspectives on Recent Irish Experience; *Housing Studies*, Vol. 17, No 4, Pp.657-672.
- Department of Trade and Industry 2006. Review of Sustainable Construction.
www.dti.gov.uk Site accessed on 09/07/2012
- Earl, G. And Regan, M. 2003. From the Three W's Public-Private Partnerships and Beyond
- Ebsen C. And Rambol, B. 2000. International Review of Sustainable Low-Cost Housing Projects; Proceedings: Strategies for a Sustainable Built Environment, Pretoria 23-25 August, Danish International Human Settlement Service, Klosterport, 4 C Dk-8000, Denmark.
- Elo, S. and Kynga, S H. 2007. The qualitative content analysis process. *Journal of Advanced Nursing* 62(1), 107–115 doi: 10.1111/j.1365 2648.2007.04569.x
<http://academic.csuohio.edu/kneuendorf/c63309/ArticlesFromClassMembers/Amy.pdf>.
Site accessed on 24/01/2013
- Emsley, S., Phibbs, P. & Crabtree, L. 2008. Models of Sustainable and Affordable Housing for Local Government. 91.
- Finmark Trust 2010. Overview of the Housing Finance Sector in Nigeria.
<http://www.finmark.org.za>. Site accessed on 17/01/2012.
- Fong, J. & Uyar, E. 2008. Building Nanobank, Data Structure and Selection Criteria.
<http://www.nanobank.org>. Site accessed on 20/05/2012
- Ghekiere, L. 2003. United Nations Economic Commission for Europe Committee on Human Settlements; Workshop on Social Housing Organised at The Invitation of Ministry for Regional Development of The Czech Republic in Cooperation with European Liaison Committee for Social Housing (Cecodhas). 153.
- Government of India 2010. Approach Paper on Defining Public-Private Partnerships, Discussion Note
- Grimley, V. A. 2009. Affordable Housing: How to Achieve New Provision. *Property Intelligence*, Autumn 2009. www.gva.co.uk/WorkArea/DownloadAsset.aspx?id=214748. Site Accessed on 25/10/2012.
- Girling, C. L. 2010. Smart growth meets low impact development: A case study of UniverCity, Vancouver, Canada; *Journal of urbanism*, vol. 3, No. 1, pp. 69-93
- Grimsey, D. and Lewis, M.K. 2007. Public Private Partnerships and Public Procurement Agenda, Volume 14, Number 2, 2007, pages 171-188
- Grimsey, D. and Lewis, M.K. 2002. Evaluating the risk of public private partnerships for infrastructure projects *International journal of project management* 20 (2002) 107-118
- Gurran, N. 2003. Housing Policy and Sustainable Urban Development: Evaluating the use of local Housing Strategies in Queensland, New South Wales and Victoria, Final Report No. 39 for Australian Housing and Urban Research Institute (AHURI). www.ahuri.edu.au. Site accessed on 24/04/2012.
- Haffner, M., Hoekstra, J., Oxley M. And Heijden H. Van Der 2009. Substitutability Between Social and Market Renting in Four European Countries; *European Journal of Housing Policy*, Vol. 9, No. 3, 241-258.
- Hamilton, A. 2006. Public Private Partnership: The Case Against. A Snap Shot of Ireland's PPP Buy-in. *Construction and Property News*.
http://berthamilton.com/uploadedfiles/cpn_2006.07.pdf Site accessed on 28/01/2013
- HM Treasury. 2012. A New Approach to Public-Private Partnerships. http://cdn.hm-treasury.gov.uk/infrastructure_new_approach_to_public_private_partnerships_051212.pdf
Site Accessed on 05/02/2013

- Hanna, K. and Steven, W. 2005. Sustainability, Planning Practice, Housing Form and Environmental Protection in the Toronto Region's Oak Ridges Moraine: Project Report.
- Harloe, M. 1994. Social Housing- Past, Present and Future; Housing Studies, Vol. 9, No. 3, Pp. 407-416.
- Hestia Services Ltd. 2006. The Provision of Advice to Housing Associations and Private Developers, and the Barriers to Incorporating Sustainable Energy Measures in Housing New Building and Refurbishment; Sustainable Housing Action Programme, Market Report
- Hills, J. 2007. Ends And Means: The Future Roles of Social Housing in England. 228.
- Jones, D. 2011. A Framework is not a Strategy. <http://www.dataroundtable.com/?P=8895> Site accessed on 7/7/2012
- Johnson, R. B. & Onwuegbuzie, A. J. 2004. Mixed Methods Research: A Research Paradigm Whose Time Has Come. Educational Researcher, 33, 14-26.
- Karuppannan, S. & Sivam, A. 2009. Sustainable Development and Housing Affordability, Presented at the European Network for Housing Research Conference 2009, 28 June to 1 July, Prague, Czech Republic.
- Kestermann, R. 2010. The Sustainability of Affordable Housing in Australia - Lessons Learnt From Studies in Brazil; Nawic, International Women's Day Scholarship. 30.
- King, P. 2003. Housing as a Freedom Right; Housing Studies, Vol.18, No.5, Pp. 661-672.
- Kroelinger, M. 2002. The Research Problem, 500 Research Methods.
- Latheef, A. 2011. Essential Ingredients for Effective Development and Implementation of Public Private Partnerships in Social Housing: Is Maldives Prepared for PPPs in Social Housing? A Dissertation Submitted to the Heriot-Watt University in Partial Fulfilment of the Requirements for the Degree of Master of Science in Quantity Surveying
- Li, W. D. H. 2007. Privatising Social Housing in Taiwan; International Journal of Social Welfare, Vol.16, Pp.12-17.
- Lim A. Po for Social Studies and Institute of Social Studies, The Hague, The Netherlands
- Malpass, P. & Victory C. 2010. The Modernisation of Social Housing in England; International Journal of Housing Policy, Vol.10, No. 1 Pp.3-18.
- Malpass, P. 2001. The uneven development of 'social rented housing': explaining the historically marginal position of housing associations in Britain; Housing studies, vol.16, no. 2, pp.225-242.
- MacLennan, D. 2008. Trunks, Tails, and Elephants: Modernising Housing Policies; European Journal of Housing Policy, vol. 8, No. 4, pp. 423-440
- Medalve, J. and Panikkar, A.K. 2006. Support and Opposition of Public-Private Partnerships. In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, D. C.: Environmental Information Coalition, National Council for Science and the Environment). Retrieved January 28, 2013. [http://www.eoearth.org/article/Support and opposition of Public-Private Partnerships](http://www.eoearth.org/article/Support_and_opposition_of_Public-Private_Partnerships).
- McKibbin, W. and Stoeckel, A. 2006. Bursting of the US Housing Bubble; Economic Scenarios, A joint product of the Centre for International Economics and McKibbin Software Group Pty Limited. www.economicsscenarios.com. Site accessed on 21/10/2012.
- McKibbin, W. and Stoeckel, A. 2009. The Potential Impact of the Global Financial Crisis on World Trade; The World Bank Poverty Reduction and Economic Management Network International Trade Department & Development Research Group Trade and Integration Team November 2009 WPS5134

- Mills, C. 2003. Sustainable of the Social Housing System and Options Open to the Department of Housing; Presentation to the Shelter NSW 'Money Matters: Financing Social Housing' Seminar, University of Sydney, 19 November 2003.
- Murphy, L. 2003. Reasserting the 'Social' in Social Rented Housing: Politics, Housing Policy and Housing Reforms in New Zealand; *International Journal of Urban And Regional Research*, Vol. 27.1, Pp. 90-101.
- Oduwaye, L., Oduwaye O.S. and Adebamowo, M. E. 2003. Challenges of housing Finance by Primary Mortgage Institutions in Lagos, Nigeria; Department of Urban and Regional Planning, University of Lagos, Akoka, Lagos, Pp. 1-23
- Ofori, G. 2010. Sustainable Construction: Principles and a Framework for Attainment -Comment. <http://www.tandfonline.com/loi/rcme20>. Site Accessed on 15/11/12
- Oliver, P. 2010. Writing Your Thesis.
- Oxley, M., Elsinga, M., Haffner, M. and Heijden, H Van Der 2010. Competition And Social Rented Housing; *Housing, Theory and Society*, Vol. 27, No. 4, Pp.332-350.
- Palmer, G. 2009. Public-Private Partnerships; Literature Review-Draft submitted to Aid Delivery Methods Programme.
- Parkin, S. 2000. Sustainable development: the concept and the practical challenge; *Proceedings of ICE, Civil Engineering* 138, paper 12398, pp. 3-8.
- Pattinaja, A. M. and Putuhena F. J. 2010. Study on the Requirements for Sustainable Settlement Development for Low Income Community in Indonesia; *Journal of Environmental Science and Engineering*, Vol. 4, No.5, Pp.78-84
- Peachey, K. 2011. Three Reasons for Rising Rents, BBC News. <http://www.bbc.co.uk/news/business-12732480> Site accessed on 15/09/2012
- Pickvance, C.G. 2009. Choice or Coercion: Dilemmas of Sustainable Social Housing. A Study of Two Developments in Kent. *Journal of Local Environment* Vol. 14. No. 2, pp.207-214. <http://www.informaworld.com>, Site accessed on 24/04/2012
- Pittini, A. and Laino, E. 2011. Housing Europe Review 2012; The Nuts and Bolts of European Social Housing Systems. 91.
- Powel, M. K. 2010. Partnership in Social Housing? Participation of Private Financial Institutions in Social Housing Initiatives in Suriname; Thesis Master of Public Administration Program in Governance 2008-2009. Paramoribo, The F.H.R.
- Power, A. 2003. Sustainable Communities and Sustainable Development: A Review of Sustainable Communities plan; Sustainable Development Commission. www.sd-commission.gov.uk site accessed 24/ 04/2012. Present and Perspectives. *Urban Studies*, Vol. 39, No. 2 191-200
- Priemus, H. 2005. How to Make Housing Sustainable? The Dutch Experience; *Journal of Environmental and Planning B: Planning and Design* 2005, volume32, pages 5-19.
- Quigley, J. M. 1999. Why Should The Government Play A Role In Housing?: S View From North America; *Housing, Theory and Society*, Pp.201-203.
- Rizvi, Z. M. 2010. Pro-Poor Housing: An Idea Whose Time Has Come; *Housing Finance International*, Pp.15-19.
- Robb, C. 2012. New Housing Minister Faces Huge Task, Shelter Warns. Shelter England.
- Rome 2006. Selection Guidelines for Submission of Documents in Global Forum on Agricultural Research (GFAR) Bibliographic Database-Draft-

- Rovers, R., Smits, A., Geet, C. V., Oosterheert, R. & Klinckenberg, F. 2002. Sustainable Housing Policies in Europe; Synthesis Report On Sustainable Housing Policies for the Third EU Ministers' Conference on Sustainable Housing, Geneva, Belgium. 76.
- Schmuecker, K. 2011. The Good, The Bad and The Ugly; Housing Demand 2025 Institute for Public Policy Research.
- Scoping Report on London Borough of Lambeth. 2008. Waterloo Station Development Brief: Sustainability Assessment (Incorporating Sea) Scoping Report
- Shelter England 2011. Rent Rises Hit Home. Shelter, The Housing and Homelessness Charity.
- Shelter England 2012. Families cut back on food and fuel. Shelter, The Housing and Homelessness Charity.
- Shelter. 2011. Analysis of Local Rent Levels and Affordability. Research Report: Shelter Private Rent Watch. www.shelter.org.uk Site Accessed on 05/02/2013
- Singh, K. 2012. Public-Private partnership: Advantages & disadvantages. Project Vendor: A Construction & Engineering Magazine for Projects. Monday January 30 2012
- Siregar, S. L., Dagnino, G. B., & Garraffo, F. 2008. Content Analysis: A Two-Phase Methodology in Obtaining Fundamental Concepts of Coopetition
- Smyth, Robyn 2004. Exploring the Usefulness of a Conceptual Framework as a Research Tool: A Researcher's Reflections; Issues in Educational Research, Vol.14, 2004
- Sobuza, Y. 2010. Social Housing in South Africa: Are Public-Private Partnerships (PPP) A Solution; A Research Project Submitted to the Gordon Institute of Business Science, University of Pretoria, in Partial Fulfilment of the Requirements for the Degree of Master of Business Administration
- South London Waste Plan: SA Scoping Report. 2008. key Sustainable Issues and Problems
- Stone, M.E. 2003. Social Housing in the UK and US: Evolution, Issues and Prospects
- Swafford, M. 2005. Assessment of References to Agriculture in a Middle Grade Science Textbook, A Thesis Presented to the Faculty of The Graduate School, University of Missouri-Columbia for The Award of The Degree Master of Science
- Thorns, D. C. 2004. Creating Sustainable Housing: The Challenge of Moving Beyond Environmentalism to New Models of Social Development. 14.
- Un-Habitat 2006. Public-Private Partnerships in Enabling Shelter Strategies. <http://www.unhabitat.org/> Site accessed on 02/07/2012
- Un-Habitat 2011. Public-Private Partnerships in Housing and Urban Development. <http://www.unhabitat.org/> Site accessed on 02/07/2012
- United Nations Economic Commission for Europe (UNECE). 2008. Guide Book on Promoting Good Governance in Public-Private Partnerships.
- United States General Accounting Office 1989. Content Analysis: A Methodology for Structuring and Analysing Written Material; Transfer Paper 10.1.3
- van Ham, M. and van Kempen, R. 2006. The Changing Role of the Dutch Social Rented Sector; Journal of Housing Built Environment 21:315-335
- Vidyattama, Y., Tanton, R. and Nepal, B. 2011. Housing Stress or Transport Stress? Issues in Australian Housing Affordability; The National Centre for Social and Economic Modelling (NCSEM) Working Paper 11/06 www.natsem.canberra.edu.au Site accessed on 21/10/2012
- Viitanen, J. 2012. Alike In Dignity? Housing in Bradford: Institute for Public Policy Research. http://www.ippr.org/images/mediaFiles/publication/2012/05/Alike-In-Dignity-Housing-Bradford-May-2012_9070.pdf. Site accessed on 17/09/2012

- Wadhwa, K. 2009. Affordable Housing for Urban Poor, Prepared by National Resource Centre SPA, New Delhi, Supported by Ministry of Housing & Urban Poverty Alleviation, Government of India, pp. 1-11.
- Williams, K. and Dair, C. 2006. What is Stopping Sustainable Building in England? Barriers Experienced by Stakeholders in Delivering Sustainable Developments. www.interscience.wiley.com, Site Accessed on 17/09/2012
- Wilson, W. 2010. Housing Supply and Demand: Key Issues for the New Parliament, 2010; House of Common Library Research www.parliament.uk. Site accessed on 15/09/2012
- Winston, N. 2009. Regeneration for Sustainable Communities? Barriers to Implementing Sustainable Housing in Urban Areas. *Journal of Sustainable Development*, Vol.18 Issue 6. Pp . 319-330
- Zaid, N. S. M. and Grham, P. 2011. Low-Cost housing in Malaysia: A Contribution to Sustainable Development?
- Zakaria, R. 2007. Sustainable Housing for Residential-Industrial Neighbourhoods in Malaysia- A Study on the Elements of Indoor Environmental Quality Improvements. A PhD Thesis Submitted to the School of Urban Development, Faculty of Built Environmental and Engineering, Queensland University of Technology.
- Zamfir, A. and Hotaran, I. 2011. Arguments and Counter Arguments of Public-Private Partnerships in the Field of Renewable Energy. <http://simpozion.management.ase.ro/zamfir.pdf>. Site accessed on 28/01/2013

SUSTAINABILITY BEST PRACTICE IN PPP: CASE STUDY OF A HOSPITAL PROJECT IN THE UK

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Globally, sustainable development has been given high priority for the Government agenda in order to achieve a balance of social, economic and environmental factors. The UK government realise the importance and criticality of sustainable development and they intend to use the public procurement power to demand more sustainable public building development to improve energy efficiency and reduce carbon emissions. Public Private Partnership (PPP) is an effective procurement tool for the government to deliver the provision of public services. In the UK, the most common PPP form is Private Finance Initiative (PFI). Up until March 2012, a total of 717 PFI projects have been delivered to sustain social and economic development in the UK (HM Treasury, 2012). There is potential to use PPP to incorporate the sustainability agenda and support low carbon economic development. However, little research has been conducted to demonstrate the benefits and advantages of the PPP procurement system incorporating sustainable development. This paper aims to demonstrate best practice in sustainable development through PPP (PFI) procurement system in the UK. It initially illustrates the relationship between PPP and sustainable development and then uses a case study of one of the largest PPP hospital projects in the UK, utilising interviews and secondary data to show evidence of how the sustainability issues have been addressed within the procurement process and the advantage and limitations of using the PPP procurement system in delivering sustainable development. The results show best practice across different strands of sustainability through contribution to local employment and the local economy, a high percentage of waste recycling, dust and noise reduction and technical innovations such as green roofs, natural ventilation and a focus on occupant comfort.

Keywords: Hospital, PPP/PFI, Public Procurement, Sustainable Development, UK.

INTRODUCTION

How to achieve sustainable development is one of the fundamental challenges for society worldwide. Contrasting with conventional methods, sustainable development provides a new route for us to live within the fragile natural system in order to conserve resources and protect the environment. At a national level, the UK government has a significant role both in establishing sustainability policies and regulations and in leading the sustainable business revolution and provide the quality of life for this and future generations (DETR, 1999). To achieve a better quality of life is not easy; it requires the highest level of government commitment and deliverable action plans from all sectors. One of the key toolkits for the UK central government is to use public procurement to demand sustainable products and services and to stimulate the domestic market. The UK government buys £125 billion worth of goods and services each year (HM Treasury, 2007). The scale of this purchasing offers an additional policy tool to the traditional approaches such as regulation and economic instruments.

Public Private Partnership (PPP) is a public procurement system by which the public sector contracts to purchase quality services on a long-term basis so as to take advantage of private sector management skills without a significant initial outlay of public funds. In the UK, the most common PPP model is the Private Finance Initiative (PFI). PFI is an essential item of the

government's Public Private Partnership toolkits. It is significant in delivering objectives in a number of policy areas such as Education, Health and Transport and so on. Up until March 2012, a total of 717 PFI projects have been delivered to sustain the social and economic development in the UK, while 648 projects are operational (HM Treasury, 2012). In theory, PFI has a natural relationship with sustainability (BRE, 2002 and Hill and Collins, 2004, Zhou, 2006, 2008). For example, the new contract form forces the private sector, particularly the main contractor, to invest more time and capital in their projects. The life cycle of the facility should be taken into account in order to achieve maximum benefits and reduce the risk transferred to the private sector. The government has recognised these PFI characteristics and the significant role of PFI in delivering sustainable development. Zhou *et al* (2005) have shown that PFI is a mature and dynamic public procurement system, which facilitates the delivery of sustainable development.

This paper aims to demonstrate the best practice of sustainable development through PPP (PFI) procurement system in the UK. It initially illustrates the relationship between PPP/PFI and sustainable development and then uses a hospital project to measure how the sustainability issues have been addressed within the procurement process and the advantage and limitations of using PPP procurement system in delivering sustainable development.

PPP AND SUSTAINABLE DEVELOPMENT

Since 1992, the Private Finance Initiative (PFI) has been used to modernise public services and achieve the best value of public spending in the UK. Under the PFI model, the public sector contracts to purchase quality services on a long-term basis so as to take advantage of private sector management skills without an initial outlay of public funds. Compared with traditional methods the PFI model could provide a higher profit rate for the private sector in the long term (normally a PFI contract lasts for 25-30 years) and better partnership with the public sector. After nearly 20 years' growth, the PFI model became one of the most important procurement processes for the UK governments and their agents. It has been significant in delivering objectives in a number of policy areas such as Education, Health and Transport. The government has used PFI to achieve value for money and public service excellence and it has arguably been used to lead a global public procurement revolution. Currently, however, there is a shift of opinion for using PFI from social infrastructure (such as schools and hospitals) to economic infrastructure (such as energy, water, transport and waste management) to support sustainable growth of the UK economy (HM Treasury 2010). This has partly arisen due to recent questions on PFI performance in terms of value for money. However, while the debate on the benefits of PFI may have entered a new and more vigorous phase there is no doubt that it has already had a major impact on infrastructure development in the UK (NAO 2011). In addition with another 61 projects in procurement this is set to continue for some time (House of Commons 2011). As such it has potentially a major impact on the capacity of the UK construction industry for addressing sustainability objectives through public procurement of major projects.

PFI can offer real scope to promote sustainable construction (Addis and Talbort 2001). Hill and Collins (2004) found that the PFI mechanism can be used as a lever to move the construction sector in the UK towards greater sustainability of its products and practices. It incorporates whole-life costing, as opposed to lowest initial price and should encourage a more sustainable approach. The transfer of risks such as energy consumption to the private sector may provide an incentive for investment in more efficient energy usage. If environmental requirements prove too expensive or result in inappropriate levels of risk transfer, however, projects may fail the value for money test, or become unaffordable. The critical factor is to ensure that sustainability gains are assessed against value rather than cost. PFI clients generally specify outputs rather than input. Clients can use this opportunity to specify a required sustainability performance (e.g. energy usage per year) rather than specifying the use of low energy equipment or facades. It is then the contractor's responsibility to find the most cost-effective way of delivering the performance level demand. Furthermore, the long-term and integrated nature of PPP services (particularly the PFI contract) has incentivised the contractors to consider the synergies between the design of an asset and its ultimate operating cost (OGC 2002).

RESEARCH METHODOLOGY

This study uses the case study approach to examine the best practice of sustainable PPP projects in the UK. One of the largest hospital projects has been selected to evaluate its sustainability performance through its procurement process. The data of the Hospital has been collected from a variety of sources. They include primary data through three semi structured interviews and secondary data through government reports, contract proposal, email information, and a number of newspaper articles. The three interviewees are Sustainability Strategy Manager; City Planner and Contractor's Environmental Advisor. Each interview took about 1 – 1.5 hours in length and was recorded and transcribed. The interview was designed to cover:

- Key stakeholders' experience and attitudes regarding sustainability;
- The project's objectives, client sustainability priorities and how the supplier responded;
- The project's sustainability performance level and benefits from social, economic, environmental and technical aspects.

Content analysis technique has been used to evaluate the primary and secondary data in order to identify the best practice of sustainability through the PFI project.

DATA PRESENTATION AND ANALYSIS

St Bartholomew's (Barts) and the Royal London Hospital is the biggest hospital PFI scheme and one of the top ten PFI projects in the UK. It combined two large and old hospitals to become one massive redevelopment project including transforming one old hospital into a Cancer and Cardiac Centre of Excellence. This project is worth £1.1 billion. The project consortium includes one main contractor: Skanska and two investors: Innisfree and the Dutch Infrastructure Fund. The Special Purpose Vehicle (SPV) company, Capital Hospitals, is responsible for designing, building, redevelopment and maintaining the hospital buildings until 2048 (Skanska, 2010). The redevelopment work began in May 2006 and scheduled to complete in 2016.

Because it is the largest hospital project, there are a number of institutional forces pushing the project to become more sustainable. The local authority, Greater London Authority, established a sustainable development commission and published a practical guide for new business proposal writing in 2004. In this guide, it introduced a '4Rs' (Responsibility, Respect, Resource and Results) principle as London's sustainable development framework which was developed in 2003. Moreover in 2006 the Mayor of London's office published a supplementary planning guidance for sustainable design and construction, which set a new policy framework for all new buildings' design and construction in London. To be in line with the national and local sustainable development policies, the NHS Trust recruited a sustainable regeneration manager in 2004 and published its outline regeneration and sustainability strategy. The strategy outlines the role of the trust in sustainable development and how it could act as a good 'corporate citizen' and make a strong impact on redevelopment and local regeneration and make a contribution to east London's economic growth. Moreover the NHS Environmental Assessment Tool (NEAT) has been developed by the Building Research Establishment (BRE) and the Department of Health. Based on the above institutional forces, the hospital and PFI consortium together established six sustainability strategic objectives as below (Attifield, 2004, Barts and The London NHS Trust, 2006):

1. To provide 21st century healthcare in an environment of which staff, patients and our local communities can be proud;
2. To reduce the maintenance backlogs of today's ageing building stock and introduce output-based standards that will ensure a 'nearly new' quality for at least 30 years;
3. To design and provide buildings that will be able to respond flexibly to the Trust's evolving clinical strategy and advances in modern provision;

4. To put patients at the heart of the new hospitals and transform the hospital experience for millions of patients from London and beyond;
5. To improve environmental quality; and
6. To improve cost efficiency.

The objectives above address sustainable development from three dimensions: social, environmental and economic, for example, the fourth objective shows that the project will become a user-centred sustainable PFI project, the fifth regards environmental issues and objective six is to face the economic challenge and to ensure the project is economically sustainable. The tendering process took over four years, with a 28 month preferred bidder period. During the negotiation stage, the contractor proposed a sustainable development strategy programme with its client to build up common understanding of sustainable development under this project context. Furthermore, in order to maximise the contribution of the PFI scheme to regeneration, the Trust (2006) developed a sustainable regeneration strategy focused on enhancing employment opportunities for local people. The Trust is also considering how it can use the project to embed sustainability in the way it manages its day-to-day operations. The aim of this strategy is to maximise the return on the investment in the new hospital in terms of local regeneration benefits and sustainability outcomes. This also links the investment to positive community health outcomes and contributes to the Trust's corporate citizenship agenda. As a result, a Sustainable Development Index (see figure 1) has been created to minimise the ecological footprint of the Trust's work and physical development and maximise its contribution to community health.

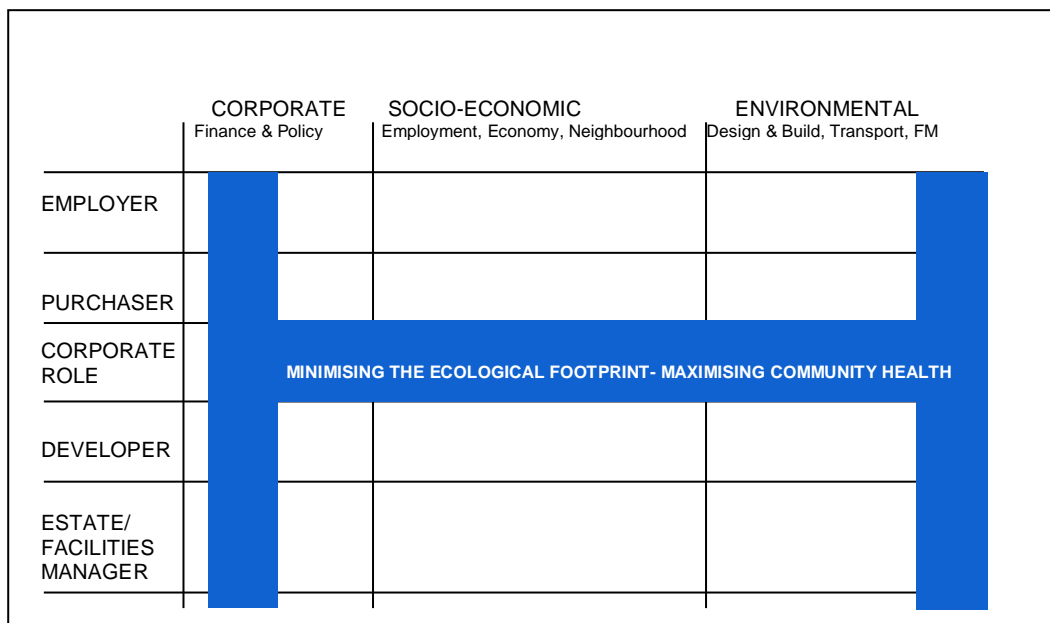


Figure1: **Barts and the London Hospitals' sustainable development index (Source: Barts and The London NHS Trust, 2006)**

The hospital environment has been designed with airy glass atria, pedestrian piazzas and landscaped gardens, to create a warm, safe, welcoming and healing sanctuary from the bustling urban environment of the City, which embedded London City's Green Transport plan and sustainable design solutions. The PFI consortium had set sustainability targets during the construction stage (Skanska, 2006):

- Achieving a rating of 'excellent' for all new buildings, using the NHS Environmental Assessment Tool (NEAT)
- Recycling 65% of their waste, and
- Sourcing 20% of their energy from renewable sources.

Furthermore, there are two unique characteristics to show how stakeholders have involvement in the PFI sustainable development:

1. Interactive stakeholder consultation: the PFI consortium has consult over 400 stakeholders including clinicians, patient and community groups to evaluate the redevelopment plan. The evaluation stage took about 18 months.
2. Sustainability Champions are from both the NHS Trust and Skanska, introduced to promote the integration of sustainability into the project. The client also employs an environmental manager whose responsibility is to develop the sustainable PFI development strategy. Furthermore, the contractor's environmental team supports the provision of more sustainable technical solutions during the construction phase, for instance to use acoustic screens to reduce the noise on site and reusable packaging to reduce the waste on site.

According to the main contractor Skanska's report (2006), Barts and the London hospital has won many sustainability awards: e.g. a Corporate Social Responsibility Awards from Construction News, a national Innovation Award from the Chartered Institute of Waste Management and a Sustainable Procurement Award at the national Sustainable City Awards.

DISCUSSION AND CONCLUSION

The case of Barts and the London Hospital has significant results to demonstrate the best practice of sustainable development through the PFI procurement system in four dimensions: Social, Environmental, Economics and Technical:

- **Social Sector:** this project provides modern hospitals and benefits the people in East London, the city and the wider community with space for 1,248 beds in a modern purpose-built environment that is suitable for the provision of healthcare in the 21st century. The NHS trust' sustainable regeneration programme contributes to the local employment level.
- **Economic Sector:** the £1bn redevelopment project has big economic impacts to the city of London. The sustainable regeneration programme will also contribute to the local economy, for instance, Skanska sources from the local labour market, use local businesses and services during the construction period and 17 per cent of the project workers are from local area. This help the project reduce recruitment cost/agency staff costs and provide a big saving in capital cost. Moreover, new evidence from Environment Agency's CRC Energy Efficiency Scheme shows that Barts and the London NHS Trust saves over £800,000 from energy efficiency of the redevelopment project (Barts and the London NHS Trust, 2012).
- **Environmental Sector:** This project was built on brownfield land and recycled over 98% of waste and 50,000 tonnes of demolition waste diverted from landfill (Construction Excellence, 2007, WRAP, 2007, Skanska 2010), which is higher than their set target of 65% waste recycled. Moreover, dust and noise disturbance was minimised during demolition to reduce pollution. An off-site construction consolidation centre was used for the Barts Hospital redevelopment to store construction materials before they were transported to the site (Skanska, 2010). This project also achieved ISO 14001 for Environmental Management System (EMS).
- **Technical Sector:** An acoustic screen made from aluminium panels with sound deadening foam is used to reduce the noise level. Green materials are promoted on site, for example, according to Skanska (2010) all timber used on the project is from sustainable sources certified by either the FSC (Forest Stewardship Council) or the PEFC (Program for the Endorsement of Forest Certification). Barts Hospital also has 1100m² green roof coverage as 20 per cent of total roof area. However due to a limit funding, full green roof coverage was not possible. Natural ventilation and a large central atrium are used to enhance the human experience inside the hospital, and make it more comfortable for the occupants (staff and

patients). The large airy atrium in the hospital will provide more natural light to the inside of the building, reduce energy use and save operational costs.

This case study demonstrates that the PFI procurement system has advantages in integrating Sustainable Development. The main contractor, Skanska, could use their sustainability strength and assist the NHS trust to set and achieve those sustainability targets in the early stage of the project. Moreover, this project has a long term strategic plan which embeds sustainability principles and aims to address the sustainability issues through the whole procurement process. However, there are some barriers for PFI projects to implement sustainability, for example, limited available budget for spending in sustainable technologies and materials and the strict legal requirements and long term contract conditions limit the future adoption of new sustainable construction technologies.

This project is the largest PFI hospital scheme in the UK and it is a flagship of sustainable building and the best example in the PFI industry and the Department of Health. Although one case study is insufficient in proving that PFI/PPP is an effective procurement system in delivering sustainable development, lessons learned from this case study could provide some guidance for PPP project's client and its consortium and demonstrate how stakeholders could work together to achieve their sustainability targets. It is worth undertaking similar case studies, particularly in different types of PPP/PFI projects, to identify their sustainability performance or best practice in the UK and other countries.

REFERENCES:

- Addis, B. and Talbot, R., (2001) Sustainable Construction procurement: a guide to delivering environmentally responsible projects, CIRIA C571, London
- Attfield, A., (2004) Improving Health; Growth and Sustaining Prosperity outline regeneration and sustainability strategy, Report to Trust Executive Team, Barts and the London NHS Trust
- Barts and the London NHS Trust (2006) Sustainable Regeneration Programme, Draft
- Barts and the London NHS Trust (2012) Barts and the London tops list for energy efficiency, News Press, 8th November 2011, [Accessed date: 20 Nov 2012]
<http://www.bartsandthelondon.nhs.uk/for-media/press-release-archive/press-release-archive/barts-and-the-london-tops-list-for-energy-efficiency/>
- BRE, (2002) Profiting from Sustainability: Business and sustainability, London
- DEFRA (2006) Procuring the Future: Sustainable Procurement National Action Plan, London, Department for Environment, Food and Rural Affairs
- DETR (1999) A Better Quality of Life: A strategy for Sustainable Development for the United Kingdom, Department of the Environment, Transport and the Regions
- Greater London Authority (2004a) The Royal London Hospital in the London Borough of Tower Hamlets, planning report PDU/0242a/01
- Hill, J., and Collins, J (2004) PFI: meeting the sustainability challenge, Green Alliance, London
- HM Treasury (2007) Transforming Government Procurement, Cabinet Office, London
- HM Treasury (2010). National Infrastructure Plan 2010, Cabinet Office, London
- HM Treasury (2012) UK Private Finance Initiative Projects: Summary Data as at March 2012
- House of Commons (2011) Lessons from PFI and other projects, Forty-fourth Report of Session 2010-12 Committee of Public Account
- NAO (2011) Lessons from PFI and other projects National Audit Office
- OGC (2002) Green Public Private Partnerships, Norwich, Office of Government Commerce

- Skanska (2010) Barts and the London Hospital, UK, Aspects of Sustainability, Case Study 65
- WRAP (2007) Recycling Demolition Arisings at Barts and the London Hospital,
WAS006-002: Demolition Exemplar Case Study
- Zhou, L., Kurul, E, and Keivani, R. (2006) Sustainability Evaluation in the PFI industry: Analysis of the questionnaire survey. Proceedings of Symposium on
“Sustainability and Value through Construction Procurement”, Manchester
- Zhou, L., Lowe, D.J., Kurul, E, and Keeping, M (2005) Is private finance initiative a good mechanism to deliver sustainable construction? Proceedings of the 2005 World Sustainable Building Conference, Tokyo, Japan
- Zhou, L., Kurul, E, and Keivani, R. (2008) The Economic Benefits of Sustainable PFI Project: A case study of Newport Southern Distributor Road, Proceedings of the 2008 World Sustainable Building Conference, Melbourne, Australia

CLUB: INNOVATIVE WAYS FOR LEARNING AND TEACHING PPPS

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This paper demonstrates the pedagogical value of using the Public-Private Partnership procurement methodology in higher-education construction and civil engineering degrees. PPPs are used as challenging learning scenario and role-play facilitated by industry PPP experts. The nickname of this elective is “*The PPP Club*”. A highly successful and popular subject amongst final year students many of them already working full time in industry. The method is by providing engaging and industry relevant content delivered by industry experts giving a feel real-life scenario. The course is assessed by a formal Expression of Interest (EOI) submission and role-play performance representing each of the major professions in a typical PPP consortium. The elective is formally registered as Work-integrated Learning (WIL). WIL is a response by all Australian universities to meet industry demands and the community for *work-ready graduates*. The paper demonstrates students’ learning outcomes and course experience satisfaction from formal and informal evaluation methods. It provides insights into the way the course is delivered and assessed. The paper concludes with a reflection of the practical transferable skills learnt as by-product of requesting the students to bid for an Expression of Interest (EOI) of a current PPP project.

Keywords: Industry skills formation, pedagogy, higher education, construction management, civil engineering

INTRODUCTION

Work Integrated Learning

All Australian universities provide work-integrated learning (WIL) in of some type in their academic programs. There is no single definition of WIL but according to the WIL National Scoping Study the most frequently used terms identified in the data include (1) professional practice, (2) internship, (3) workplace learning, (4) industry-based learning, (5) project based learning and (6) cooperative education and fieldwork education (Patrick et.al 2008). WIL is a response by the Australian Higher Education Sector to providing industry relevant courses in engaging ways for all parties involved and not only students thus this paper describes the way students, academics and industry practitioners interact. The bottom line is that WIL is to equip students to meet employers’ demands and industry ready graduates. Outcomes of the WIL program are geared to benefit all participating parties including students, industry and community partners, and teaching staff (Eddington 2006; OECD 2007; Patrick 2008; Sher 2012; Fien and Winfree 2012).

The PPP Club was formed against a backdrop of demands by the Australian Government. Higher education universities and tertiary education institutions are to provide work-ready graduates thus meeting industry demands. As a consequence universities are increasingly required to show how theory and practice combine. The School of Property, Construction and Project Management at RMIT University took rapid response to such demands implementing WIL across a number of subjects and undergraduate electives. The PPP Club was set to providing (1) technical occupational related knowledge to procuring construction and infrastructure projects under Public-Private Partnership methodology and (2) key transferable skills including professional communication, practice values and conduct thus equipping students beyond technical

engineering competencies. Equipping them with a set of core professional practice communication and negotiation skills important to succeed in a competitive work environment such as construction management and engineering (Aranda-Mena, 2010).

In response to industry demands (HESA 2003), and in 'recognition of the workplace as a unique and valuable learning environment for over 60,000 students' registered at RMIT University has increased the emphasis on WIL curriculum with the inclusion of WIL goals in institutional strategic directions and the provision of internal structures and support that value WIL as a learning and teaching approach. The growth and enhancement of WIL in universities is supported at the corporate strategic level, from within disciplines and from careers and employment elements. Industry is also increasingly prepared, as a response to skill shortages, to offer a variety of WIL experiences in an effort to access future employees prior to graduation. In this context the paper now proceeds to discussing the value Public-Private Partnership procurement method as a valuable pedagogical instrument.

What are PPPs and why are they of interest to us?

Public-Private Partnerships (PPPs) are sophisticated procurement systems for infrastructure provision and as such this procurement method provides an excellent educational scenario for higher education to final year bachelor students. This paper reports on the experience by the authors in delivering the PPP elective to fourth and final year university students undertaking bachelor degrees in Construction Management, Project Management and Civil Engineering. For this, the expected knowledge categories include:

- Integrated Financial and Business Sustainability thinking
- Integrated Design and Construction thinking
- Integrated Contract Management and Building Information Modelling
- Integrated Design and Building Operations thinking

The above-expected skills are a condition under particular procurement methods such as PPPs, Private-Finance Initiative, Build Operate and Transfer (Partnerships Victoria 2001, 2002 and Elnglish 2006). Emerging expected skills to applied across and not just PPPs projects include:

- A logic of integrated information technologies.
- Collaborative contracting.
- Professional communication and negotiation skills.
- Maximise time, cost and quality efficiencies.
- Improve customer/client service.
- Serves both the domestic and export markets through high skills.

The teaching of the PPP model over 12 weeks is not by any means exhaustive to equip students to the knowledge required in dealing with large complex projects but certainly a first expose on technical aspects and even more importantly a se of values and attitudes for professional practice and these values and attitudes that have a lasting impact.

The course introduces the PPP methodology based on Partnerships Victoria (Partnerships Victoria 2001 and 2002; Sampath 2006) students are expected to develop an understanding of the methodology by applying it to call for "*Expression of Interest*" [EOI] of a PPP major project in health, transportation or infrastructure. Students build up their technical knowledge for over 6 weeks before starting preparing the EOI document and EOI presentation as they return from mid-semester break.

Industry workshop are scheduled to look at generic professional skills required to winning a PPP at the EOI stage such as (1) strategic thinking skills, (2) analytical and (3) critical thinking (Sampath 2006; Ttraford and Proctor 2006). Also, oral, written and design communication for presentation preparations. Industry experts highlight the importance of attention to detail down to dress code and body language. The following section describes the pedagogical approach to “The PPP Club”.

PPP Club[ing]:

The PPP methodology used for the elective is that on of Partnerships Victoria (2001 and 2002), which has been the reference, model adopted across Australia (Infrastructure Australia 2008). The PPP curricula is delivered over one semester thus 12 weeks combining lectures and workshops. On a week-by-week basis professional disciplines represented by the Special Purpose Vehicle (SPV) are to explain areas of finance, construction, facilities management, architecture and information and communication technologies (ICT). Each week is filmed, documented and streamed on a dedicated wiki-web. The PPP Club members can then access slides, videos and lecture material on demand. The attendance rate remains high during 12 weeks (including 10 lectures, workshops and industry presentations). From day one the PPP Club was set to have all material on-line and specially the wiki-web not just a rich-media knowledge centre but as a forum discussion and learning interaction.

“I missed the lecture by Richard from Partnerships Victoria so had to watch it online. I just want to let you know how fantastic it was to be able to do this. Was of a great quality and being able to see the lecture slides as well was just great. I just wanted to give you some feedback on how the video lecture performed. I will now proceed with my weekly diary entry. Thanks for this, Courtney”.

Table 1: Teaching Schedule

Teaching Schedule

Thursdays 5:30

Thurs 1 March	Introduction to Advanced Construction Procurementg: Public Private Partnerships (PPPs)	Week 1
Thurs 8 March	PPPs: Government - Partnerships Victoria	Week 2
Thurs 15 March	PPPs: Construction and Supply Chain	Week 3
Thurs 22 March	PPPs: Facilities Management	Week 4
Thurs 29 March	PPPs: Architecture and Information Technologies	Week 5
Thurs 5 April	Expression of Interest [EOI] and feedback session	Week 6
Mid semester break	---	MSB
Thurs 19 April	PPPs: Finance I	Week 7
Thurs 26 April	PPPs: Finance II	Week 8
Thurs 3 May	PPPs: Legal I	Week 9
Thurs 10 May	PPPs: Legal II	Week 10
Thurs 17 May	EOI feedback	Week 11
Thurs 24 May	EOI presentations	Week 12
Thurs 31 May	EOI presentations	Week 13

Student Demographics:

RMIT University, city campus attracts students from Melbourne inner and outer city and from regional Victoria, other Australian states and international students are also widely represented mainly from Southeast Asia, China and India. RMIT University has over 60,000 full and part-time students enrolled. There are also students on exchange programs often come from continental Europe and North America.

A single class can 250 students. An average number of students enrolled in the PPP Club are 110 peaking at 170 in 2012. Student undertaking the PPP elective are required to complete a problem based learning assignment which simulates an industry project in the format of an Expression of Interest (EOI) including a presentation of the EOI to an expert industry panel comprising industry representatives. Industry feedback provided to students both verbally and in written form via responses to a series of prompts which align with the criterion.

The vehicle for learning the above is by applying the principles of the PPP methodology developed through a variety of industry presentations and workshops under the following modes:

- Industry Lectures
- Applied Workshops
- Debate roundtables
- On-line weekly diaries/critical discussions
- Industry assessed presentations of a PPP-EOI
- Report writing of a PPP-EOI

Table 2: Typical learning scenarios and industry participation

Role	Adviser
Financial and Commercial Adviser	Ernst & Young
Legal Adviser	Minter Ellison
Probity Practitioner	Pitcher Partners
Communications	Fenton Communications
Architectural Services - Design	TBA
Architectural Services – Health Planning	TBA
Quantity Surveyor	TBA
Engineering Services	TBA
FF&E	TBA
ICT	TBA
Facilities Management	TBA

The above table illustrates the typical range of professionals and PPP experts participating at the PPP Club each profession presented on a weekly by week basis. An invitation is sent early in the year. Most industry presenters are willing to return others rest and new presenters are invited. The response for participation is generally very positive. The course co-ordinators collaborates with industry presenters before, during and post-presentation debriefing. Also during each lecture and workshop by providing support to the class, housekeeping and documenting the lecture and facilitating debate roundtables at the end of each lecture. The coordinator is also responsible to prepare and maintain the with PPP wiki-web which has shown to be a strong method to engage with the class. Students' attendance rate exceeds over 80% throughout the semester.

As a first stage the PPP elective organises a set of lectures around the technical knowledge required to understand the PPP methodology (Grimsey and Lewis 2004). Presentations by industry experts take place on a weekly basis following the structure of a PPP Special Purpose Vehicle (SPV) starting the Government as the client (Joyner 2007). A changing industry presenter is introduced to the group on a week-by-week basis introducing thus all aspects of domain experts

such as financiers, lawyers, engineers, architects, contractors, information technology and facility managers.

Plenary lectures last for about an hour and then discussion and questions is actively encouraged. In cases where more than one industry experts present in once single lecture session debate is also encouraged. Plenary lectures are on the scale of 150 students. Code of conduct is reminded along with house keeping on a weekly basis. This includes professional behaviour such as timely punctual arrival, no phoning, no messaging, no eating, no *facebooking* ... all weekly reminders.

Presenting industry leaders do it on a voluntary basis. Course co-ordinators meet the once or twice early or before the semester begins to brief them on the structure and academic expectations of the course. Also to explain how their individual lecture fits and aligns with the rest of the course. Although there is much freedom for each presenter to talk and deliver examples of their own work/projects there is indeed a number of expected aspects to cover in a particular lecture. These must be taken in consideration by each of the presenters. Both course co-ordinators brief presenters months in advance of their lecture.

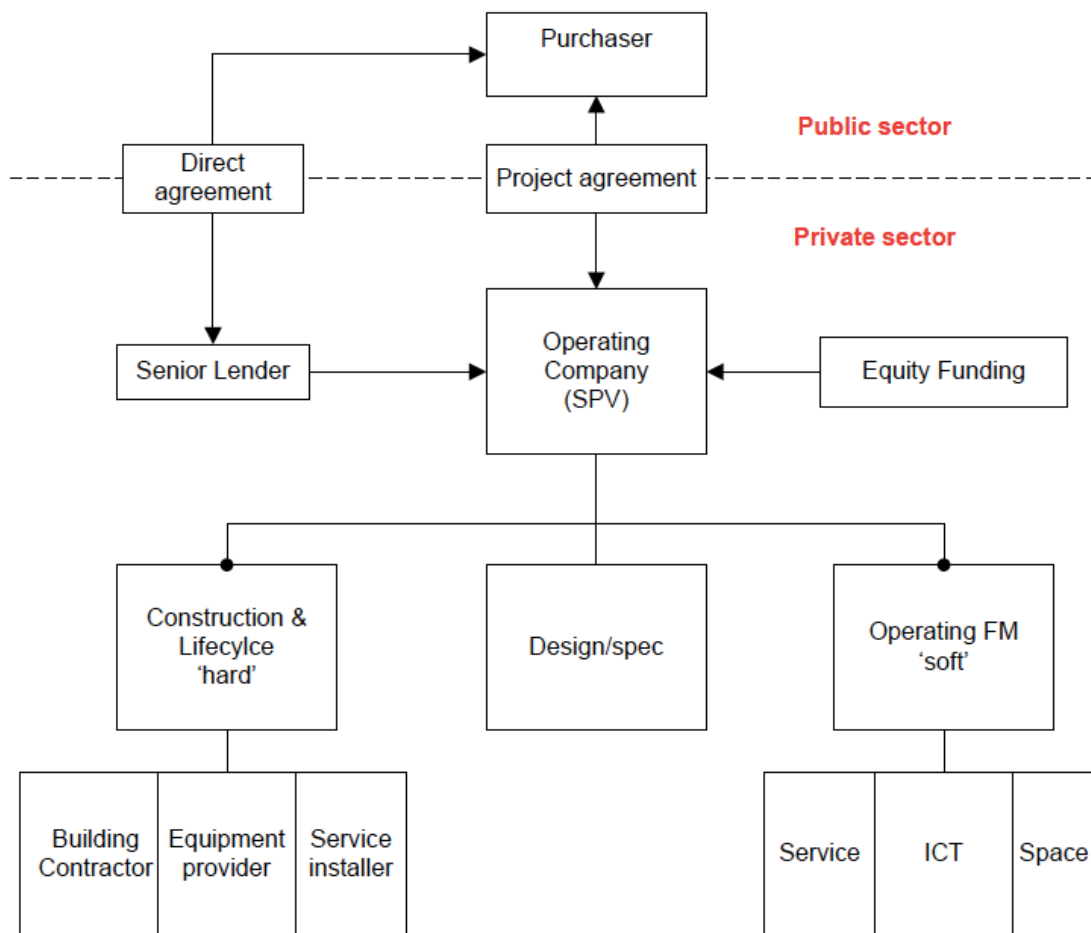


Figure 1: **Public-Private Partnership: Consortia structure also known as Special Purpose Vehicle (SPV)**

Critical thinking is encouraged and development takes place on a weekly basis each student is required to build up a wiki-web diary discussion. All other class members get to see and read entries and discussions are open to comments and argumentations. On week one many students “transcribe” a “verbatim” of the lecture or documents such as CDAF (2006). On week two it is demonstrated how to move away for this frame of thinking into *reflective critical* writing thus thinking. Writing and thinking skills continue developing over the semester. The wiki-web is monitored and good and bad examples are shown to the students at the start of the lecture. Students also get to see improvements and build up confidence. Here a selected of an on-line discussion (out of hundreds of them) to provide insights of the wiki-web diary discussions.

Week 1:

"Hello PPP Club members,

An interesting introduction to PPPs by Guillermo and Vince; I can definitely tell that this subject will be unlike most others.

Public Private Partnerships are an increasingly popular method of procuring major public projects. Traditionally, governments would take the role of project management upon themselves, thereby accepting a significant amount of risk.

In risk analysis, the letter delta is used to denote those risks that cannot be measured, but must still be accounted for. Therefore, project-managing governments had to tie up large sums of money as contingency for this unknown risk as projects are delivered. As public projects become larger, more complex, and more expensive, the Government's ability to finance them is reduced; especially in these uncertain economic times.

Therefore, public authorities adopted a policy of transferring risk to those most capable of managing it. This has allowed Governments to have some certainty when budgeting. The Scottish Parliament House construction is a prime example of the sort of uncertainty Treasury would like to avoid. Design obscurities and changes throughout construction, which were caused by the public servants managing the project, caused the cost, estimated to be 10m-40m pounds, to blow out to 414m pounds.

Public Private Partnerships encourage innovation more than other forms of project delivery. The precursor to the PPP, Build Own Operate Transfer (BOOT) contracts, required the government to essentially design the facility before putting it out to competitive tender. PPPs, on the other hand, are run more like a competition or an Olympic Games bid: the Government provides a basic project outline and a set of objectives, and simply sees what the private sector can come up with. It also allows for discussion and proposal modification throughout the tender process; allowing for the optimal result

As a consequence of this, bidding for a PPP is a very expensive process. There are only a few firms and financial institutions with the resources required to bid for them. The nature of PPPs also means that it is only suitable for large projects; Vince used \$100m and up as a rough figure.

What our EOI for the Flinders St Station (Melbourne) design project should demonstrate is that the PPP is the most effective means for ensuring that all of the objectives associated with socially sensitive projects are not only met, but also surpassed. Cheers, Domenic"

Week 4:

"Hello PPP Clubbers,

What a pursue ochre very interesting lecture on design to get us into the mind frame before we start our EOIs. Even though it was only one lecture, Drew has really provided me with more thorough understanding the overall requirements for design. I am going to be involved in the planning and design aspect of my SPV and so naturally I found this lecture to be highly relevant.

One point he made about how the VCCC (Victorian Comprehensive Cancer Research Centre) was located at a 'sensitive site' within Melbourne reflected the way that architecture and design on such a site can influence the entire city rather than simply the people directly involved with it. This is an important consideration to make when considering the design for Flinders Street Station. Rather than thinking about the building sitting on the site, it needs to be considered where the building lies within Melbourne and how it interacts with the city and its residents.

In response to the article the Ben posted at the start of this weeks discussion, I would personally like to see something like this built as a toll road as long as it does not have an impact on the design. This saves government money for other more important projects that are harder to fund through tolls such as rail infrastructure upgrades. It seems like some of the toll road consortiums

are pushing for a set of city onramps to be including in the project. This was outside the original scope presented by Sir Rod Eddington in his original report (Eddington 2008). If the project cannot be built in its proposed form and must be sacrificed for commercial interests this it should not be built at all. The money should be sourced from the government if this is the case. Thank You.”

Week 5:

“Hello, the lecture emphasised the value for money related to design (what does it mean to the consortium, how is that valued and expressed through the architectural world). Drew made it clear that it is vital to deliver as much as possible on a given brief and budget in order to win a tender.

Firstly we went through the problems with the procurement structures of schools and universities. The main problem seems not involving the contractor in the design process, typically contractors only have few weeks to gain an understanding of the documentation that in cases has been developed over a number of years. Through PPP's you get someone like the department of education to hand the whole project over to a developer who puts a team together (architect, engineers, contractors, managers etc.). This means everyone gets longer to agree on a design/cost and is involved in the whole design process. As a result everyone has a more in depth understanding of the potential risks involved and how to minimise them.

When looking at Drew's example of the construction of Fitzroy high I found it particularly interesting how much risk/contingency can potentially blow the budget out. In Fitzroy case, the project came in 25% under budget (the fear of non standard elements in the construction meant contingency on top of contingency compounded blowing the budget out). This information can now be used in similar succeeding projects so their risk/contingency sector of the budget is significantly reduced.

Following this Drew spoke about his experience as an architect on the PPP project VCCC (Victorian Comprehensive Cancer Research Centre). Drew highlighted the importance of innovation in his design when competing in order to win the tender. In a new hospital at least 50% of the budget goes straight away to services (air ducts, filters etc.), These are all essential to the way the building works however are elements the public will never see. With the rest of the budget it is vital to produce the most functional and aesthetically pleasing design possible. Through producing the most attractive and iconic design Drew's team were able to win the tender.

Through the two examples of Fitzroy and the VCCC I was able to get a more in depth grasp on the architectures involvement in PPP. Once again this lecture reinforced the importance of innovation and helped outline the passing of risk with PPP's from the Government sector”.

The above discussion clearly illustrates the level of critical independent thinking taking place in the weekly-diary online submissions. It was observed that a level of peer pressure takes place encouraging the less motivated students to jump into lively and at time steamy discussions. All discussions are monitored and selections of good and poor examples are shown to the class on a weekly basis as part of feedback to the group. De above clearly takes some of the concepts of value for money on board and the students grasps an understanding of the difference between cost and value as explained by Nisar (2007).

ASSESSMENT AND FEEDBACK

Assessment includes group reports and individual diary submissions. The reports are structured with individually named sections for student accountability. Assessment tasks are as follow:

- 20% - Individual on-line weekly diary
- 20% - Industry workshops
- 60% - Final EOI report and EOI presentation to industry expert panel.

The industry expert panel also provides oral and written feedback to students. Feedback is recorded and submitted to students. All results are tabulated and moderated by the two course coordinators.

Course feedback has been very positive, formally via RMIT University student satisfaction survey and informally via emails. In 2010 the PPP elective received the Golden Key International Award to best subject/lecturer. In 2011 and 2012 students satisfaction survey results exceeded expectations.

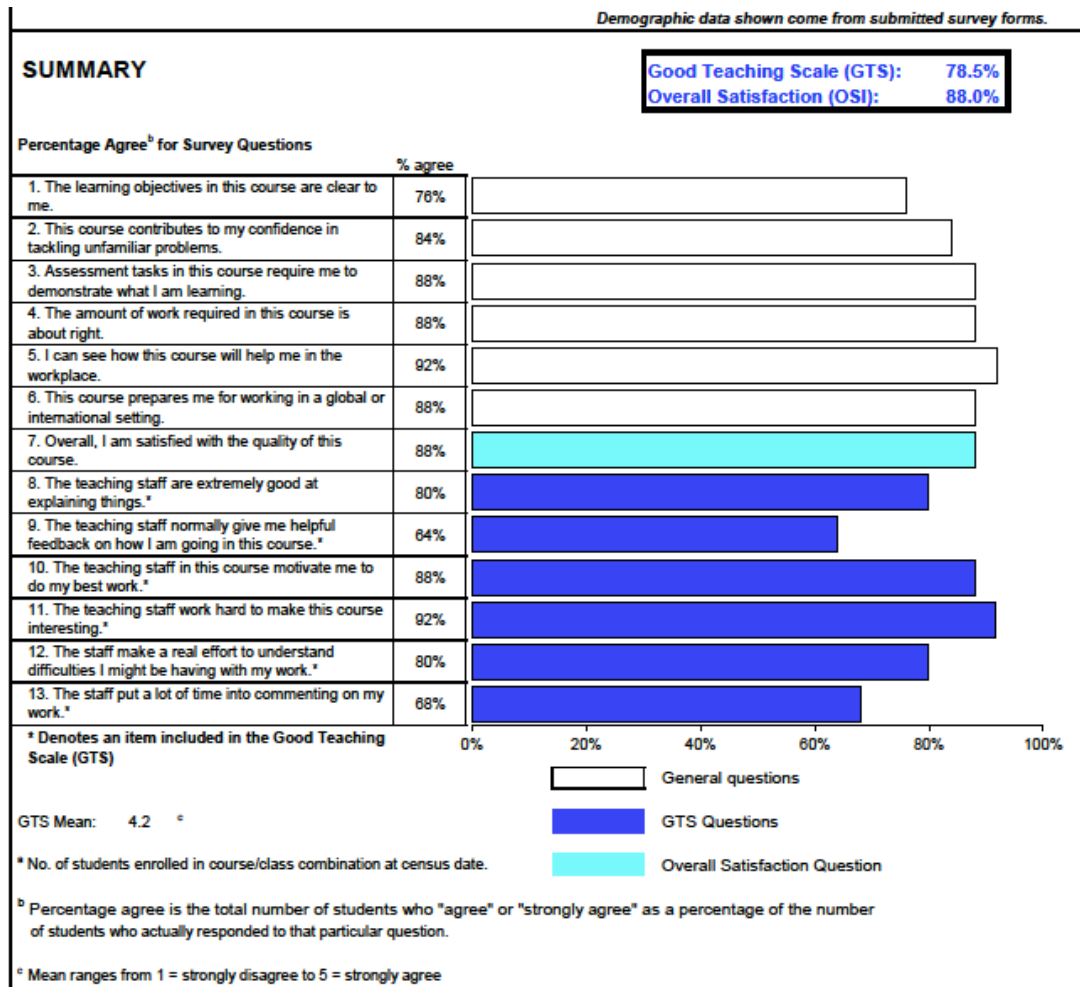


Figure 2: Student Satisfaction Survey for 2012: Advanced Construction Management final year elective

The following figure shows results of the 2011 Student Satisfaction Survey. Questionnaire questions are the same as those in the above figure for 2012.

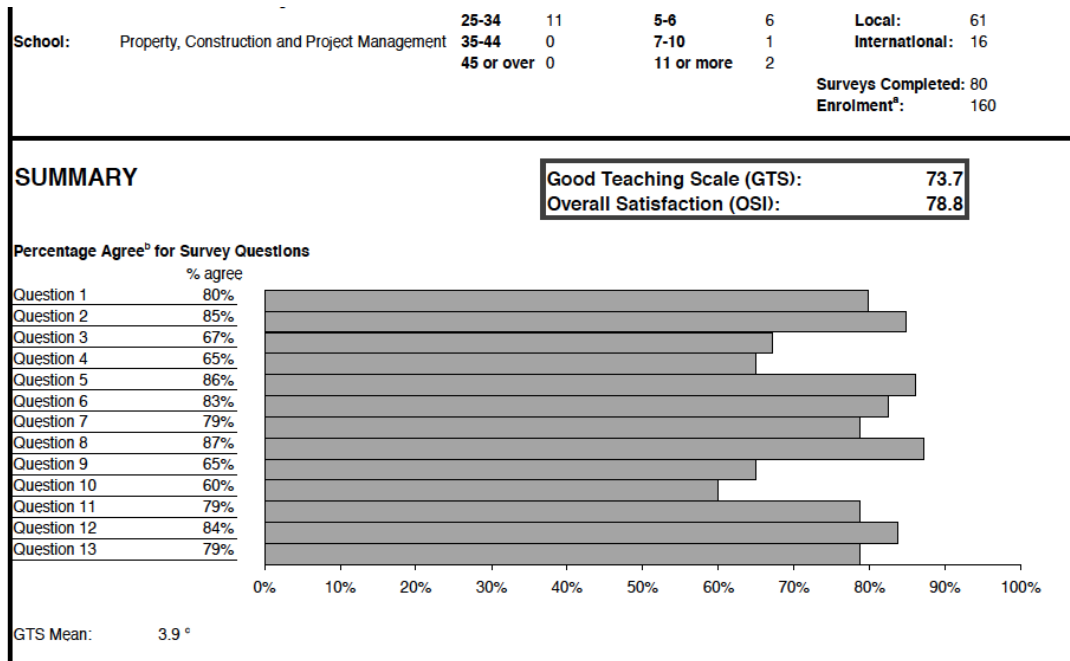


Figure 3: **Student Satisfaction Survey for 2011: Advanced Construction Management final year elective**

A short come to the survey is that it takes place (independently administered) on the last week of semester before assessment takes place and the semester concluded. Still, the lecturer and co-ordinator usually receives oral and email informal feed back. In some cases months after the semester has concluded, a more reliable and genuine kind of feedback.

Industry Feedback

“The PPP Club has formal and informal methods including a series of meetings to clarify the scope for the course and schedule prior to commencement with follow up documents to ensure the schedule and scope is formally set for the semester.

PPP workshop forums are modeled on Industry practice with the format and methodologies often used by Senior Management in Industry, which has been another of the effective tools and well adapted to a classroom context.

We have observed that the attitude to learning is infectious, as it promotes the Student to challenge and test the information presented. All presenters are engaging and inspiring to both students and other Industry speakers as evidenced by their continued involvement”.

Industry PPP expert

DISCUSSION AND CONCLUSION

It is over three years since the PPP Club elective has been running under RMIT University's Advanced Construction Management program. The skills learnt over one semester by final year Construction and Engineering students aim to mirroring a real-life scenario in putting together an expression of interest (EOI) for a Public-Private Partnership. Projects may vary from health to train stations to roads depending on what is on offer at the time for real in Australia. Authors argue that the PPP methodology provides a fit pedagogical scenario for higher education level construction and engineering students.

The paper argues that PPPs provide an incentive to learning beyond specific technical legal and economic knowledge but also communication and professional practice skills often overseen or even avoided in engineering and technical degrees. As by-product such expected technical Engineering and Construction skills students develop *high-level of strategic thinking and industry negotiation and communication skills* – much expected at managerial levels. This particular aspect of learning industry-insight clearly boosts students' confidence building increasing their employability and job offer opportunities. Beyond semester results we have seen that they do improve their performance at industry fairs and job interviews and the PPP is often sites at the most valuable elective during their undergraduate studies.

Follow up activities for 2013 is to maintain a close industry engagement and aim to leveraging the PPP Club to Master and PhD researches. Doctoral and postgraduate students often attend to the industry lectures and presentations. Also with program reviewers such as accreditation bodies including the Royal Institute of Charter Surveyors (RICS), Engineers Australia and the Institute of Project Management (IPM) to ensure continuity and direct industry participation in meaningful ways for all involved parties.

As for the authors, establishing close industry-academia collaborations has certainly been highly motivational, productive and certainly a rewarding professional experience. Knowledge-transfer across scholarship and practice but also across professional disciplines has demonstrated to be of high benefit at many levels. A level of risk and innovation has been taken at various levels by all involved in the PPP Club, from students tanking more responsibility on their hands, from academics taking non-conventional teaching modes, from industry for putting in-kind time and commitment over a number of years and from RMIT School of PCPM Directive to allowing meaningful learning and teaching practices to eventuate.

REFERENCES

- Aranda-Mena, G. (2010) Course Guide for Advanced Construction Management: Procuring Public-Private Partnerships" School of Property, Construction and Project Management, RMIT University, Melbourne, Australia.
- CDAF Commonwealth Department of Administration and Finance, (2006), "*Introductory Guide to Public Private Partnerships*", Australian Government Printing Service
- Eddington, N. (2006) A New Paradigm for Skills Formation in the Civil Construction Industry, *Clients Driven Innovation: Moving Ideas into Practice International Conference 12-14 March*. Cooperative Research Centre for Construction Innovation, QUT Publications.
- Eddington, R. (2008) *Investing in Transport*, Victorian Government report. Vic Gov, Australia
- English, L.M. (2006) Public Private Partnerships in Australia: An overview of their nature, purpose, incidence and oversight, *University of New South Wales Law Journal*, (29)3, 250-262
- Fien, J. and Winfree, T. (2012) *National Industry Education and Training Vision & Action Plan for the 21st Century*, Technical Report 2. Built Environment Industry Council (BEIIC) 19 October 2012.
- Garvin, M. J. and Bosso, D. (2008) Assessing the Effectiveness of Infrastructure Public--Private Partnership Programs and Projects, *Public Works Management & Policy*, 13(2), 162-178

- Grimsey, D. and Lewis, M.K., (2004) *Public Private Partnerships: The Worldwide Revolution in Infrastructure Provision and Project Finance*, Edward Elgar Publishing, Cheltenham, UK
- HESA (2003) *Higher Education Support Act 2003*
- Infrastructure Australia (2008) *National PPP Guidelines: Overview*, Australian Government Printing Service
- Joyner, K. (2007) Dynamic evolution in public-private partnerships: The role of key actors in managing multiple stakeholders, *Managerial Law*, 49 (5/6), 206-217
- Karlsen, J.T. (2002) Project Stakeholder Management, *Engineering Management Journal*, 14(4), 19
- Nisar, T.M. (2007) Value for money drivers in public private partnership schemes, *International Journal of Public Sector Management*, 20(2), 147-156
- Organisation for Economic Co-operation and Development, (2007) *OECD Principles for Private Sector Participation in Infrastructure*, Organisation for Economic Co-operation and Development
- Partnerships Victoria, (2001) *Partnerships Victoria: Risk Allocation and Contractual Issues*”, Victorian Government Printing Office
- Partnerships Victoria (2003) *Partnerships Victoria Guidance Material: Contract Management Guide – June 2003*, Partnerships Victoria
- Patrick, C., Peach, D. and Pocknee, C. (2008) *The WIL Report: Work Integrated Learning a National Scoping Study*, The Australian Learning & Teaching Council. QUT Publications.
- Sampath, S., (2006) *Building public sector capacities to implement successful public-private partnerships*, The Commonwealth Ministers Reference Book, Commonwealth Secretariat
- Sher, W. D. (2012) *Tertiary Construction Management Education: the lived experience of academic staff in Australia*. Unpublished PhD. The University of Newcastle, Australia.
- Trafford, S., Proctor, T. (2006) *Successful joint venture partnerships: public-private partnerships*, *International Journal of Public Sector Management*, 19 (2) 117-12

PPP RENEGOTIATIONS IN THE WATER SECTOR: IS THE PUBLIC SECTOR CONDEMNED TO LOSE?

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The private sector involvement in drinking water services has been largely supported on public-private partnership (PPP) contracts. Like in other infrastructure related services, this has allowed for a fast infrastructure growth without excessive pressure on the government public budget. Nevertheless, the experience shows that renegotiations, undertaken in a highly asymmetric environment, often attenuate the benefits of using the PPP model. The public sector ability to effectively renegotiate contracts is jeopardized by its lack of expertise and by the bilateral and non-competitive environment under which renegotiations take place. Ultimately this results in excessive rents for the private sector, thus decreasing the social welfare. This paper (An earlier version of this paper was presented in the Workshop “Neither Public Nor Private: Mixed Forms of Service Delivery Around the Globe” held in Barcelona on the 17-18 May 2012) analyses the Portuguese experience, since 1994, analyzing some selected case studies and extracting policy recommendations to decrease the adverse results of renegotiation.

Keywords: renegotiation; risk sharing; water sector; regulation by contract

INTRODUCTION

Privatization has been gaining prominence for the past 20 years in infrastructure across the world. Searching for productive efficiency, higher quality of service, capacity to make large investments or ideology are some of the reasons pointed out to privatize an infrastructure (Hart, 1988). Drinking water services are not an exception and since the 90s several countries have carried out deep privatization programs (Marques, 2010). Although a minor number of countries opt for the full divestiture model (e.g. England and Wales and Chile only partially), known in the water sector as the English model, most of them use public-private partnerships (PPPs). Both contractual PPPs (e.g. concession contracts) and institutional ones (mixed companies) are used to introduce private sector participation in the delivery of water services. The use of contracts in the water sector has been known as the French model which normally is associated with the provision of these services by the local government (e.g. municipalities).

Although the theory points out good reasons for privatization, frequently the option of politicians for it is related to the so-called scissors effect (e.g. the very bad performance of in-house public services demands deep changes) or for gaining up-front rents. These reasons might distort the results when public and private management efficiency is compared (Marques, 2008).

PPPs in theory might be a good option, since there is a sound competition for the market (Demsetz, 1968) and the long term contracts, where rights and duties of both public and private partners are established, are carefully designed. However, in practice, this barely happens (Williamson, 1976). First, the contracts are incomplete and the reality changes with time, particularly during the course of 30 or 40 years. Therefore, renegotiations become necessary, in order to adapt the contract to new conditions. Second, the bidders suffer from the optimist bias in the public tender stage and present overoptimistic bids thinking in the subsequent renegotiation of the contract in a bilateral way, which they normally get. Third, designing the contract, which is a

complex and multidisciplinary task, requiring a significant volume of resources (both human as financial). This is particularly serious at the local government level, where there is lack of resources, and contracts are inadequately designed and do not consider the renegotiation issue (Cruz and Marques, 2012c).

On the other hand, the private companies are usually transnational or larger companies with great resources and know-how, thus creating an important gap between the levels of expertise on the two sides. As such, the access to the market, the risk sharing and transfer and the management contract issues are not conveniently dealt with. So, most of the contracts are renegotiated little time after being signed. In Portugal all PPP contracts in the water sector have already been renegotiated, some of them 3 or 4 times (Dinis and Marques, 2010). This situation penalizes considerably the public interest and eliminates the potential benefits of privatization, since most of the renegotiation results are biased towards favoring the concessionaire.

This research reviews the PPP renegotiation cases in the water sector in Portugal, using a case study: a contractual PPP (concession contract). It is possible to conclude that in the cases where the contract fails the consequences are even more serious than it is generally recognized, and those cases may erode the advantages of developing PPPs.

THE PROBLEM OF RENEGOTIATION

In the drinking water sector, contracts are frequently renegotiated. Guasch (2004) found that for Latin America (with a sample of 1.000 contracts) 75% of the water concession contracts were renegotiated after an average of 1,6 years after their signature. According to this research, a higher incidence of renegotiation occurs under competitive bidding, price cap regulation, the non-existence of a regulatory body, compulsory investments, and when award criteria are based on the lowest tariff and the legal framework is embedded only in the contract (Guasch, 2004).

Renegotiation represents a major disappointing outcome for PPP contracts (Marques and Berg, 2010). Under re-negotiation, there is bilateral bargaining to restore a mutually acceptable situation for the parties; however, without competitive options, the operator will always have more information on the implications of alternative contractual arrangements – problem of information asymmetry (Holmstrom, 1982). Thus, service providers tend to be in a position to impose their requirements. Bajari et al. (2006) shows empirically that renegotiation unavoidability leads to an extra cost on users. This can happen directly, towards increases in uses charges, or indirectly through governmental compensations disseminating the cost for the entire society. Furthermore, such changes in the rules of the game undermine the legitimacy of the original contract award.

Renegotiation is associated with the risk allocation and transfer. The main theoretical benefit in PPPs is that risks would be assigned to the contractual party that is best able to mitigate them risk or to bear them (Grimsey and Lewis, 2002; Meda, 2007). This allocation minimizes the economic costs associated with such risks. From this perspective, the municipality should not transfer the risks that are under its control to the private partner; nor should it (as it represents taxpayers) assume the risks that are out of its control. The problem is that most contracts have clauses protecting the private sector from bearing such risks while ensuring economic and financial equilibrium during the contract (Marques and Berg, 2011). If it is clear that exogenous events would lead to the contract renegotiation, such events (related to risks) should have been assigned to appropriate parties and carefully defined ex-ante. The allocation of risks and the contractual clauses affecting the economic and financial equilibrium are required to avoid opportunistic behavior and to provide the value for money of the project.

This issue is exacerbated in PPPs since frequently in the public tender stage the preferred bidder is the most optimistic and not necessarily the best one (Marques and Berg, 2010). For example, if the sponsor considers the average tariff as a bid evaluation criterion but it does not standardize the population, clients, consumption per capita and their evolution over the time, the wrong bidder may be chosen as the best one. In fact, one may argue that the chosen bid will be the most optimistic. This phenomenon is not exclusive of water concessions, but it is also observable in road concessions (Hong and Shum, 2002). In these cases, the public interest is damaged twice as

the best bidder is not chosen and soon the contract will be renegotiated. As shown by Guasch (2004) and Cruz and Marques (2012a), the question is not whether the contract will be renegotiated, but when, since the probability of renegotiation is extremely high. Another relevant aspect is that evaluators should also focus on the particular aspects of a PPP contract, such as the outcomes of sensitivity analyses of the bid (business case) to adverse situations (e. g. consequences of a substantial drop in demand or in macroeconomic recession), the financial ratios and the shareholder rate of return (IRR) of the business case since these are the ones taken as basis for the renegotiation bargain (financial and economic equilibrium of the business case).

The outcomes are not the same if one bidder presents a IRR of 10% or a IRR of 15%. Note that the average tariff might be the same of these two bidders. Different IRR will lead to diverse results in the renegotiation, since the clauses for restoring the financial equilibrium frequently determine that the IRR should be kept at the same level (it is not rare to find clauses that determine a variability of only 0,01% in this ratio). Moreover, it should be emphasized that the tender documents are frequently badly prepared, not just the forecasts for consumption, but also the investments plans. If more studies and information are collected before the tender call notice, all the parties will benefit (Crampes and Estache, 1998).

THE WATER SECTOR IN PORTUGAL

Institutional model

The water sector in Portugal follows the French institutional and regulatory model where the water and wastewater activities are under the responsibility of local government authorities that may delegate them to the private sector. However, comparing it with the French model, there are some differences, such as the separation between wholesale (bulk) and retail (end-user) services which correspondingly refer to regional systems and municipal services, the State is the main operator through state-owned companies in the regional systems and there is a sector-specific regulatory agency, The Water and Waste Services Regulation Authority (ERSAR), which supervises the Portuguese water market. The municipal authorities can choose between four provision models, respectively: the municipal services (activities provided directly by municipalities), the semi-autonomous utilities (with administrative and financial autonomy), the municipal companies with or without a private shareholder and, finally, the concessionaire companies. The first three models are under public management carried out by the local municipal authority or the State, whereas the concessionaire companies are under private management. The mixed company (institutional PPP) is under the public sector control.

Market structure

Until the reforms of 1993, the water utilities were almost wholly vertically integrated. In that year the Government paved the way to the creation of the bulk (regional) services both in water and wastewater. These services belong to the State as a major shareholder and include municipalities with minority shareholder positions. Several state-owned (regional) companies were created (18 in total encompassing near 60 per cent of the population), one of them only for water (abstraction, treatment and transmission), others only wastewater (final transportation and treatment wastewater), others for water and wastewater and another one for water, wastewater and solid waste. The customers of these companies are exclusively the municipalities. In horizontal terms the utilities have a reduced degree of integration, as there are 300 utilities for almost 10.3 million inhabitants from which 25 per cent is supplied by private operators.

In Portugal, only 18 water utilities supply a population of more than 100.000 inhabitants and 109 cover a population of less than 10.000 inhabitants. Concerning the services delivered, the utilities provide, almost always, the water and wastewater services together. They often include the urban solid waste services and, less frequently, other activities such as the transportation. There is only a limited number of operators that provide water and wastewater services individually.

Private sector participation

In Portugal, until the end of 2011 about 50 international public tenders were launched by the Portuguese municipalities (or their associations) with the aim of selecting a private partner for the management of the drinking water (and wastewater) services. 35 of them were successful. The model mostly chosen was the PPP of contractual type by concession agreements (31 against only 5 of institutional type). Some of the tenders were not awarded due to the change of local government or because the mayor decided so (e.g. by not agreeing with the decision of the awarding committee about the best bidder). In the drinking water sector the population supplied by the private sector reaches almost 25%. Table 1 presents the PPPs that have already been signed in Portugal.

The first entity to launch a PPP for the management of environmental services was the municipality of Mafra which, through a public tender started in 1993, consulted the market to assign the operation and management of its water supply service to a private partner. This tender was the one with higher number of bidders so far (it attracted 9 players). The average number of bidders was 4 for all the tenders but there were some tenders with only one bidder because of their low degree of attractiveness. The average time elapsed between the launching of the procedure for selecting the private partner and the full implementation of the delegate management in the sector was 22 months. This is a very long period, highlighting the complexity of these processes and the difficulty of the municipalities to deal with it.

The maximum term of a PPP of contractual type is now limited by law to 30 years. There are some existing partnerships whose maximum term is 35 years (e.g. Cartaxo) and others with less than that because they did not include investment (leasing or affermage contracts). In the case of institutional PPPs, given that the call-option is possible for both partners, the maximum term of the partnership does not apply.

Concerning the drinking water and wastewater sectors, there are several players (private companies) working in Portugal including the AGS – Administração e Gestão de Sistemas de Salubridade, S.A. (capital held 100% by Somague Ambiente which makes part of the Group Sacyr Vallehermoso); Indáqua – Indústria e Gestão de Águas, S.A. [capital held by Mota-Engil (42,86%), Soares da Costa (28,57%) and Hidrante (28,57%)]; the company Aquapor/Luságua, which belonged to the Group Águas de Portugal, today belong to the companies Alexandre Barbosa Borges (ABB), S. A. and Domingos da Silva Teixeira (DST); the Compagnie Générale des Eaux Portugal, S.A. (held by Veolia Water); the Geswater – Águas e Resíduos, SGPS, S.A. (whose shareholders are the ABB and the DST and BragaParques – Estacionamentos de Braga, S.A.; a Aqualia – Gestión Integral del Agua, S.A. (held by FCC – Fomento de Construcciones y Contratas, S.A.); and Lena Ambiente, S.A. (belonging to Lena group). The group Aquapor is the market leader, followed by AGS and by Indáqua. Although there are many conflicts between municipalities and private entities, none of the PPPs, to date, has been prematurely terminated (by rescission). Anyway, most contracts have already been renegotiated, at least once, and several of them have undergone multiple restoring of the economic and financial balance.

Table 1: PPPs in the drinking and wastewater sectors in Portugal

PPP type	PPPs no.)	Population (Inhab.)	Average (Inhab.)	Median (Inhab.)	Minimum (Inhab.)	Maximum (Inhab.)
Contractual type	31	1.877.900	64.755	52.871	7642	170.683
Institutional type	5	322.847	64.569	54.506	21.102	164.193

Renegotiations

All the PPPs in Portugal have already been renegotiated, some of them 3 or 4 times and, generally, in a very early stage of the contract (Cruz and Marques, 2012a). Renegotiation always takes place in one direction (of the concessionaire) and until now there is no situation in which the sponsor has triggered it. The main reasons for renegotiation are the volume of consumption (or wastewater much lower than what was initially forecasted (optimism bias), change of the investment plans (unilateral change by the sponsor), change in law, change of the “bulk” water price and change of the scope and PPP object, among other factors. In general, as we will see next, the contract includes a clause of financial and economic recovery that mitigates the risk for the private partner in the project where the aspects that may trigger the process of renegotiation are presented (percentage change of 15% of the volume of distributed water in relation to the one expected in the initial base case). The economic and financial balance might be restored in different ways, including the rise of tariffs, the change in the term of the partnership, the increase or decrease of financial nature obligations and the allocation of direct compensation or the combination of them.

CASE STUDY

Contractual PPP

Consider the case of the Municipality A with 30.0000 inhabitants (about 13.000 customers) which is representative of this type of contracts of the Portuguese municipalities. It enters in concession arrangement with a private company for 30 years comprising its water and wastewater services. The contract includes an amount of 10 million Euro of investment and an annual payment of 1 million of euros to the municipality. There were 7 bidders in the public tender. The process took 2 years and the criteria and weight for choosing the preferred bidder were the average tariff (70%), quality of service (10%), safety of the provision (10%), strength of financial and contractual structure proposed (4%), quality and appropriateness of the plan of proposed investments (4%) and the payment to the municipality and its temporal distribution (2%). All the criteria are divided in several subcriteria. In addition, it presents an economic and financial equilibrium restoration clause which reduces the sharing and transference of risks and consequently increases the probability of renegotiation.

Table 2 summarizes the contents of this clause. Finally, it should be highlighted that there are few rules for the contract management (only the information required to be sent by the concessionaire, sanctions of the bad performance and the earlier termination mechanisms) and there is no structure and means predicted to carry out this activity, which, unfortunately occurs quite often. The earlier termination mechanisms are also (as usual) little favorable for the sponsor, being almost impossible to put them into practice (to the authors knowledge, this has never taken place).

The concession contract of Municipality A suffers from several pitfalls leading to a higher probability of renegotiation. First, as we can see in table 2, most of the risks are retained and borne by the public sector, such as consumption (water and wastewater after a trigger of 20% change), legislation, financing, unilateral change by the sponsor and construction risks. Concerning the latter, note that the change of the amount of investments proposed by the business case of concessionaire lead to the renegotiation of the contract. Second, the public tender was launched as the public work tender does not take into account the particularities of a PPP contract (e.g. the shareholder rate of return, which is the basis for the restoring the economic and financial equilibrium, is not assessed). For example, the consumption was predicted by the concessionaire leading to the optimism bias since the average tariff had a score of 70% in the evaluation of the bids. Therefore, probably the winner bidder was not the best one and it is very likely that renegotiation might take place. In approximately ten years the contract was renegotiated 3 times, always penalizing the previous contract in the direction of the public partner restoring the shareholding rate of return.

Table 2: Clause of restoration of financial and economic equilibrium

Changes requiring restoration of financial/economic equilibrium	Risk
Change greater than 20 % (up or down) of the annual volume of water distributed predicted by the bidder	Consumption
Change greater than 20 % (up or down) of the annual volume of wastewater collected predicted by the bidder	Consumption
Expansion or reduction of the system scope concerning the works predicted by the concessionaire	Several
Change of the amount of investments proposed by the business case of concessionaire	Several
Meaningful change of the rules or legislation which leads to the alteration in equipments and procedures	Legal/regulation/operation
If the concessionaire has to bear charges related to the factors that could not be predicted at the date of contract signature as, for example, new taxes, tariffs or taxes determined by new legislation	Legal/regulation
Change greater than 20% of the annual average value of Euribor (6 months) when compared with the previous year	Financing
If the price of wholesale services (water and wastewater) suffer a change different from the one proposed at the date of public tender	Operation

CONCLUSION

In this paper some lessons of privatization of the Portuguese water sector are presented. First, the tender documents should be designed with a great care (Marques and Berg, 2010). Therefore, template documents should be defined, recognizing that ‘one size fits all’ is not acceptable and the draft of a proposed contract design should be provided as an annex in the public tender documents. Second, an external entity (regulator) should be established, having as an external independent regulator monitoring the PPP benefits citizens whose involvement should begin with the design of tender documents. Note that even when the law gives final authority to local municipalities, the external regulator can provide a reality-check on the terms and conditions of the contract and can support the municipality in evaluating the performance of the PPP. Third, baseline studies should be prepared. There is strong evidence of the need for more comprehensive studies prior to launching a PPP. At a minimum, the documents should provide complete information about trends in infrastructure system operations and the objectives of the PPP but it should also involve the developing of the public sector comparator (a baseline) and provide bidders with a template for a business plan. The public sector comparator will allow verifying the value for money of the selected proposal. Fourth, in the public tender evaluation selection criteria should be prioritised taking into account the specificities of the PPPs. As the probability of renegotiation and alteration of the initial regulatory premise are substantial, the criteria should include an analysis of how such situations are to be mitigated and when disputes occur, how the public interest is to be defended. It was demonstrated that the existence of rules for restoring the financial equilibrium is not enough, if those rules are not fair. Fifth, competitive bidding should be facilitated since more bidders for the PPP imply more value for money. Therefore, only the documentation strictly necessary should be required, reducing the high costs for participating in the bidding process. Sixth, the allocation of risks should be presented in an explicit manner, since it minimizes the likelihood of renegotiation but also saves money (mitigating risks, thus reducing the economic cost of bearing risk). Seventh, sanction procedures and monitoring should be simplified and, finally, transparency should be ensured.

REFERENCES

Bajari, P., Houghton, S. and Tadelis, S. (2006) Bidding for incomplete contracts: An empirical analysis. *Working paper no. 12051*, NBER, Cambridge, Mass.

- Crampes, C. and Estache, A. (1998) Regulatory trade-offs in the design of concession contracts. *Utilities Policy*, 7(1), 1-13.
- Cruz, C. and Marques, R. (2012a) Endogenous determinants for renegotiating concessions: Evidence from local infrastructure. *Working Paper* no. 1 Càtedra Pasqual Maragall, Universidade de Barcelona, 37 p.
- Cruz, C. and Marques, R. (2012b) Using the ‘economic and financial re-equilibrium’ model to decrease infrastructure contract incompleteness. *Journal of Infrastructure Systems*. doi:[http://dx.doi.org/10.1061/\(ASCE\)IS.1943-555X.0000110](http://dx.doi.org/10.1061/(ASCE)IS.1943-555X.0000110), (forthcoming).
- Cruz, N. and Marques, R. (2012c) Delivering local infrastructure through PPPs: Evidence from the school sector. *Journal of Construction Engineering and Management*, (forthcoming).
- Cruz, N. and Marques, R. (2012d) Mixed companies and local governance: no man can serve two masters. *Public Administration*. ISSN: 0033-3298, (forthcoming).
- Demsetz, H. (1968) Why regulate utilities? *Journal of Law and Economics*, 11(1), 55–65.
- Dinis, S. and Marques, R. (2010) *Análise das Parcerias Público-Privadas nos Serviços Municipais de Água e de Águas Residuais*. Associação das Empresas Portuguesas para o Sector do Ambiente (AEPsA), Lisbon.
- Grimsey, D. and Lewis, M. (2002) Evaluating the risks of public private partnerships for infrastructure projects. *International Journal of Project Management*, 20(2), 107-118.
- Guasch, J. (2004) *Granting and Renegotiating Infrastructure Concessions: Doing it Right*. Washington, DC: World Bank.
- Hart, O. (1988) Incomplete contracts and public ownership: Remarks, and an application to public-private partnerships. *Econometrica*, 113(486), 69-76.
- Holmstrom, B. (1982) Moral hazard in teams. *Bell Journal of Economics*, 13(2), 324-340.
- Hong, H. and Shum, M. (2002) Increasing competition and the winner’s curse: evidence from procurement. *Review of Economic Studies*, 69(4), 871-898.
- Marques, R. (2008) Comparing private and public performance of Portuguese water services. *Water Policy*, 10(1), 25–42.
- Marques, R. and Berg, S. (2010) Revisiting the strengths and limitations of regulatory contracts in infrastructure industries. *Journal of Infrastructure Systems*, 16(4), 334-342.
- Marques, R. and Berg, S. (2011) Risks, contracts and private sector participation in infrastructure. *Journal of Construction Engineering and Management*, 137(11), 925-932.
- Meda, F. (2007) A game theory approach for the allocation of risks in transport public private partnerships. *International Journal of Project Management*, 25(3), 213-218.
- Williamson, O. (1976). Franchising bidding for natural monopolies – in general and with Respect to CATV. *Bell Journal of Economics*, 7(1), 73–104.

LIFE CYCLE COSTING AS AN IMPORTANT PART OF PUBLIC PRIVATE PARTNERSHIP CONTRACTS

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The public sector is costly in all nations and often there is a need for private finance to carry out projects, which is one of the main purposes of PPP (Public Private Partnership). The purpose of introducing LCC (Life Cycle Costing) in the PPP contracts is to focus on life cycle investments rather than project procurement and management and how this can be defined in the contract. The Life Cycle perspective will ensure interaction between project competences and operational competences. Methods and tools used, including literature study, questionnaire and interviews is a result of research and development projects and studies in Norway and Slovenia. In some European countries PPP is well and deeply rooted in regulation and practice while some hardly have any experience at all, for instance in Norway there is no regulatory requirements and only a few examples of experience. In Norway there is a long tradition within the public sector to use LCC calculations as a base for "cost-covering-rent". PPP contracts often last for 20 – 30 years, which corresponds with the estimated technical life time of building components and technical infrastructure. This paper suggests how to define which costs should be included in the rent, how to assess residual value and how to define requirements for technical conditions at the end of the contract.

Keywords: Contracts, LCC, PPP

INTRODUCTION

The public sector is costly in all nations. Mostly there is a need for private finance to carry out projects, and this is one the main purposes of PPP (Public Private Partnership). Development and use of PPP differs from country to country throughout Europe. In some European countries PPP is well and deeply rooted in regulation and practice while some hardly have any experience at all, for instance in Norway there is no regulatory requirements and only a few examples of experience.

The definition of PPP may vary between countries. In this paper we focus on extensive PPP contracts of the BOT type (Build-Operate-Transfer) in line with the European Commission's green paper characteristics as described by Kappeler and Nemoz in their PPP report of 2010:

- The relatively long duration of the relationship, involving cooperation between the public partner and the private partner on different aspects of a planned project (...);
- The method of funding the project, in part from the private sector, sometimes by means of complex arrangements between the various players (...);
- The important role of the economic operator, who participates at different stages in the project (design, completion, implementation, funding) (...);
- The distribution of risks between the public partner and the private partner, to whom the risks generally borne by the public sector are transferred (...).

The purpose of introducing LCC (Life Cycle Costing) in the PPP contracts is to get focus on life cycle investments rather than project procurement and management. LCC is defined as “capital costs and annual costs related to management, operation, maintenance and development” (Norwegian Standard NS 3454 Life Cycle Costs for buildings and infrastructure”). The Life Cycle perspective will not only improve the financial basis for project and investment decisions, but also ensure interaction between project competences and operational competences. This interaction in the early stages of a project is necessary to develop financially and environmentally sustainable buildings and infrastructure e.g. in selecting materials, components and systems.

To obtain sustainable construction - buildings and infrastructure - it is important that the construction obtain a long total life time (TLT). Changes and new needs in the use of the construction will lead to new performance requirements. To meet these needs the construction must be adaptable i.e. they will undergo refurbishment throughout the TLT.

METHODOLOGY/APPROACH

The methodology and tools, including questionnaire, so far are results of research and development projects and studies in Norway and Slovenia:

- Multiconsult’s Experience as consultants to public bodies considering PPP as a vehicle of financing public buildings or infrastructure;
- Multiconsult’s Experience as consultants to construction companies involved in bidding for PPP contracts;
- Questionnaire to large public property managers in Norway, covering approx. 10% of public building gross area;
- Different research from the housing sector in Slovenia;
- LCC expertise from design phases for PPP projects and other public and private construction projects during more than 20 years;
- Literature study.

FINDINGS

Kappeler and Nemoz have found that PPPs in recent years have developed from the traditional base in the transport sector to public buildings and infrastructure such as water and waste management. The total volume of contracts has developed from just over one billion EUR in 1994 to nearly 30 billion EUR in 2007, and back to approx. 15 billion EUR in 2009. The UK is still by far the EU member with the highest number and highest value of projects, however the PPP model is gaining in new countries and the UK proportion of the total value of projects is approximately 50% in recent years. In other words: PPP is a large market with a considerable potential for growth.

Generally, at the end of the PPP contract period, the public tenant has the right to purchase the building from the PPP company at a price set in the contract. A seemingly increasing number of PPP contracts include predefined times during the contract period with an option for the tenant to end the contract by purchasing the building.

Consequently, the PPP contract makes the PPP company plan for a long period. Recent contracts for schools and other public buildings in the Norwegian market have had a perspective of 40 years or more. In some contracts the fixed contract period may be no longer than 20 years, but will include an option for the tenant to extend the contract in one or more stages. Other contracts have longer fixed periods, where the tenant has the option to end the contract at given intervals by purchasing the property at a price which is set in the contract. In both cases, the shorter or longer fixed contract period, the building will gradually evolve (see figure 1) from:

- (i) “new” with limited needs for maintenance and adaption to new requirements;
- (ii) “mature” with needs of regular maintenance activities and possibly adaptation to new user requirements;
- (iii) “old” with increasing need for repair and unforeseen maintenance as well as adaptation to new user requirements and upgrading to meet technical requirements.

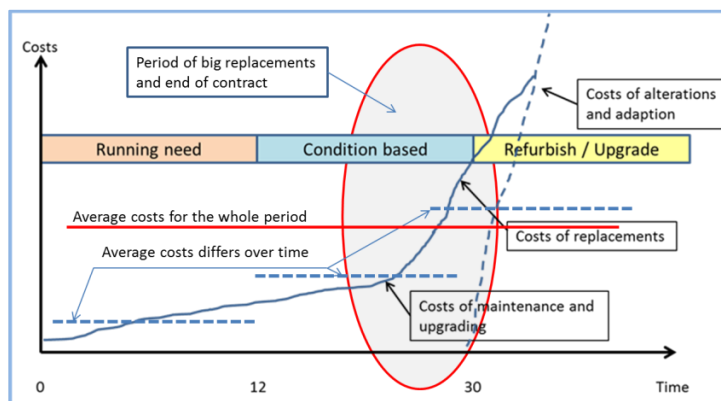


Figure 1: **Increasing costs over time with peak in normal end time of PPP contract (Source: Bjørberg 2012)**

The long duration of the PPP contract transfers a great deal of risk from the public user to the PPP company. The PPP company must predict a realistic cost level for operation and maintenance incorporated in the rent.

Figure 2 illustrates how the real expenses will vary during the property’s service life and how these expenses must be converted to a robust regular cost picture in order to calculate the rent.

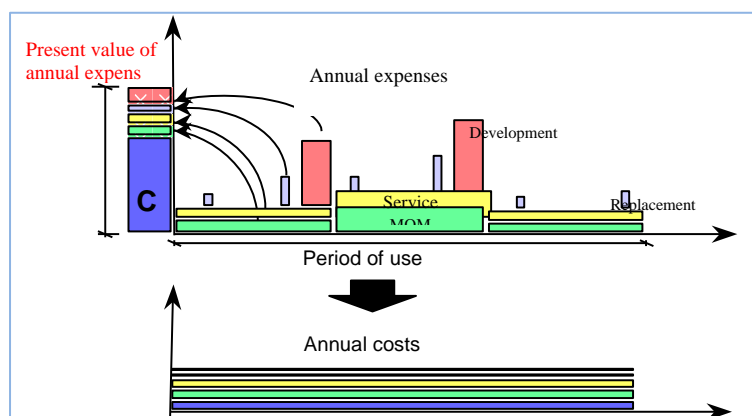


Figure 2: **Cost distribution over time (Source: Bjørberg 2000)**

The investor’s assessment of Internal Rate of Return (IRR) obviously is of great importance. This paper shall, however, not discuss IRR, but focus on the uncertainty of important elements of the operational costs.

The figure below illustrates how the initial investment (100%) is depreciated over time. Technical systems and internal works have a shorter service life than the main structures of the building. Figure 3 illustrates how this affects the depreciation, and how important it is to understand the actual depreciation pattern of the building to assess a realistic residual value.

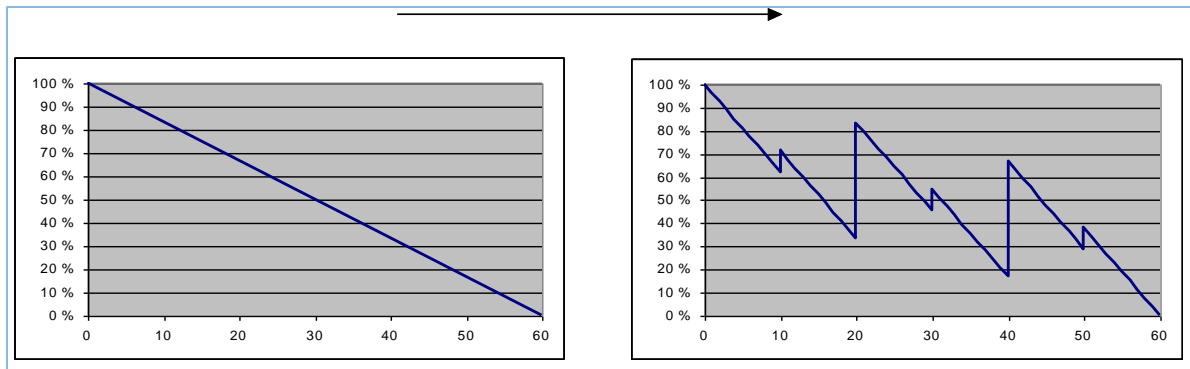


Figure 3: **From traditional to decomposed depreciation – gives increased rate of depreciation (Source: Larsen 2002)**

When we look at how the expenses vary over time, and take into consideration the Service Life Period (SLP) of technical installations, we find that most PPP contracts expire at a time in the building's life where several major factors are hard to estimate.

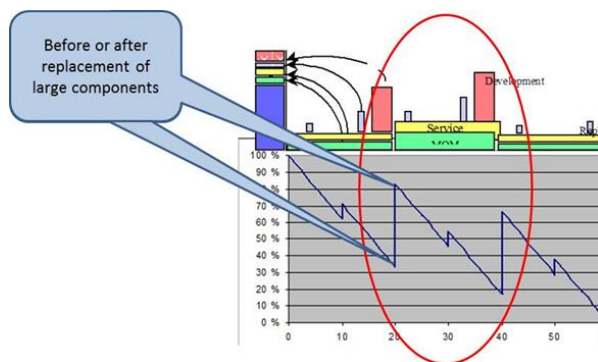


Figure 3: **Assessing residual value for buildings in PPP contracts (Source: Kristiansen 2012)**

It is tempting to add even more uncertainty in this picture to illustrate the need for transparency. Figure 4 show how buildings for dynamic businesses will undergo frequent changes, whereas more stable users will demand little adaptability from their buildings. SLP for the same use in the same way will differ due to core business needs for alterations. The frequency and scope of alterations are hard to predict and the PPP contracts normally define these types of changes as outside the scope of the cost covering rent. Consequently there will be a negotiation about the adjustment of the rent in connection with the alterations, and this calls for a calculations model which is transparent and useful to both parties of the PPP contract.

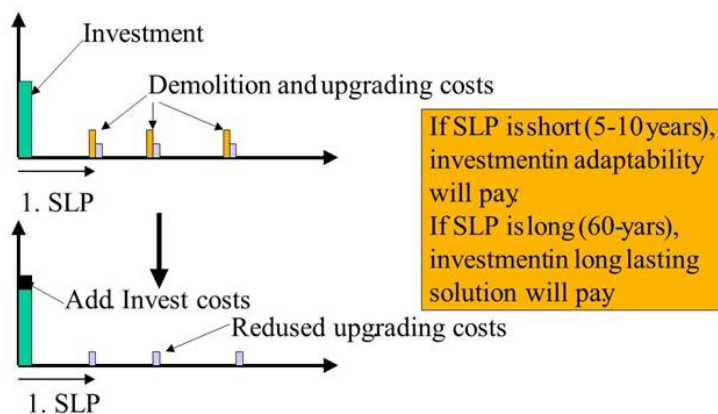


Figure 4: **Need for adaptability depends on time of SLP (Source: Bjørberg 2003)**

Using LCC methodology for calculating cost covering rent has been used for more than 20 years in Norway, but has to be developed further i.e. from the view that constructions are static to the recognition that they are dynamic (Listerud, et. al. 2012). The intention of the new approach is that user and owner may use the contract as a base for condition upgrading over time, at expiry and / or at option points for extension of the contract etc.

The recognition that buildings must be dynamic due to frequent needs for changes in core business increases the focus on creating adaptable buildings so that they may have a longer total life. This also meets requirements for Sustainable Buildings. A sustainable building can be defined as “*buildings that serve functionality over time while consuming the least possible resources*” (Bjørberg 2011).

The new LCC approach takes into consideration that we have to determine or anticipate two kinds of life times; Total Life Time (TLT) and Service Life Time (SLT) up to the first refurbish / upgrading point of time.

Consequently all the building components have to be divided into three groups, e.g those we:

- never see again such as foundation, part of load bearing elements, drainage etc.;
- can see but not replace but can maintain such as part of load bearing components etc.;
- can easily can maintain and replace such as ceilings, internal division walls etc.

This approach will enable us to calculate the depreciation and values at chosen times. It will also give a better base for calculation of rent during a BOT period and hence a better definition of contract content. Figure 5 and 6 show the difference between the traditional and the new calculation model.

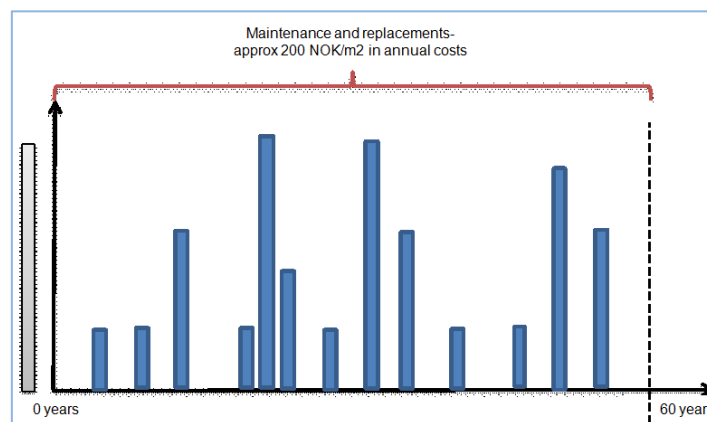


Figure 5: **Old calculation model with calculation period of 60 years. In this model residual value is often ignored, because of the complexity of this calculation (Source: Listerud 2011)**

The method has proved to be efficient, and the understanding of the problems is spreading among public bodies and PPP companies. Recent PPP contracts in Norway:

- take into consideration the unpredictability of needs for alterations and adaptations, but have not so far given examples of calculations models for rent adjustments;
- have requirements for the technical condition of the building at the relevant points in time for contract expiry, but these are hitherto not sufficiently precise.

The main challenge is still how to assess residual value at contract expiry, especially when there are several possible exit times.

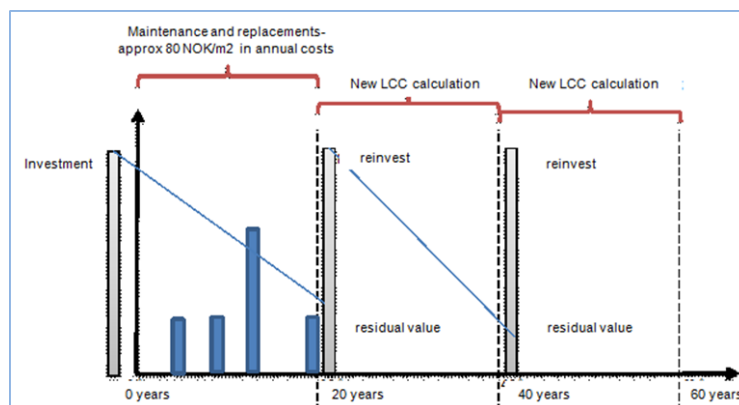


Figure 6: **New model gives with shorter calculation periods. The model also makes it possible to calculate the technical residual value at end of calculation period (Source: Listerud 2011)**

In Slovenia the standard of most housing facilities is unsatisfactory. The rebuilding has been in the last years really neglected and the same goes for housing maintenance and renovation (Temeljotov, 2006). From the owners of the apartment building it is quite difficult to get consensus in terms of much crumbled ownership. The problem seems bigger because many buyers have bought apartments on the liquidation from the former social apartments which means the price was much lower that it would be otherwise. Many residents' incomes are quite low, so their participation is usually on minimum rate. By the Housing regulation (Ur.l.RS, 69/2003) and the other maintenance standards there are obligatory minimums for the reservation fund for all the buildings with more than eight flats. The financial contributions depends on their percentage of floor area, building age and reconstruction, and it would vary from 0,0 Euro/m² for all buildings younger than 10 years to 0,30 Euros/m². Because of the regulations, mixed ownerships, degradation of living quality of some residential areas and consequently their social transformations (Uršič, 2005), public strategies focused in co-financing the refurbishment investments through the different funding schemes (Temeljotov at all, 2011), we find this new model as a very good tool of activating funds in maintenance.

In Norway the two main reasons for selecting PPP rather than projects financed by the government are related to ideological/political view on roles and responsibilities and easier access to funding to skip the queue in public budgets. Furthermore the main developers of PPP are, on the client side national bodies for infrastructure and some of the large municipalities, and on the supplier side some of the large construction companies in cooperation with a limited number of legal experts. There is no dedicated legislation regarding PPP, however the PPP models are based on the public acquisition regulations and national standards for complex building contracts and lease contracts. The public sector generally lacks experience in implementing and managing PPP contracts, however some of the large municipalities and national bodies for infrastructure are taking a leading position.

RELIABILITY AND VALIDITY OF RESULTS

Different contract standards and varying practices in different countries unfortunately affects the level of precision in this study. We feel however, that the response from both public and private entities engaged in PPP, confirm the following main statements and findings.

CONCLUSIONS

The new LCC method as described covers a need that is becoming increasingly important as the focus of using PPP contracts increases in most European countries.

In order to define which costs should be included in the rent, one should concentrate on the elements which have the largest possible predictability. The total costs of a building would in a standard lease contract normally be distributed in three main elements as shown in table 1: landlord's costs; service charge (shared among the tenants); and the tenants exclusive costs.

Table 1: Distribution of costs (Source: Kristiansen 2013)

	Included in rent	Service charge	Tenant's expense
Capital costs	X		
Management	X	X	
Operation	X	X	X
Energy, water, waste			X
Maintenance and replacement	X		
Alterations and adaption	X		*)

*) see bullet-point concerning alterations and adaption below.

- Financing costs, whether related to loans or equity are controlled by the investor, and should be included in the rent as the landlord's responsibility.
- Depreciation models for complex infrastructure and adaptable buildings are complicated. Different components will have different technical lifetimes. Depreciation on the initial investment should be included in the rent as the landlord's responsibility. Here, we see great practical use of the new LCC model. Related to residual value of the various components related to the possible expiry dates in the contract
- Taxes and fees which are related to the construction at the start of the contract period are also naturally the landlord's responsibility. How to distribute risk and responsibility for changes in regulation during the long contract period must be solved.
- Costs related to management of the investment and the infrastructure would normally be the landlord's responsibility as in a standard lease contract.
- Operational costs, such as cleaning, janitor services, running of technical installations etc. are distributed between the tenants in normal leases. In PPP contracts we see that most of these costs are included in the fixed rent. In predicting operational costs, LCC databases based on standardised costing structures are useful. The Norwegian LCC standard NS 3454 is one example.
- Consumption related to energy, water and waste are controlled by the tenant, and are normally the tenant's responsibility, also in PPP contracts.
- Maintenance and replacement of components in the initial investment must be landlord's responsibility. Again we see the use of the new LCC model, which takes each SLP into account.
- Alterations and adaption are normally initiated by (i) either the tenant as a consequence of changes in the core business, or (ii) the authorities as a consequence of new absolute requirements related to health, safety, environment or social factors. It is not possible to predict when these requirements will occur, and consequently it would not be cost effective to include future costs of this kind in the rent. The actual physical alteration should in each case be developed in cooperation between landlord and tenant, and the adjustment to the rent should be calculated in each case. The calculation model should be described in the PPP contract, and should be in accordance with the new LCC model.

In order to obtain long technical lifetime of the main components, especially the envelope, it is necessary to optimise the combination of materials, design and detailing, and construction/execution together with systematic condition based maintenance.

The internal works should be designed and constructed to accommodate for the demands for adaptability.

In order to define requirements for the technical condition of the asset the public body takes over the asset, there is a need for:

- Standardised definitions of degrees of technical condition. The Norwegian NS 3424 has a simple four-level scale of Condition Grades from 0-3 where 0 is new building standard, and 3 is the worst. These Condition Grades are defined with description of symptoms for the main components. There is a risk that a more detailed scale would lock the contractual parties into a non-productive discussion about numbers rather than trying to deliver according to an acceptable level;
- Agreement on how to assess the technical condition;
- Agreement on how to solve disagreements.

In preparing the PPP contractual documents, the public body has the responsibility to define the exit periods, optional or fixed, during the PPP contract period. Here lies an opportunity to balance risk and avoid unnecessary costs by considering the expected service life of the main components in the asset.

REFERENCES

- Bjørberg, S and Larssen, A. K. (2004) Users Demands for Functionality and Adaptability Model and a Tool for Evaluation of Buildings. In: Proceedings of the CIB W70 Symposium, December 2004, Hong Kong.
- Bjørberg, et al. (2005) LCC for byggverk. Nordisk hovedprosjekt –sluttrapport. Hørsholm: Statens Byggeforskningsinstitut.
- Bjørberg, S et al. (2003) Livssyklus kostnader for bygninger. Oslo: RIF & Norges Bygg- og Eiendomsforening.
- Bjørberg, S et al. (2005) Avskrivning av bygninger - Prinsipper og konsekvenser. In: Kappeler, A. and Nemoz, M. (eds) Public-Private Partnerships in Europe – before and during the financial crisis.
- Listerud et al (2012). LCC in Norway- State of the art 2012. In: Proceedings of the IALCCE Conference, November 2012, Vienna.
- Listerud, C. et. al. (2012) Life Cycle Costs- A new approach and an innovative model for calculation. In: Proceedings of the IFHE Congress, April 2012, Norges Bygg- og Eiendomsforening, Oslo.
- ISO (2008) ISO 15686: Buildings and Constructed Assets – part 5: Whole Life Costing. Geneva: ISO.
- The Norwegian Standards Association, (2000) NS 3454 Life Cycle Costs for Building and Engineering Work, Principles and Classification. Oslo: Standard Norge.
- Temeljotov, S A (2006) The quality of built environment and legislation. In: Černič, M B (Ed.), Housing in an expanding Europe: theory, policy, implementation and participation. Ljubljana: Urban Planning Institute of the Republic of Slovenia, Available from: <http://enhr2006-ljubljana.uirs.si/>.
- Temeljotov, S A, Jancar, J, Stritof, B M, Trpin, G. (2011) The development of the real estate investment fund for the purpose of regional development. Lex localis, 9, 265-281.
- Uršič, M (2005) Changing the quality of living and housing (residential) mobility in Ljubljana: Increase of social instability in larger housing estates. Urbani izziv, 16(2), 156-163.

A COMPARATIVE ANALYSIS OF PPP FINANCING MECHANISM FOR SOCIAL INFRASTRUCTURE

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Determining the most appropriate form of finance for Public Private Partnerships (PPP) is a difficult task for the public sector. This paper compares and contrasts the various forms of finance available for PPP projects. As a result of this comparative analysis it is proffered that during the procurement preparation process the characters of the social infrastructure projects need to be aligned to ensure that they lead to an appropriate PPP financing mechanism. Several PPP financing mechanism have been reviewed. It is suggested the review presented in this paper can assist the public sector to choose the appropriate PPP financing mechanism for their particular circumstances.

Keywords: Financing; Infrastructure; Investment; Public-Private Partnership.

INTRODUCTION

Developing economies in the Asia-Pacific region need adequate and reliable infrastructure to ensure that they can obtain sustainable growth and improve their competitiveness in international markets. With increasingly limited budgets and short-term fiscal constraints being imposed on governments, there is a need and demand for investment from the private sector to support economic development. Consequently, the public and private sectors have begun to form partnerships to fund economic and social infrastructure projects.

The process and justification for using PPPs for economic infrastructure is relatively straightforward as there is a bankable revenue stream, yet this is not necessarily the case for social infrastructure. Grimsey and Lewis (2004) have suggested that the economic infrastructure provides key intermediate services to business and industry and its principal function is to enhance productivity and innovation. Social infrastructure however is seen as a provider of basic services to households, with its main role to improve the quality of life and welfare in the community (Grimsey and Lewis 2004).

PUBLIC PRIVATE PARTNERSHIPS

A Public Private Partnership (PPP) is a long-term contractual arrangement between the public and private sectors for the delivery of public services. The main characteristics of PPP for infrastructure investment are (Grimsey and Lewis 2004):

- The construction of a new infrastructure asset (or the refurbishment of an existing one) to be designed, built and financed by the private sector to the procuring agency's services specification, within a particular deadline and to a fixed price;
- Long-term (25 to 35 years) contracts for the provision of infrastructure services associated with the asset; and
- Collection of revenue by operator or the payment by the public sector body to the private body of a fee or unitary charge, allowing the contractor to make a return on investment commensurate with the levels of risk assumed.

According to Delmon (2010) a PPP is a contractual agreement between a governmental entity (national, regional or local) and a private legal entity (generally, as service providers). The private sector will seek a secure revenue stream to ensure repayment of debt/ investment (and hence lower interest rates) and profitability over time. There are fundamentally two model sources of revenue for PPP schemes (Delmon 2010):

- Concession model: this is where users pay compensation for public services provided. This is normally referred to as a “Tariff” and relates to a revenue stream sourced from consumers; and
- Private Finance Initiative (PFI): This model is related to government compensation for public services provided. It is a “Fee” related to a revenue stream originating from one offtaker/public entity. This structure provides the project company with simplified billing and collection, and assessment of credit risk.

In addition to the forgoing Yong (2010) suggests there are performance-based payments where Governments can provide financial support to PPP projects in the form of shadow tolls or guarantees for a minimum level of revenue. These are usually linked to the performance of the project, but may also be provided directly in the PPP contract (Yong 2010).

MEASURES IN FINANCE MECHANISM OF PPP PROJECTS

There are various measures that can be used by the Public Authority to determine the economic viability of a project. The measures include (Yescombe 2007):

- Value for money (VfM) which identifies the benefits and costs of the project, including its indirect effects. In preparing a cost-benefit analysis, a key element is determining the discount rate to be applied to future benefits and costs so as to calculate the economic return of the project;
- Affordability, which is the ability of the project to secure the return of investment, whether it can actually afford to pay the Service Fees (in the PFI Model), or the Public Authority will probably have a set budget for the project (in the Concession Model). The Facility has to be affordable for users, and
- Balance-sheet treatment.

The Public Sector Comparator (PSC) is the most common tool used by the public sector to determine the cost to construct an asset through public funding, which is compared with the cost to build it as a PPP (Yescombe 2007). The reasons for variation in financing practices adopted by governments are numerous which include (Chan et al. 2009):

- Infrastructure characteristics that affect the user profiles and revenue-raising capacities of particular assets;
- Fiscal and macroeconomic conditions that can restrict the use of particular financing vehicles due to their budgetary consequences;
- Institutional arrangements that define the legal and regulatory framework as well as the intergovernmental relationship within which public infrastructure assets are operated and financed; and
- Perceptions of the role and ability of government which underlie voters’ expectations for the involvement of government in delivering specific services and manage the economy.

TYPE OF INFRASTRUCTURE FINANCING FOR FINANCIAL MODELLING

There are inherent differences between the economic functions of ‘investment funding’ and ‘financing’. Investment pertains to the allocation of economic resources, whereas financing relates to raising and allocating ‘monies’ or ‘finances’. This distinction has significant implications for policy issues relevant to the efficient provision of public infrastructure (Chan et al. 2009).

Chan *et al.* (2009) also considers financing to be a vehicle to raise the cash component to meet payments for construction and, in some situations the operation, of an infrastructure project. It can influence the funding gap through the incentives it generates for user charges, the restraints it imposes on risk management, and the costs of financing which form part of the lifetime project cost. Financing vehicles may differ in (Chan et al. 2009):

- *Risk management* - the assignment of non-diversifiable project risks and management of the overall project risk;
- *Transaction costs* -the cost of arranging and managing finance, and costs associated with delay or uncertainties with availability of finance; and
- *Exposure to market or other disciplines* -the extent to which borrowers and lenders share, signal and can act on information on project prospects and risks in the investment decision.

There are several types of infrastructure financing available for PPP projects. However before selecting a particular model, it is important to initially understand the funding mechanism for each type of infrastructure financing, as well as their constraints.

PROJECT FINANCE

According to Nevitt and Fabozzi (2000) project finance is defined as a particular economic unit in which a lender examines the cash flow and earnings of an economic unit. This will be the source of funds from which a loan will be repaid. The assets of the economic unit is collateral for the loan (Nevitt and Fabozzi 2000). For this form of finance the lender relies on the project’s ability to cover interest and debt repayment, operating costs, and return on equity (i.e. yield). It is necessary to conduct extensive due diligence in advance of financing the project. Thus, the evaluation of the project is based upon the expected future cash flows that influence the financing decision and the interest terms established by the lender. Essentially, the lender is a partner in the project and therefore takes substantial risks. This includes the insolvency risk of the private Special Purpose Vehicle (SPV). To estimate the risk-related financing costs, the lender conducts due diligence checks of the project’s technical and economic viability. Furthermore, controlling measures are installed during the negotiation process and establish the contract period. Moreover, with the substantial risk transfer, the interest margin of the lender is higher in project finance. Hence, in this context, the lender’s risk-related financing costs are higher (Daube, Vollrath, and Alfen 2007).

PRIVATE FINANCE INITIATIVE (PFI)

The PFI is a form of public private partnership (PPP) that marries a traditional public procurement programme. The public sector purchases capital items from the private sector, to an extension of contracting-out, and the public services are contracted to the private sector (Allen 2001). Referring to Ball (2002) in Dixon (2005) under a PFI, private sector organisations borrow funds to build infrastructure, and then operate and manage it on behalf of the public sector. The private sector organisation may also provide services in conjunction with the infrastructure (Dixon, Pottinger, and Jordan 2005)

PFI entails transferring the risks associated with public service projects to the private sector in part or in full. Where a private sector contractor is judged best able to deal with risk, such as those related to construction, then these responsibilities should be transferred to the private sector contractor. Where the private sector is deemed less able to manage the project's risks, such as demand (i.e. usage of an asset), then at least some of the responsibility must remain within the public sector. The most common form of PFI, the private sector has tended to adopt is the design, build, finance and operate (DBFO) model based on 'output' specifications determined by the public sector. The availability based payment mechanism is the most common form of PFI-based projects in the UK, being extensively used for hospitals or schools (Akintoye and Chinyio 2006; Chan et al. 2009; Chan et al. 2011; Yong 2010).

FORFEITING MODEL (FM)

The Forfeiting Model (FM) is a specific arrangement that the private contractor sells claims for payments that result from the construction contract with the public sector to the lender

(Daube, Vollrath, and Alfen 2007). Forfeiting implies the sale of claims for payment. The term has been established in export financing, but is currently used for a special form of funding for a PPP project.

When resorting to a Forfeiting Model, the financing costs associated in the FM are considerable lower than those in Project Finance. This is due to the levels of risk transfer to the private contractor and the declaration of a waiver of objection by the public principal. In Forfeiting model due diligence or controlling measures are not made by the lender (Daube, Vollrath, and Alfen 2007). As a result, the transaction costs remain on a relatively lower level. Furthermore, the Forfeiting Model is based on the creditworthiness of the highly rated public principal.

CREDIT GUARANTEE FINANCING (CGF)

Credit Guarantee Financing (CGF) was introduced into the United Kingdom (UK) in 2003 to provide a mechanism for using public debt capital to finance PPP projects. The nucleus of the transaction is the guarantee furnished by the consortium's bankers or a credit enhancement agency (i.e. monoline insurer) to the state as security for a senior debt facility provided by the UK Treasury. The objective of CGF is to reduce the consortium's cost of capital and thereby improve the long-run and overall VfM outcomes for the state (Regan, Smith, and Love 2011b).

To lower the cost of debt capital, the SPV will ensure the project is assessed by a credit rating agency (the underlying rating) with a view to obtaining credit enhancement (credit risk insurance) from a monoline agency. For a fee, the SPV will secure a guarantee of its financial obligations from an AAA credit rated monoline insurer, which lowers borrowing costs. The objective of CGF is to reduce the consortium's cost of capital and thereby improve the long-run and overall VfM outcome for the public sector. This arrangement is a departure from traditional project finance principles whereby senior debt is secured by option to the underlying project assets (Regan, Smith, and Love 2011b). CGF is full recourse debt and this does affect the traditional incentive mechanisms that are a feature of conventional project and PPP finance (Regan 2009a).

SUPPORTED DEBT MODEL

The Queensland Government in Australia in 2008 introduced a pilot program for PPPs in the education sector. They used a hybrid variation of the CGF, which is referred to as a Supported Debt Model (SDM). The SDM is calculated against a notional risk-free minimum value for the project which the state can make debt capital available to the project at cost (Regan, Smith, and Love 2011a). The SDM has several distinguishing characteristics which include (Regan 2009b):

- The SPV arranges private construction finance;

- When the asset is commissioned, the state provides a long-term finance facility to repay construction finance;
- The level of state debt employed is calculated using a formula that equates to a minimum asset value (or recoverable amount) in the event of consortium default. This may be expressed as a percentage of on-completion value. The state assumes the role of limited recourse lender although the arrangement does not rule out a requirement for full and partial guarantees;
- The state holds the senior debt position. The SPV will raise additional subordinated debt and equity capital from private sources. The SDM preserves traditional ex ante incentives and does not require credit enhancement or supporting private guarantees; and
- The lower cost of state debt reduces the cost of capital for the SPV, which should be reflected in an improved VfM outcome for the state.

Advantages and disadvantages from a preliminary assessment of experiences of the Queensland Government with SEM suggested (McKenzie 2008):

- Despite negative coverage reported in the Australian Financial Review, the market sounding phase of the schools project attracted the interest of a large field of potential financiers; and
- The estimated proportion of the projects total financing requirement expected to be risk free in the operational phase of schools project was estimated to be 70%, which represents the portion refinanced as senior debt by the Queensland Treasury Corporation. The remaining capital is expected to consist of 22.5% mezzanine finance and 7.5% equity (DIP 2008). Savings are expected to accrue from the application of this capital structure compared to the typical 100% privately financed model, provided the cost of mezzanine finance is below a 'break-even' benchmark.

STATE GUARANTEE OF PRIVATE DEBT

An alternative form of state support for PPP projects not widely used is the use of state guarantees to support privately sourced project finance in adverse capital market conditions. Debt guarantees, unlike the CGF and SDM approaches, are a contingent liability of government for borrowing limit purposes (Regan, Smith, and Love 2011b). A state guarantee can be viewed as a trade-off in project and service delivery risks. Conventional PPPs transfer most project risks to the SP. In this case the public sector body may initially adopt a Design-Build (DB) contract and engage a private sector firm or SPV to design and build a facility in accordance with requirements determined by the government, after the facility is completed and paid for, the government assumes responsibility for operating and maintaining the facility. It may then use a service or management contract to outsource all or part of operations and maintenance. The state may retain full or part responsibility for site conditions and residual demand or political risk, which principally concerns service delivery failure. Under a state guarantee arrangement, it assumes a contingent liability for the SPV's default. Under conventional procurement, subject to specific risk transferred to contractors, the state carries ultimate responsibility for infrastructure service delivery and the multiplicity of risks that this involves.

The benefit of state allocation of risk to the SPV is improved VfM. The guarantee risk will need to be measured, priced and valued and incorporated into the PSC. If the VfM result is positive, the decision to proceed with a PPP is justified (Regan, Smith, and Love 2011b). Debt guarantees in the form of a present obligation that may, require a payment in the future are accounted for as a contingent liability and noted in the financial reports of government agencies. Where the present obligation "probably requires" a future payment by the state, the guarantee is recognised as a provision and disclosed as such in the agency's financial reports (Regan, Smith, and Love 2011b).

STATE AND MUNICIPAL BONDS

Many central, provincial and local governments raise private capital for infrastructure development by issuing bonds. In many cases, the bonds are issued by the regional authority seeking to raise the capital, the interest payable on the bonds offers some form of tax exemption and the obligations of the issuing authority are fully or partially supported by central or provincial government guarantee. Developed economies with established capital markets trade infrastructure bonds in competition with traditional public and private bond issues. In developing economies, small or inefficient capital markets, unstable exchange rates, high rates of interest and sub-investment grade sovereign credit ratings limit the opportunities for this source of capital (Regan 2009b).

RAISING EQUITY CAPITAL THROUGH IPOS, SPECIFIC-PURPOSE BONDS

Specific-purpose securitised borrowing refers to the issuance of debt instruments such as bonds, debentures and inscribed stocks for the purpose of financing specific infrastructure by the public sector (PIF na). These borrowings are usually secured on the asset, or against the revenue stream arising from the asset. Debts incurred through these bonds are usually repaid from income generated from the investments or government grants and funds.

RELATED FISCAL POLICY

The implications of PPPs for the government budget are pervasive. The specific public sector costs that have a bearing on current and future budgets (Posner, Ryu, and Tkaxhenko 2009) include:

- Annual payments for the life of PPP projects;
- Capital contributions to establish PPPs;
- Revenue losses from forgoing user fees;
- Contingent liabilities such as guarantees and
- Tax expenditures such as accelerated depreciation taken for private investment.

In addition to government budgetary payments, some countries provide more indirect forms of subsidies for PPPs and concessions. Guarantees and other forms of payment are often triggered when projects fall below certain financial thresholds, constituting a contingent liability. In most countries, budget and accounting rules do not require appropriations for these contingent claims.

COMPARISON ANALYSIS

Table 1 is the comparative analysis for key factors of PPP financing; the key factors to support the financing that have been indicated are: source of financing; return or payment methods; and the character of the PPP projects. As the result of this comparative analysis the characters of the social infrastructure projects need to be aligned that will lead to appropriate PPP financing mechanism.

Table 1: Comparison of PPP financing mechanism

Type of Financing	Source of financing/ investment	Return/ payment	Character of projects
Conventional Procurement	Public budget	Progress work or turn key	Any PSO infrastructure
Project Finance	Capital from equity SPV Construction costs and other from lender loan under project collateral	User charges in concession period	High profit projects High Return, high IRR, high NPV Profit Oriented Bankable (Project as Collateral) The lender is involved as a risk partner and therefore takes substantial risks High Effort in Due Diligence
PFI	Capital from equity SPV Construction costs and other from bank loan under SPV loan	Annual payment from government or availability-based payment in concession period	Less profit project Moderate Return, moderate IRR, moderate NPV Private Sector take Risk (ex. Construction risk) Private sector is deemed less able to manage the project's risks
Forfeiting Financing	Capital from equity SPV Construction costs and other from bank loan under SPV loan	Private contractor sells claims for payments, bank paid by Government	Less investment projects High Moderate Return, moderate IRR, moderate NPV The transaction costs remain on a relatively lower level Bankable (?) Due Diligence or controlling measures are not made by the bank
CGF	Capital from SPV with mezzanine loan Construction costs and other from bank loan and government provide senior debt with lower rate and it will be paid only after 70% commissioning to increase VfM	Senior debt agreement from the government	Less investment projects High Moderate Return, moderate IRR, moderate NPV The transaction costs remain on a relatively lower level Bankable (?) Due Diligence or controlling measures by rating agency
SDM	Capital from equity SPV or mezzanine loan Construction costs and other from bank loan and government provide senior debt with lower rate and it will be paid only after 70% commissioning to increase VfM	Senior debt agreement from the government	Less investment projects High Moderate Return, moderate IRR, moderate NPV The transaction costs remain on a relatively lower level Bankable (?) Due Diligence or controlling measures are by rating agency
State Guarantee	Capital from SPV Construction costs and other from bank loan under SPV loan,	Under a state guarantee arrangement, the state assumes a contingent	Moderate Return, moderate IRR, moderate NPV

	government provide state guarantee (contingent liability) for residual demand or political risk	liability for the SPV's default under either agreement.	Private and Public share Risk Calculated Risks
Municipal / Specific Purposed Bonds	Government issued municipal bonds or specific purpose bonds to finance specific/ certain infrastructure	Projects income and the interest payable on the bonds offers some form of tax	High Return, high IRR, high NPV Profit Oriented Calculated Value of Shares to offer to public/ capital markets
Other Fiscal Policy	Subsidy for equity and capital Senior debt funding, direct public-sector lending with private-sector bank or insurance-company guarantees	Availability based payment and/or performance based payment Annual payments for the life of PPP projects. Capital contributions to establish PPPs. Revenue losses from forgoing user fees. Contingent liabilities such as guarantees. Tax expenditures such as accelerated depreciation taken for private investment.	Project for-profit
Donor Funding, International Financing Institutions (IFIS)	Using international financing institutions	Availability based payment and/or performance based payment	Project for-profit Project not-for-profit

A PPP Contract integrates finance with construction and operation of the facility and also a post-construction take-up (or assumption of risk). As the highest-risk phase for a PPP is during construction, the construction finance arrangement needs to be planned very well. The most common method to reduce construction risk by the SPV is with the project risks transferred to subcontractors. Transfer of risk to the subcontractor with turn-key based payment can be implemented to all methods of PPP financing mechanisms.

Financial risk will also need to be considered, these are the main pre-Financial Close costs, for example, the Sponsors' own staff costs and those of external advisers, including lenders' advisers. There is often a time gap between when the total CAPEX (Capital Expenditure) budget is agreed with the lenders and Financial Close, and during that time there is a risk that legal and similar costs which are not fixed may mount up more than budgeted. Commonly it will be treated as part of the initial equity investment. Negotiations will arrange these development costs as reimbursement to the Sponsors at Financial Close, but if they are above budget by that time, lenders may require reimbursement of the excess to be deferred until the end of the construction period, at which time reimbursement may be allowed if sufficient funds are then available.

Using public-sector funding for the SPV may impose debt to the government as a way of reducing the SPV's capital-cost disadvantages, while leaving the rest of the standard PPP structure in place. The benefit from this is limited if any financing risks are retained in the private sector. The CGF and SDM apply public debt of the construction cost in a different way. The SPV arranges private construction finance. When the asset is commissioned, the state provides a long-term finance facility to repay construction finance. Another method is a Joint-Venture PPP where the public authority becomes an equity shareholder, the idea of this being to ensure that the public sector shares in equity returns and any funding windfalls. However this is liable to lead to a conflict of interest which may not be in the public authority's best interests.

There are two revenue streams that are commonly generated from PPP projects. One revenue stream user charges based payment and the other is availability based payment. There are natural caps on the level of revenue stream which can be fed into the financial structure at the time of bidding, insofar as the SPV's revenues are derived:

- In the case of a Concession, projected demand and 'willingness to pay' will determine the levels of usage and the rates to be charged for tolls etc.
- In the case of a PFI-Model project, the Public Authority's VfM and Affordability requirements have to be taken into account.

CONCLUSIONS

PPP financing mechanisms are required by governments to continue on their path towards financial sustainability. Governments must make best use of available funding. This does not only mean optimizing income from rates and fees; it requires innovative procurement models, coordination at a regional level, alternative ownership structures for network assets and responsible borrowing within the financing mechanism.

Governments should therefore investigate a demonstration project for which a financial product can be developed and marketed to private investors. Furthermore governments should also create sustainable revenue streams that provide a direct link between those who benefit from new investments and those who pay for them.

Inadequate investment in infrastructure leads to: constrained economic activity; lower productivity and competitiveness; reduced amenity for users; and declining social equity. To support economic development, the implementation of PPP to develop infrastructure will be continually used. The problem of implementing PPP in social infrastructure projects is to find the most efficient methods or types of financing to increase the VfM in order to attract private entities to participate.

Identification of the finance methods available for use in PPP projects with appropriate PPP financing mechanisms has been summarized above. The aim of this paper was to compare the differences of the various forms of finance available including Project Finance, Private Finance Initiative, Forfeiting Finance, Credit Guarantee Finance, Obligations and Bonds. Each of the financing mechanisms has indicated suitability for certain types of PPP projects. It can be concluded that infrastructure projects which have sustained income streams would be better using the project finance mechanism and specific purpose bond financing. For projects which need support capital from governments, it would be better using the forfeiting model and the PFI model. CGF and SDM model are financing methods that are more complicated because it will need a rating agency for the SPV to get a guarantee of senior debt arrangement from the government. State guarantee is a financing method for infrastructure projects where risk is more predictable and could be budgeting in fiscal contingent fund.

This research will continue to be developed by examining financial models for particular types of PPP financing mechanisms in order to determine the most appropriate financing methods for social projects.

REFERENCES

- Akintoye, Akintola, and Ezekiel Chinyio. 2006. "Private Finance Initiative in the Healthcare Sector: Trends and Risk Assessment." *Emerald Engineering, Construction and Architectural Management* 12 (6): 601-616. doi: 10.1108/09699980510634155.
- Allen, Grahame. 2001. *The Private Finance Initiative (Pfi)*.

- Chan, Albert P.C, Patrick T.I. Lam, Daniel W.M. Chan, Esther Cheung, and Yongjian Ke. 2009. "Drivers for Adopting Public Private Partnerships—Empirical Comparison between China and Hong Kong Special Administrative Region." *Journal of Construction Engineering and Management* (c) ASCE: 1115-1124. doi: 10.1061/ASCECO.1943-7862.0000088.
- Chan, Albert P.C., John F.Y. Yeung, Calvin C.P. Yu, Shou Qing Wang, and Yongjian Ke. 2011. "Empirical Study of Risk Assessment and Allocation of Public-Private Partnership Projects in China." *Journal of Management in Engineering* 27: 136-148. doi: 10.1061/(ASCE)ME.1943-5479.0000049.
- Daube, Dirk, Susann Vollrath, and Hans Wilhelm Alfen. 2007. "A Comparison of Project Finance and the Forfeiting Model as Financing Forms for Ppp Projects in Germany." *International Journal of Project Management*. doi: 10.1016/j.ijproman.2007.07.001.
- Delmon, Jeffrey. 2010. Understanding Options for Public-Private Partnerships in Infrastructure: Sorting out the Forest from the Trees: Bot, Dbfo, Dcmf, Concession, Lease ...
- DIP, Queensland. 2008. Supported Debt Model – Sdm Versus Ppp, Powerpoint Presentation, Queensland Department of Infrastructure and Planning (DIP),
- Dixon, Timothy, Gaye Pottinger, and Alan Jordan. 2005. "Lessons from the Private Finance Initiative in the Uk." *Emerald Journal of Financial Management of Property and Construction* 23 (5): 412-423. doi: 10.1108/14635780616016.
- Grimsey, Darrin, and Mervyn Lewis. 2004. Public Private Partnership: The Worldwide Revolution in Infrastructure Provision and Project Finance. Cheltenham.
- McKenzie, Richard. 2008. "Strategies to Improve Value for Money in Financing Public Private Partnerships." *Public Infrastructure Bulletin* 1 (7): Article 2.
- Nevitt, P.K., and F.J. Fabozzi. 2000. *Project Finance*. London.
- PIF. na. "Chapter 5: Specific-Purpose Securitised Borrowing." In *Specific-Purpose Securitised Borrowing*. Public Infrastructure Financing (PIF).
- Posner, Paul, Shin Kue Ryu, and Ann Tkaxhenko. 2009. "Public-Private Partnerships: The Relevance of Budgeting." *OECD Journal on Budgeting* 2009/1.
- Regan, Michael. 2009a. A Survey of Alternative Financing Mechanisms for Public Private Partnerships. Bond University.
- Regan, Michael, Jim Smith, and Peter Love. 2011a. "Infrastructure Procurement: Learning from Private-Public Partnership Experiences 'Down Under'." *Environment and Planning C: Government and Policy* 29: 363-378. doi: 10.1068/c10122b.
- Regan, Michael, Jim Smith, and Peter E.D. Love. 2011b. "Impact of the Capital Market Collapse on Public-Private Partnership Infrastructure Projects." *Journal of Construction Engineering and Management*. doi: 10.1061/(ASCE)CO.1943-7862.0000245.
- Yescombe, E.R. 2007. Public-Private Partnerships Principles of Policy and Finance. Great Britain: Elsevier Ltd.
- Yong, H.K. 2010. *Public-Private Partnerships Policy and Practice*. United Kingdom: Commonwealth Secretariat.

JVS AND PARTNERSHIPS: TOWARDS ORGANISING FOR VIABLE INFRASTRUCTURE DELIVERY IN DEVELOPING COUNTRIES

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The need for improved infrastructure stock in developing countries has been highlighted, severally, in previous research. This need is premised on the on-going debate over the relationship between infrastructure capital and economic development especially as it concerns improved productivity, competitiveness and better living standards for the citizens of a given country. The infrastructure delivery process has also been recognized as contributing immensely to the growth of the local economy through the provision of employment, skills and increased productivity. There has been a clamour for increased collaboration between the private and public sector for the procurement of the desired infrastructure capital in the past couple of decades. This advocacy has given rise to the advent of Joint Ventures and Partnerships between both parties. Developing countries have joined the race to bridge their infrastructure deficit by adopting these partnership routes. Numerous infrastructure projects are presently on-going in developing countries whilst some have been completed. Despite the fact that respective governments, globally, have sought to utilize the investments made in the delivery of these projects to create socio-economic benefits for their respective societies through employment and skills acquisition exercises, the unemployment rates in such climes have continued to rise. In view of this, this paper seeks to establish if these PPP projects, as presently constituted, possessed the capability of driving the attainment of these socio-economic benefits. Adopting a viable systems theoretical lens, this paper understudies two infrastructure project case studies from a knowledge management and exchange prism. A series of interviews were conducted and a review of contract documents was also carried out. Based on preliminary findings, partnerships possess the capabilities of driving effective knowledge management activities within large infrastructure projects in developing countries. Their ability to do so is dependent on an identification of the main components of a viable system and a strict adherence to maintaining them throughout the lifecycle of the project.

Keywords: Infrastructure, Partnerships, Joint Ventures, Viable Systems Model, Public-Private Partnerships

INTRODUCTION

Investments in infrastructure assets have been linked with economic growth (Estache, 2004, Prud'Homme, 2005, Schubeler, 1996, Baldwin and Dixon, 2009, Aschauer, 1989). This has led to an ever increasing clamour for an improvement in the level of infrastructure stock available to developing economies (UNIDO, 2010, Aschauer, 1989, Akinyosoye, 2010). Bridging this deficit has become an issue which has attracted global attention, thus culminating into the identification of the need for the provision of quality infrastructure as part of the Millennium Development Goals (MDGs) by the United Nations (Adetola et al., 2011). The process of delivering infrastructure and other public services through public procurement has also been recognized as been capable of contributing immensely to the growth of the local economy through the provision of employment and increased productivity (Awuzie and McDermott, 2012, Hawkins and Wells, 2006, Arrowsmith, 2002). Unfortunately, this has not been the case in the developing climes as they are being plagued by the lack of critical infrastructure and increasing unemployment thus leading to low productivity. This has succeeded in having a crippling effect on most of these economies, leading to years and even decades of continuous economic redundancy.

There has been a clamour for increased collaboration between the private and public sector for the procurement of infrastructure, globally (Adetola et al., 2011, Akampurira et al., 2009, Brinkerhoff and Brinkerhoff, 2011). Several developed countries have adopted this organisational mode of delivering their infrastructure despite mixed feelings evident within a wider spectrum of the society and scholars, on its effectiveness as a project delivery vehicle. The merits and the demerits of the PPP arrangement have been severely debated and this paper avoids a rehash. However, there appears to be a consensus that the PPP arrangement remains a better option for infrastructure delivery (Brinkerhoff and Brinkerhoff, 2011, Gidado, 2010, Grimsey and Lewis, 2005, Klijn et al., 2007, Bovaird, 2004).

The term '*infrastructure*' has continually defied a broadly accepted definition within literature (Snieska and Simkunaite, 2009, Harris, 2003, Baldwin and Dixon, 2009, Prud'Homme, 2005). These authors insist that rather than define the term infrastructure, an attempt at identifying what constitutes infrastructure would be apposite. Others have gone ahead to attempt a classification of infrastructure according to its features (Kwak et al., 2009, Howes and Robinson, 2005). For the sake of this paper, the term infrastructure shall be used to connote only economic infrastructure, which can be defined as any physical improvement or structure capable of increasing the levels of productivity of any given society and encouraging better living conditions among its citizenry (Aschauer, 1989, Howes and Robinson, 2005, Baldwin and Dixon, 2009, Akinyosoye, 2010). This definition highlights the significance of infrastructure within any given economy.

Various researchers have argued that the huge expenditure in infrastructure delivery should be able to directly impact on the host environment, boosting as it were the local economy of such locality (Hawkins and Wells, 2006, Arrowsmith, 2002, McCrudden, 2004). This proposition has become a major driver for the development of new infrastructure especially in view of the current adverse economic conditions. The public sector has become more careful in project selection towards ensuring that all expenditure made in procuring public goods, such as infrastructure and other ancillary services, would reverberate within the locality, and with the impact of such spend enabling and empowering the citizens and residents with skills, jobs and other inherent socio-economic benefits. Presently, in the United Kingdom, there is an increasing drive to deliver socio-economic benefits with every infrastructure spend (IUK, 2010).

Whilst the need to collaborate to deliver projects of such magnitude as infrastructure projects and taking into cognisance the Critical Success Factors for PPPs as espoused by Babatunde et al. (2012) and Li et al. (2005) is understood in this research, this study proposes that for a PPP infrastructure delivery process to deliver these socio-economic benefits alongside other project deliverables, it should possess the features of a viable system. To achieve viability, the delivery system should be able to effectively manage knowledge creation and exchange (Wiig, 1997). Gidado (2010) posits that effective knowledge management among other factors remains one of the crucial interdependent enablers for implementing PFI/PPP in Nigeria, a developing economy. The broad acceptance of the positive impact of effective knowledge management on the level of competitive advantage which a particular organisation/society has over others (Laihonen, 2006, Lawson et al., 2009, Argote et al., 2003, Von Krogh and Roos, 1996, Lang, 2001, Wiig, 1993) has made management of knowledge flows imperative within PPP infrastructure delivery systems. Knowledge as used in this study is dependent on the views espoused by Gupta and Govindarajan (2000). They define knowledge flows as involving the transfer of the required know-how usually in the form of expertise between organisations and not operational knowledge. Although this study does not delve into the world of knowledge management and knowledge flows given the vast amount of literature on the subject, see (Laihonen, 2006, Lang, 2001, Gupta and Govindarajan, 2000), it is imperative that the significant nature of knowledge flows within and outside organisations be buttressed especially as it affects adaptability (viability) of the organisation. According to Laihonen (2006) effective knowledge flows and the management of these flows can offer valuable insights for improving an organisation's adaptability.

In line with this proposition, we then seek to understudy these collaborative arrangements between the public and private sector, on particular projects, with the intention of ascertaining whether they have been organised in such a manner that they would remain viable throughout the course of their lifecycle and if not, to provide guidance as to how to attain such viability. It is

hoped that this paper provokes a discourse on how projects of such magnitude are organised and managed towards achieving effective knowledge creation and exchange with the aid of the viable systems methodology. Based upon the foregoing, this study shall proceed to discuss the following concepts in subsequent sections: viability; Joint Ventures (JVs) and Partnerships; and a case for PPPs as an integral part of JVs and Partnerships. A discussion of the research methodology adopted would ensue, closely followed by the research's preliminary findings. These findings would be discussed summarily before concluding.

JVS AND PARTNERSHIPS-TOWARDS ENHANCED COLLABORATION IN PROJECT DELIVERY SYSTEMS

Infrastructure delivery systems are complex systems which draw together, under diverse contractual arrangements, various partners, diverse interests, values, cultures, and modes of rationality (Van Marrewijk et al., 2008). The fragmented nature of the delivery system has led to increased clamour for collaborative working among various parties, the development of trust and a common project culture within the project environment. Van Marrewijk et al. (2008) posit that the manner in which such projects are designed and organised as well as the politics of decision making among partners were responsible for the dismal performance of such projects. This statement thus informs the stand taken in this study as it concerns the need to diagnose the current modes of organisation available to procuring authorities under the PPP regime. This diagnosis becomes necessary to ascertain their ability to deliver on critical socio-economic outcomes such as skills development and acquisition within the local communities. It is hoped that such collaboration as evident in JVs and partnerships would give rise to effective management of knowledge flows and subsequent transfer between members of the system.

A theory of joint ventures as a medium for improving organisational learning is proposed by Kogut (1988). He posits that the JV can be used to transfer organisationally embedded knowledge which cannot be easily transferred through market transactions. Furthermore, Kogut adds that the market is replaced by a JV due to need to replicate pragmatic knowledge which is not well understood. For transactions, such as the delivery of infrastructure, which are the product of complex organizational routines, the transfer of know-how can be severely impaired unless the organization is itself replicated. Firms adopting this organisational mode tend to either seek new knowledge or to retain their inherent capabilities.

Another concept which seeks to foster collaborative working practices within project delivery systems is the partnership concept. According to Brinkerhoff (2002b), partnership can be defined as constituting of a relationship between several parties which is premised on a set of mutually agreed upon objectives. This set of objectives are then pursued through a shared understanding on a very rational task designation arrangement taking full cognisance of the respective comparative advantages of each of the parties to such an agreement. Key features of robust partnerships were identified as including: mutual influence; balance between synergy and individual autonomy; incorporation of mutual respect; equal participation in decision-making; mutual accountability and transparency (Brinkerhoff, 2002b).

Whilst Brinkerhoff (2002a) states that the need to access resources required to accomplish a particular task, but lacking within a given party's domain, is a major driver for engaging in partnerships of diverse nature, Googins and Rochlin (2002) assert that four trends have contributed to the rise of partnership. These trends include: the failure of communism and state economies; the rise of global capitalism; the decreased role of government; and weakened status of the civil sector. Googins and Rochlin (2002) and Brinkerhoff (2002a) agree that partnerships have become the new approach to mediate the changing roles and the perceived responsibilities of what are commonly referred to as the three primary institutional sectors of the society: government; business and the civil society. Brinkerhoff (2002a) insists that for partnerships to be successful and accomplish the tasks for which they were created, the internal and external perceptions of what the identity of such partnership actually is should be properly managed. These concepts have laid the foundation for the evolution of the PPP mode of project delivery.

PUBLIC-PRIVATE PARTNERSHIPS AS INTEGRATIVE FRAMEWORKS OF JV'S AND PARTNERSHIPS

Several rationales for the adoption of the PPP arrangement in the delivery of infrastructure in various climes have been highlighted (Akintoye et al., 2003, Hodge and Greve, 2007, Grimsey and Lewis, 2005). Suffice to say that this paper would neither concern itself with definitions of the PPP; its respective typologies nor with the debate as to whether PPPs were mere language games or governance modes (Hodge and Greve, 2007, Hodge and Greve, 2009, Hodge and Greve, 2010, Bovaird, 2004, Klijn et al., 2007, Li et al., 2005, Akintoye et al., 2003). Having dealt with the underpinning foundations for the adoption of PPPs in the previous section, this paper takes a look at the ability of these PPP arrangements, to accomplish the tasks for which they were commissioned and deliver socio-economic value to the host environment.

PPPs have been advocated as being the best recipe for the delivery of sustainable infrastructure globally, particularly in the developing economies. Developing countries like Nigeria have indulged in the use of PPP mechanisms (JVs) in critical areas such as the oil and gas industry since the 1950s. This was intended to assist the transfer (exchange) of know-how between the parties and to encourage local participation in this sector. Unfortunately, after five decades of continued exploration and development of infrastructure by these JVs in the upstream and midstream sectors of the industry, the local communities have not benefitted from the requisite skills. This singular factor has contributed to the high unemployment rate in the country and prevalence of abandoned and failed infrastructure in other sectors of the country's economy (Iwayemi, 2008, Okonjo-Iweala and Osafo-Kwaako, 2007, Foster and Pushak, 2011).

This is not peculiar to Nigeria alone as it affects a majority of other developing countries particularly in Africa where the absence of the required skills and resources have led to poor infrastructure stock and gaping infrastructure deficits (Harris, 2003, Estache and Limi, 2008). Arguably, this should not ordinarily be the case given that such collaborative relationships are intended to support transfer of organisationally embedded knowledge (Kogut, 1988) and to maximise individual as well as joint comparative advantages among participants. Brinkerhoff (2002b) asserts that these partnerships have failed to live up to expectation due to factors emanating from hostile environments: presence or potential of partnership champions; existence, effectiveness, and efficiency of institutional linkages among partners; capacity, commitment, strong organisation identity, and compatibility of partner organisations; extent to which there is a ready demand for partnership products and services; homogeneity and degree of organisation among partnership stakeholders and constituents; degree to which legal frameworks are facilitative or inhibiting ; and stability of the partnership's internal and external environments.

This study proposes that these factors remained capable of undermining the effective management of knowledge flows within PPP arrangements, ultimately preventing the delivery of socio-economic benefits to the local economy. It then adopts the VSM theory as a theoretical lens to diagnose the current PPP processes in the developing and developed climes.

WHAT IS A VIABLE SYSTEM?

Whereas the Oxford Advanced Learner's dictionary defines the term viable as connoting the fact that something "*can be done; that will be successful*", the term as used in this paper is in sync with systems thinking literature (Beer, 1979, Hoverstadt, 2008, Schwaninger, 2006, Espejo, 2003). Therein, the term "*viable*" has been used to connote that particular characteristic of a given system to survive in a given environment notwithstanding the degree of adversity which the environment exerts on the system (Espejo, 2003). These systems do not only possess the ability to survive but also retain within themselves the capability to respond to any uncertainty resulting from its host environment capable of undermining its performance. Jackson (1988) states that for a particular system to attain viability status and remain so, it must possess the capability to respond to both foreseen and unforeseen changes within its environment even if those changes could not have been foreseen at the time during which the system was being designed. To become and remain viable, a system has to achieve requisite variety with the complex environment that it

faces. It must be able to respond appropriately to the various threats and opportunities presented by its environment and also plan ahead for anticipated changes within its external and internal environments. According to Beer (1979), viability remains a common goal-either long term or, in the case of temporary organisations, considerably long enough to accomplish its intended purposes.

Viable systems have been portrayed as possessing the same features as intelligent organisations /systems by Schwaninger (2001). These features include: *“the ability to adapt, i.e. to change as a function of external stimuli; to influence and shape their environment; if necessary, to find a new milieu, or to reconfigure themselves anew with their environment; and to make a significant contribution to the viability and development of the larger wholes in which they are embedded”*.

The concept of viability was propounded by Sir Stafford Beer (Beer 1979). Deriving from the law of requisite variety as put forward by Ron Ashby and the Conant-Ashby theorem, see (Schwaninger, 2012), he observes that for a system to remain viable and deliver its purposes whilst maintaining its identity within the ever changing world, it would need to consist of several integral layers all which must be available to make a viable whole. This led to the eventual development of the Viable Systems Model (VSM) by Sir Beer in the late sixties and early nineties (Leonard and Beer, 1994). The Viable System Model (VSM) is a system-based model which has been proven effective in diagnosing and re-designing organisations. This model has as its greatest leverage, its self-organising and recursivity features. Being self-organising refers to the ability of every subsystem within the whole to organise and manage itself whereas the principle of recursivity portrays every subsystem as being similar in structure to the whole. This allows for decentralization and effective flow of information within the system. The VSM theory thus posits that for a system to be viable, it must consist of five subsystems, usually labelled 1-5. These subsystems 5, 4, 3, 3*, 2 and 1 are named policy, development, delivery, coordination, audit/monitoring and operation subsystems respectively. These subsystems must be present in systems for such systems to be regarded as viable systems.

A description of these levels has been extensively treated by previous studies (Hoverstadt, 2008, Schwaninger and Ríos, 2008, Espejo and Gill, 1997). An attempt would be made in latter stages of this study. These subsystems on their own part must remain viable in themselves in order to contribute to the overall viability of the entire system. The VSM has become a major tool for diagnosing and designing organisations for effectiveness. In line with such diagnostic functions, Schwaninger and Ríos (2008) identify three major pathologies which might arise from either the absence of any of the viable subsystems or lack of proper positioning of these subsystems within the whole: structural; functional; and pathologies as it regards information flow within the system. Schwaninger (2001) describes the VSM as the most advanced theory for assessing the viability of an organisation in functional terms. It remains an excellent conceptual device for diagnosing and enhancing the viability of an organisation, independent of the steering criteria of the lower levels. The VSM has been extensively used in diagnosing and redesigning organisations in several areas (Brocklesby and Cummings, 1996, Devine, 2005). It has also been used for creating an effective framework for managing knowledge within organisations (Leonard, 2000).

METHODOLOGY

Based on the wide and generic applicability of the VSM in determining the viability or otherwise of any organisation (Schwaninger, 2006, Brocklesby and Cummings, 1996), this study proposes to adopt it as an effective methodology to conduct a diagnosis of existing cases of PPP oriented infrastructure delivery process in developing and developed countries respectively. It is hoped that this approach would enable a better understanding of the issues which have hindered the effective management of knowledge flows within the infrastructure delivery systems. The use of the case study strategy is hinged upon the abductive logic (Blaikie, 2009) of theory development upon which this research is premised. Having tested the applicability of the VSM to generic types of organisations and upon discovering that the theory and model can be applied to any organisation form in search of viability or survival, it then applies the VSM on the selected cases. According to

Blaikie (2009) the abductive logic is usually associated with the case studies as it seeks to provide answers to 'why' and 'how' questions.

The use of the case study strategy also allows for an empirical in-depth enquiry into a contemporary phenomenon-the Infrastructure Delivery System, within its real life context, addressing a situation in which the boundaries between phenomenon and context are not clearly evident (Yin, 2009). He adds that case study research approach constituted of an investigation into a 'technically distinctive' scenario wherein there would be more variables than the available data would be able to highlight. It becomes apposite to utilize the case study strategy as this study is not concerned with any other variables which might be responsible for the non-attainment of socio-economic goals which an infrastructure delivery system is expected to deliver.

Questions asked during the interviews were geared towards establishing the presence of the required subsystems necessary for the attainment of viability within the infrastructure delivery system. This is in line with this study's proposition that a project delivery system must be viable to be able to deliver value to stakeholders. Value, as it concerns this study concerns the transfer of know-how to the local supply chain. The presence of a locally sourced skilled supply chain would invariably lead to more sustainable projects on the long term as against the current situation where many infrastructural projects in developing countries become unsustainable due to the absence of local skills to manage them (Hawkins and Wells, 2006). The same exercise would be replicated with the developed nation case study. This study adopts a multiple case approach. It is intended that the adoption of multiple case study method would encourage and sustain enhanced theoretical replication across cases (Eisenhardt, 1989, Eisenhardt and Graebner, 2007, Amaratunga and Baldry, 2001). Yin (1994) in corroborating this view asserts that multiple-case studies were more capable of providing a stronger foundation for theory building than the single case study.

CASE STUDY AND PARTICIPANT SELECTION CRITERIA

Yin (2009) and Eisenhardt and Graebner (2007) collectively agree that the most important decision to be taken by a case study researcher should be that which is centred upon the selection of the cases to be used for the intended study. Any mistakes made in the selection of the cases would ultimately affect the validity of the study. This study seeks to employ the use of a multiple case study method so as to identify a pattern within the phenomenon being understudied.

Two infrastructure projects were selected for investigation into their degree of viability and how these impacts upon the knowledge management processes within these projects. The selected projects each situated within the context of a developed country and a developing country were viewed through a VSM and knowledge flow management perspective. The infrastructure projects were selected based on the following criteria: PPP projects; developed to boost government public procurement policy on socio-economic objectives; location-developed and developing countries; and that they were qualified to be labelled economic infrastructure. Principal parties to such projects were identified and interviewed. Interviewees ranged from; project managers, project engineers, and procurement lead advisors for the client (JV), local-indigenous- contractors and local community liaison officers or council officials as the case may be. These interviewees had an average of fourteen years of experience in the procurement and eventual delivery of oil and gas infrastructure in their respective countries and had partaken in projects of immense sizes during this period. Documents pertaining to the project objectives were also analysed. The adoption of the case study strategy makes it easier for this research to apply multiple data collection methods to conduct the investigation.

PRELIMINARY FINDINGS

Unfortunately, this paper would be presenting just a narrow stream of findings from the case study X. Preliminary evidence accruing from a series of interviews, five separate semi-structured interviews and a review of the contract documents point towards the fact that whereas there was a general consensus among the interviewees, consisting of two project managers, a community liaison officer for the project, two officials of the JV representing the collaborating organisations

involved in the JV respectively, that the manner of project organisation affected the capability of the delivery system to deliver on project objectives, a majority of the interviewees-three of them, remained oblivious of the overall socio-economic objectives which the project was meant to deliver. They were interested in the attainment of timely commissioning, completion according to the budget and to the required specifications. This could be traced to inability of the delivery system to understand and maintain its identity and to communicate same to different constituents of the system. This type of design deficiency has been categorised under structural and information system and communication channel pathologies, see (Ríos, 2010). It was also established that knowledge as managed within the project was not from the perspective of encouraging the transfer of know-how as described by Gupta and Govindarajan (2000) but rather for ensuring proper operations described as know-what them. This involved the showcasing of project schedules and other project information within the project site. This deficiency could also be classified as constituting a structural, functional, and information system and communication channel pathologies.

CONCLUSION

This research paper, a work in progress, sets out to diagnose the ability or otherwise of PPP procured infrastructure projects to deliver, alongside value for money to its public sector partners, socio-economic benefits to their host environments. Socio-economic benefits as it concerns this research have been described as involving skills acquisition and transfer of knowledge within and out with the delivery system, thus developing the local construction supply chain. To carry out this diagnosis, the paper relies solely on the VSM, a model of systems viability which has proven beyond doubts as possessing the capability for diagnosing organisations for viability sake and for re-designing organisations towards achieving viability. The concept of viability and viable systems was also discussed. Partnerships and JVs were extensively discussed and portrayed as the underlying principles guiding the evolution of PPPs. The VSM was applied in attempting a diagnosis of two case studies-infrastructure projects procured through the PPP regime situated in two different locations or extremes. Thus far, the VSM has assisted in the identification of certain pathologies which undermined the ability of the PPP procured project to deliver socio-economic objectives to the local communities. The rationale for using the VSM was mentioned as well the adoption of case studies and the abductive logic of theory building. Summarily, results of some preliminary findings which have been obtained at this stage have been put forward. Agreeably, these preliminary findings within the custody of the authors are not strong enough to lend support to the proposition that the manner of organising projects affects the ability of the project delivery system to deliver on its proposed objectives especially with regards to know-how transfer and exchange. Regrettably, it can be seen that the diagnosis of Project X is still on-going, especially as this informs part of an on-going PhD research. It is the intention of the authors to furnish full details of its findings in subsequent papers and the final thesis in the near future.

REFERENCES

- Adetola, A., Goulding, J. & Liyanage, C. 2011. Collaborative Engagement Approaches for Delivering Sustainable Infrastructure Projects in the AEC Sector: A Review. *International Journal of Construction Supply Chain Management*, 1, 1-24.
- Akampurira, E., Root, D. & Shakantu, W. 2009. Stakeholder perceptions in the factors constraining the development and implementation of public private partnerships in the Ugandan electricity sector. *Journal of Energy in Southern Africa*, 20, 3.
- Akintoye, A., Beck, M. & Hardcastle, C. 2003. Public-Private Partnerships: Managing Risks and Opportunities.
- Akinyosoye, M. 2010. Infrastructure Development in Nigeria: Road Map to Sustainable Development. *Greenhill Technical Services*, . Ontario.
- Amaratunga, D. & Baldry, D. 2001. Case Study Methodology as a means of Theory Building: Performance Measurement in Facilities Management Organizations. *Work Study*, 50, 11.

- Argote, L., Mcevily, B. & Reagans, R. 2003. Managing knowledge in organizations: An integrative framework and review of emerging themes. *Management Science*, 49, 571-582.
- Arrowsmith, S. 2002. Public procurement as an instrument of policy and the impact of market liberalisation. *International Library of Critical Writings in Economics*, 144, 445-494.
- Aschauer, D. A. 1989. Is Public Expenditure Productive ? *Journal of Monetary Economics*, 23, 24.
- Awuzie, B. O. & McDermott, P. 2012. Using a Systems Viability Approach to Investigate The Social And Economic Impact Of Energy Infrastructure Investments On Local Construction Supply Chain Development-A Case Of Nigeria's Niger Delta Region. In: Javernick-Will, A. & Mahalingam, A. (eds.) *Engineering Project Organisation Society Conference*. Rheden, Netherlands.
- Babatunde, S. O., Opawole, A. & Akinsiku, O. E. 2012. Critical success factors in public-private partnership (PPP) on infrastructure delivery in Nigeria. *Journal of facilities management*, 10, 212-225.
- Baldwin, J. & Dixon, J. 2009. Infrastructure Capital: What is it? Where is it? How Much of it is There? *Where is it*.
- Beer, S. 1979. *The Heart of Enterprise*, Chichester, Wiley.
- Blaikie, N. 2009. *Designing social research*, Polity.
- Bovaird, T. 2004. Public-private partnerships: from contested concepts to prevalent practice. *International Review of Administrative Sciences*, 70, 199-215.
- Brinkerhoff, D. W. & Brinkerhoff, J. 2011. Public-Private Partnerships: Perspectives on Purposes, Publicness, and Good Governance. *Public Administration and Development* 31, 13.
- Brinkerhoff, J. 2002a. Assessing and improving partnership relationships and outcomes: a proposed framework. *Evaluation and Program Planning* 25, 17.
- Brinkerhoff, J. M. 2002b. Partnership for International Development: Rhetoric Or Results?, Lynne Rienner Pub.
- Brocklesby, J. & Cummings, S. 1996. Designing a Viable Organization Structure. *Long Range Planning*, 29, 9.
- Devine, S. 2005. The viable systems model applied to a national system of innovation to inform policy development. *Systemic Practice and Action Research*, 18, 491-517.
- Eisenhardt, K. M. 1989. Building Theories from Case-study Research. *Academic Management Review*, 14, 19.
- Eisenhardt, K. M. & Graebner, M. E. 2007. Theory Building from Cases: opportunities and challenges. *Academy of Management Journal*, 50, 8.
- Espejo, R. 2003. The Viable System Model : A briefing about organisational structure. Available: <http://www.cybersyn.cl/imagenes/documentos/articulos/INTRODUCTION%20TO%20THE%20VARIABLE%20SYSTEM%20MODEL3.pdf> [Accessed 17th October 2011].
- Espejo, R. & Gill, A. 1997. The Viable System Model as a framework for understanding organizations. *Phrontis Limited & SYNCHO Limited*.
- Estache, A. 2004. Emerging Infrastructure Policy Issues in Developing Countries. *World Bank Policy Research Series*. Washington D.C: World Bank.
- Estache, A. & Limi, A. 2008. Procurement Efficiency for Infrastructure Development and Financial Needs Reassessed. *World Bank Policy Research Series*. Washington: World Bank.
- Foster, V. & Pushak, N. 2011. Nigeria's Infrastructure; A continental perspective. *Policy Research Working Paper*. Washington D.C: World Bank.

- Gidado, K. PFI Implementation and Evaluation Model For Developing Economies: Example Of Nigeria. Proceedings Of International Conference On Engineering, Project And Production Management, 2010.
- Googins, B. K. & Rochlin, S. A. 2002. Creating the Partnership Society: Understanding the Rhetoric and Reality of Cross-Sectoral Partnerships. *Business and Society Review*, 105, 127-144.
- Grimsey, D. & Lewis, M. K. Are Public Private Partnerships value for money?: Evaluating alternative approaches and comparing academic and practitioner views. Accounting forum, 2005. Elsevier, 345-378.
- Gupta, A. K. & Govindarajan, V. 2000. Knowledge flows within multinational corporations. *Strategic Management Journal*, 21, 473-496.
- Harris, C. 2003. Private participation in infrastructure in developing countries: trends, impacts, and policy lessons, World Bank Publications.
- Hawkins, J. & Wells, J. 2006. Modifying Infrastructure Procurement to Enhance Social Development In: Mcdermott, P. & Khalfan, M. M. A. (Eds.) *Symposium on Sustainability and Value through Construction Procurement -CIB Revaluing Construction Theme*. The Digital World Centre, Salford, UK.
- Hodge, G. & Greve, C. 2010. Public-Private Partnerships: Governance Scheme or Language Game? *Australian Journal of Public Administration*, 69, S8-S22.
- Hodge, G. A. & Greve, C. 2007. Public-Private Partnerships: An international performance review. *Public Administration Review*, May/June 14.
- Hodge, G. A. & Greve, C. 2009. PPPs: The passage of time permits a sober reflection. *Economic Affairs*, 29, 33-39.
- Hoverstadt, P. 2008. The Fractal Organization: Creating sustainable organizations with the viable system model., West Sussex , UK John Wiley and Sons Ltd.
- Howes, R. & Robinson, H. 2005. Infrastructure for the built environment:Global procurement strategies, London, Butterworth-Heinemann Ltd.
- IUK 2010. Infrastructure cost review: Main report. In: UK, I. (ed.). London: HM Treasury.
- IWAYEMI, A. 2008. Nigeria's dual energy problems: Policy issues and challenges. *International Association of Energy Economists*, 4th Quarter, 5.
- Jackson, M. C. 1988. An appreciation of Stafford Beer's 'Viable System' viewpoint on managerial practice. *Journal of Management Studies*, 25, 557-573.
- Klijn, E. H., Edelenbos, J. & Hughes, M. 2007. Public-Private Partnership: A Two Headed Reform. A Comparison of PPP in England and the Netherlands. *New Public Management in Europe. Adaptation and Alternatives*, 71-89.
- Kogut, B. 1988. Joint Ventures: Theoretical and empirical perspectives. *Strategic Management Journal* 9, 14.
- Kwak, Y. H., Chih, Y. & Ibbs, C. W. 2009. Towards a comprehensive understanding of public private partnerships for infrastructure development. *California Management Review*, 51, 51-78.
- Laihonen, H. 2006. Knowledge flows in self-organizing processes. *Journal of Knowledge Management*, 10, 127-135.
- Lang, J. C. 2001. Managerial concerns in knowledge management. *Journal of Knowledge Management*, 5, 43-59.
- Lawson, B., Petersen, K. J., Cousins, P. D. & Handfield, R. B. 2009. Knowledge sharing in interorganizational product development teams: the effect of formal and informal socialization mechanisms *Journal of product innovation management*, 26, 17.

- Leonard, A. 2000. The viable system model and knowledge management. *Kybernetes*, 29, 710-715.
- Leonard, A. & Beer, S. 1994. The systems perspective: Methods and models for the future. *AC/UNU Project*.
- Li, B., Akintoye, A., Edwards, P. J. & Hardcastle, C. 2005. Critical success factors for PPP/PFI projects in the UK construction industry. *Construction Management and Economics*, 23, 459-471.
- Mccrudden, C. 2004. Using public procurement to achieve social outcomes. *National Resources Forum*, 28, 19.
- Okonjo-Iweala, N. & Osafo-Kwaako, P. 2007. Nigeria's economic reforms: Progress and challenges. *Policy Research Series*. Washington: World Bank.
- Prud'Homme, R. 2005. Infrastructure and development *In: Bourguignon, F. A. P., B. (ed.) Annual World Bank Conference on Development Economics-Lessons of Experience*. Washington: World Bank and Oxford University Press.
- Ríos, J. P. 2010. Models of organizational cybernetics for diagnosis and design. *Kybernetes*, 39, 1529-1550.
- Schubeler, P. 1996. Participation and partnership in urban infrastructure management, Washington D.C, World Bank.
- Schwaninger, M. 2001. Intelligent Organizations: An integrative Framework. *Systems Research and Behavioural Science*, 18, 15.
- Schwaninger, M. 2006. Theories of Viability: a Comparison *Systems Research and Behavioural Science* 23, 11.
- Schwaninger, M. 2012. Making change happen: recollections of a systems professional. *Kybernetes*, 41, 348-367.
- Schwaninger, M. & Ríos, J. P. 2008. System dynamics and cybernetics: a synergetic pair. *System Dynamics Review*, 24, 145-174.
- Snieska, V. & Simkunaite, I. 2009. Socio-economic impact of infrastructure investments. *Inzinerine Ekonomika-Engineering Economics*, 3, 10.
- UNIDO 2010. Energy Infrastructure and Industrial Development. *In: ISAKSSON, A. (ed.) Research and Statistics Branch Working Paper 12/2009*. Vienna: United Nations Industrial Development Organisation.
- Van Marrewijk, A., Clegg, S. R., Pitsis, T. S. & Veenswijk, M. 2008. Managing public-private megaprojects: paradoxes, complexity, and project design. *International Journal of Project Management*, 26, 591-600.
- Von Krogh, G. & Roos, J. 1996. Managing knowledge: perspectives on cooperation and competition, Sage Publications Limited.
- Wiig, K. M. 1993. Knowledge management foundations: thinking about thinking: how people and organizations create, represent, and use knowledge, Schema Press Arlington.
- Wiig, K. M. 1997. Integrating intellectual capital and knowledge management. *Long Range Planning*, 30, 399-405.
- Yin, R. K. 1994. *Case study research: Design and methods*, Thousand Oaks, Ca, Sage Publications.
- Yin, R. K. 2009. *Case study research design and methods*, Thousand Oaks, Ca, Sage Publications.

RATIONAL INFORMATION ACQUISITION FOR PPP PROJECTS IN AN ENTREPRENEURIAL CONTEXT

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Risk allocation (RA) for Public Private Partnership projects is crucial for the project's success. There is potential for improvement in decision-making because in practice intuition, habit or opportunism dominate the according decision-making process. One option to achieve rationalization is by quantification. However, a quantitative model is only as good as its input. Therefore, the process of information acquisition (IA) for a quantitative RA model needs to be rationalized, as far as possible. Aspects of decision-making that could be relevant for the optimization of the IA's cost-benefit ratio are elaborated. This study discusses further the allocation of decisions to a strategic or operational entrepreneurial level. The aim is to raise the general awareness for rationality in decision-making. This study exemplifies this abstract matter, where possible, using a process oriented approach as well as methodologies such as the continuous improvement process and the Analytical Hierarchy Process. However, the specific solution depends on the given circumstances and the decision-maker's background. The subject matter presented is relevant for all kinds of projects aiming to optimize resource use and achieve process quality.

Keywords: Project management, Risk, Rationality, Decision analysis, Key performance indicators.

INTRODUCTION

Many national economies are confronted with infrastructure investment needs. To meet these needs, Public Private Partnership (PPP) has become an alternative to traditional public procurement. Finding the optimal risk allocation is of high importance for PPP projects (Andersen and LSE 2000; Jacob and Kochendörfer 2002). Today, risk allocation (RA) takes place mainly in a qualitative way according to intuitive, habitual or opportunistic criteria or bargaining strength (Delmon 2009; Girmscheid and Pohle 2010). The underlying hypothesis of this work is that this kind of RA is suboptimal for PPP projects and that a PPP project's success can be improved by using a more rational approach to RA. Rationality is increased through use of traceable decision-making with clear criteria and quantitative approaches, where possible. The research aim is therefore the development of a quantitative risk allocation model for an "optimal" risk allocation for PPP projects under consideration of the private party's risk-bearing capacity. Quantitative in this context means implementable. Optimal refers to cost minimal according to the economic minimum principle. Risk-bearing capacity is ensured, if the project's risk coverage exceeds the project's risk load at all times. The main elements of the proposed model are displayed in Figure 1. Precondition for a quantitative RA model, and also this paper's subject, is a likewise rational information acquisition (IA) used as input for the quantitative model (see subsystem I, Figure 1).

The IA comprises the following elements: risk identification, risk assessment, risk classification and risk handling. These elements are part of the general risk management process (Girmscheid 2010) and cannot be quantified in an implementable way. This applies in particular to risk assessment and risk handling, as these processes acquire the most important and most sensitive information used in the implementation part of the model (see subsystem II, Figure 1). Risk identification is a preliminary step to risk assessment and important insofar as all relevant risk

should be identified, else they cannot be dealt with. Risk classification is an optional but not mandatory step after risk analysis that allows to structure risks according to their importance.

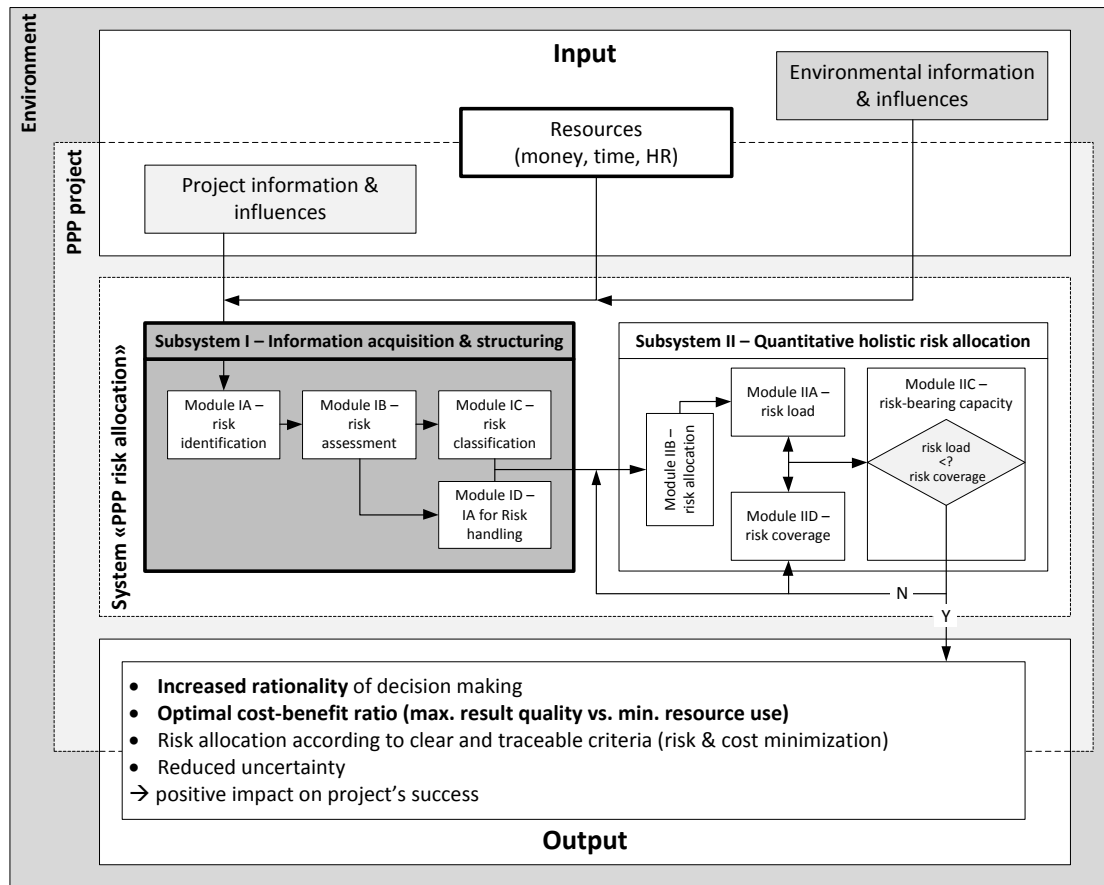


Figure 1: **Concept of a quantitative holistic risk allocation model focusing on rational IA and an optimal cost-benefit ratio**

The paper's objective is to raise awareness for rational decision-making in general and in the context of a PPP project's pre-contract phase in particular. The inherent conflict between the aim of maximizing output quality and minimizing resource use is discussed. Special attention is put on a differentiation of strategic and operation level of decision-making and implementation. Focus is laid on the decision of choosing either internal or external human resources (HR) for team composition in the context of rational IA. Finally, continuous improvement and learning are considered.

GENERAL RESEARCH METHODOLOGY

The presented overall research is based on the research methodology according to Girmscheid (2007). Construction management science lies between engineering and social science and is related to the Third World of Popper's three worlds (Popper 1987). The construction management's processes and models design the socio-technical environment of Popper's Third World according to the hermeneutic research paradigm. The presented research follows a constructivist model development in the tradition of radical constructivism according to Von Glasersfeld (1997). In that context, the objectives of the according problem and the target-means-relationship to solve the problem and achieve the objectives are developed. The model structure is formed according to cybernetic systems theory and the methodological focus lies on the application of quantitative methods, where possible.

RATIONAL INFORMATION ACQUISITION IN AN ENTREPRENEURIAL PROCESS ORIENTED CONTEXT

Motivation and context

To fulfill the requirements of a holistic approach and to achieve a systematic derivation of recommendations, the aimed for rational IA is embedded in an entrepreneurial process oriented context. This is displayed in Figure 2, showing the processes and elements relevant for IA as well as their causal relations. The deployed process oriented approach focuses on value generating performance processes.

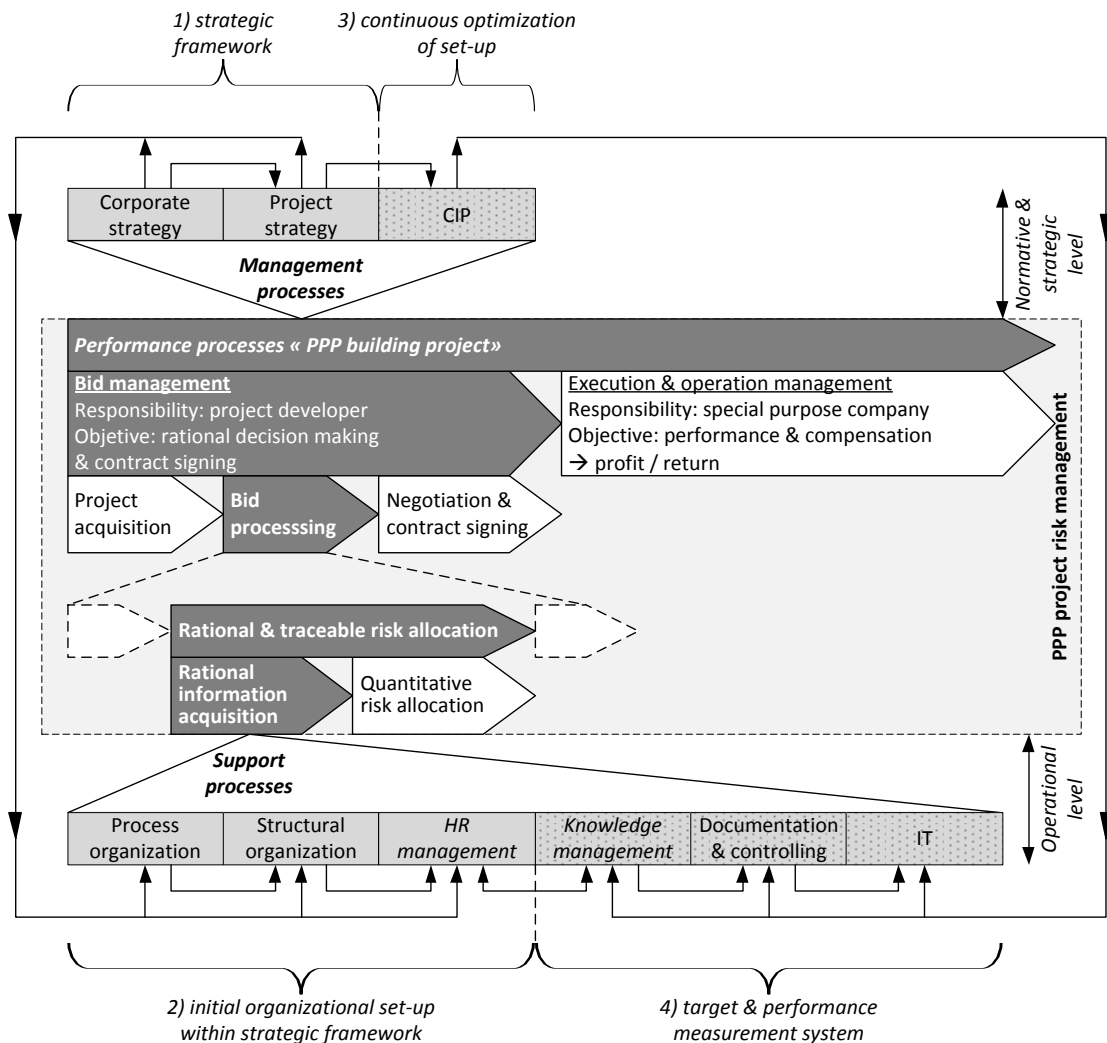


Figure 2: **Information acquisition for a quantitative holistic risk allocation model embedded in an entrepreneurial process system adapted from Girmscheid (2010)**

For a company that manages PPP (building) projects, one can mainly distinguish between the bid process and the contracting process (construction and operation) as performance relevant. Within the bid process, the main sub-processes are: project acquisition, actual bid preparation and contract negotiation as well as signing (adapted from Girmscheid 2010). During bid preparation, the PPP project's risk situation needs to be evaluated and, amongst others, a RA proposal needs to be determined. The input information for a rational and, in this case, quantitative RA model needs to be acquired. The model's requirements of rationality and traceability are thus mandatory not only for the quantitative RA itself, but also for IA representing a pre-stage of a quantitative RA model. However, IA can't be quantified in an implementable way, like it is done for the RA in the presented work, as it depends on subjective expert estimations. A possible statistical determination of risk information out of data is not possible because of the unique character of

PPP projects. Consequently, IA needs to be done by experts by means of subjective estimations and thus, the result quality is vulnerable to bounded rationality and opportunism.

As displayed in Figure 2, the relevant aspects to consider are structured into management and support processes. The management processes on a rather strategic level affect the support processes relevant for IA on a rather operational level, as shown in Figure 2. The corporate and project strategy set the frame for the organizational set-up of how to actually conduct IA (see Figure 3). Over time, a continuous improvement process (Deming 1989) can optimize an organizational set-up of IA, while considering the strategic specifications mentioned above. The most important aspect for achieving continuous improvement is a target and performance measurement system that is integrated into regular controlling and provides relevant indicators for evaluation and further development. These are the aspects discussed in the following sections.

Strategic framework

The following could improve rationality of IA by minimizing cognitive limitations and opportunism and thus maximizing output quality: thorough documentation, data or method triangulation, mix of qualified internal and external experts, use of IT infrastructure as support where possible, enough experts for variety of opinion, independent repetition as well as process audits and reviews.

However, in real life, resources such as money and time are limited. Determining how many resources are to be spent for the achievement of a target and how these resources are to be allocated among processes or projects is an entrepreneurial strategic decision to determine. This needs to be decided on a corporate and on a project level. Hence, if the resources are constrained, the output quality is limited as well. Therefore, it is helpful for the operational implementation of IA to define minimal quality requirements on the strategic level as a further restriction, in a general pursuit for an optimal cost-benefit ratio. The upper limit of resource availability and minimal output quality requirements set the frame for the IA process with respect to an optimal cost-benefit ratio. The consequence is a target system with inherent conflicts that requires trade-offs, as shown in Figure 3. With the given restrictions (upper limit of resource availability and lower limit of output quality requirements) and main objective (optimal cost-benefit ratio) the appropriate entrepreneurial set-up needs to be established regarding process organization, structural organization and HR management.

Initial organizational set-up within strategic framework

Figure 4 provides an overview of the main aspects of an IA risk management process organization, differentiated according to modules. The main challenge - because of their dominant cost relevance - is the determination of time and human resources necessary for each process step. This is strongly related to the next two aspects, structural organization and HR management.

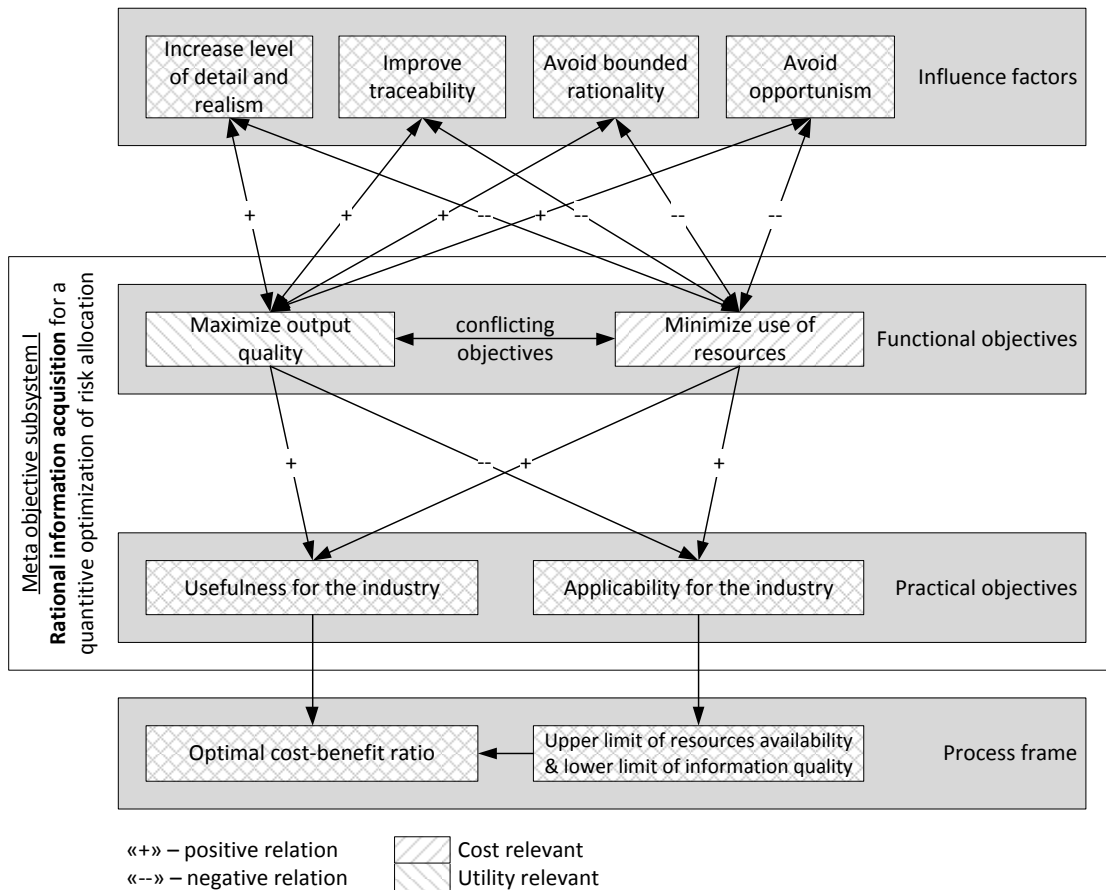


Figure 3: Target system for rational information acquisition under restrictions

Subsystem I: information acquisition				
	Module IA: risk identification	Module IB: risk assessment	Module IC: risk classification	Module ID: risk handling
Objective	Identification of as many risks as possible related to the PPP building project under consideration of the cost-benefit ratio	Assessment of identified risks regarding impact, probability and further characteristics to determine the risk load for a quantitative risk allocation	Classification and structuring of identified and assessed risks regarding their importance relative to risk costs	Identification and assessment of risk handling measures for each risk and player under consideration of measure cost and residual / net risk
Input	<ul style="list-style-type: none"> Specific project information Global environmental information Human resources Other resources 	<ul style="list-style-type: none"> Risk accumulation matrix Specific project information Global environmental information Human resources Other resources 	<ul style="list-style-type: none"> Risk profile A Human resources Other resources 	<ul style="list-style-type: none"> Risk profile B Specific project information Global environmental information Human resources Other resources
Output	Risk accumulation matrix (cause related risk structuring)	Risk profile A (with qualitative and quantitative characteristics for determination of the risk load) + correlation matrix	Risk profile B = Risk profile A + multi-stage risk classification according to risk costs	Risk profile C = Risk profile B + measure costs, residual / net risk for each risk, player and measure cost
Process elements	Documentation, HR qualification check-up, selection and mix of process specific methods			
Methodical re-commendation	<ul style="list-style-type: none"> Determination of risk structuring Project specific risk analysis Group size and composition Stop criterion 	<ul style="list-style-type: none"> Identification of relevant risk load characteristics Project specific risk analysis Group size and composition Risk attitude and risk strategy 		<ul style="list-style-type: none"> Identification of relevant risk handling characteristics Project specific risk analysis Group size and composition Risk attitude and risk strategy
Threats	<ul style="list-style-type: none"> Contract analysis Brainstorming Risk check lists 	<ul style="list-style-type: none"> Human estimation: <ul style="list-style-type: none"> Expert estimation or Classic round-based Delphi Method or Modified real-time Delphi Method 	<ul style="list-style-type: none"> Portfolio analysis ABC analysis Equi-Risk-Contour method Impact analysis Sensitivity analysis 	<ul style="list-style-type: none"> Decision table Decision tree method Utility analysis Simulation and / or risk assessment methods
	<ul style="list-style-type: none"> Important risks not identified Unappropriate resource use 	<ul style="list-style-type: none"> Unappropriate assessment of risk load characteristics because of bounded rationality, opportunism or subjectivity Inappropriate resource use 	<ul style="list-style-type: none"> Non-consideration of important risks because of risk classification results Interpretation or conclusion mistakes because of bounded rationality, opportunism or subjectivity 	<ul style="list-style-type: none"> Inappropriate assessment of risk handling because of bounded rationality, opportunism or subjectivity Inappropriate resource use

Figure 4: Operational process organization overview for a rational IA process

Structural organization in the present context describes structural project organization, temporarily formed for the bid management and thus risk related IA of the project. Typically, a bid matrix organization is chosen (Girmscheid 2010) depending on resource availability (upper limit) and output quality requirements (lower limit), strategic HR team composition as well as type, size and complexity of the project. Therefore, it is necessary to set up a budget, task and schedule plan that considers the factors above.

Along with general considerations of HR management, one important aim in the given context is to find the ideal team composition that supports an optimal cost-benefit ratio of IA. As described earlier, differentiating between strategic and operational level is necessary. The strategic framework provides the targets and restrictions. Furthermore, the decision alternatives, decision-making criteria and their weightings need to be determined on the strategic level. The research of the alternative's actual data, the implementation of the decision results as well as the performance control must take place on an operational level. Figure 5 shows the interaction of decision-making between the strategic and operational level for the purpose of a decision result. The main focus of the operational level, after implementation, lies on performance monitoring by means of controlling and thus provides an important element for the continuous improvement process (CIP). CIP is an established concept to improve output quality, without necessarily using further resources. CIP can help to optimize the cost-benefit ratio, starting from an initial set-up within the given strategic framework.

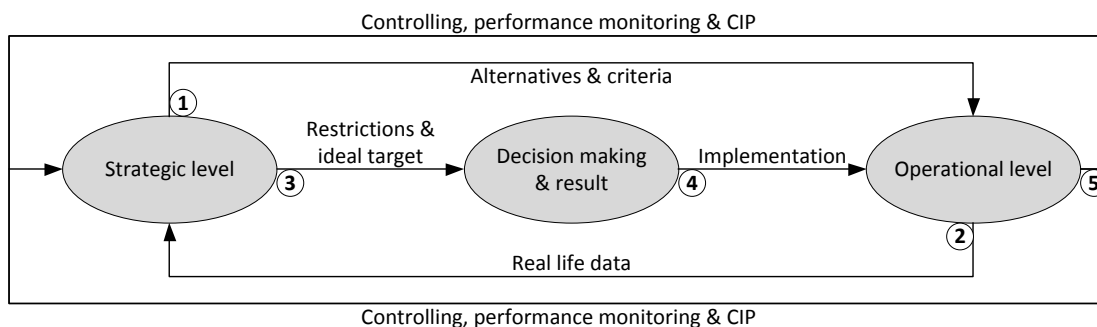


Figure 5: **Interaction between strategic level, operation level and decision-making**

Continuous improvement process (CIP) for rational information acquisition (IA)

Once the process and structural organization is determined and the HR management concept is developed, CIP can be used to further enhance the initial organizational set-up within the strategic framework and thus improve the cost-benefit ratio without necessarily using more resources.

According to Kostka and Kostka (2008), CIP is an executive philosophy and therefore originates in the strategic and/or managerial level of an entrepreneurial system (see Figure 2). It needs to be established on a corporate level and on a project level employing a holistic view of the issues related. As the name states it is crucial to establish a continuous improvement effort in the whole entrepreneurial system in small steps as governing mindset. The focus lies on the reduction of non-value-adding and wasteful activities. Of course, the strategic initialization of CIP strongly influences the operational level and thus the support processes (see Figure 1). The four pillars of CIP are employee and customer orientation, target and result orientation, process and quality orientation as well as transparency and fact orientation.

In this paper's context, the CIP aims for an optimization of the cost-benefit ratio for rational IA. This is achieved by reducing resource use without lessening quality (resource management) and / or by increasing quality without higher resource use (quality management). The responsibility for CIP implementation in this context should be tightly linked to the responsible positions dealing with bid management.

While CIP takes place continuously within the given organizational set-up, the latter needs to be reevaluated regularly, for example on an annual basis. Firstly, it is necessary to check if the strategic restrictions need to be adapted. Secondly, the chosen organizational set-up within the strategic frame itself needs to be reconsidered regularly. This allows, amongst others, for adjustments due to insights gained from controlling results even though the strategic level remains unchanged. Of course, if changes took place in earlier steps (i.e. changed targets), any and all consequences for the CIP need to be considered. This regular evaluation that might lead to reorganization can be seen as potential for a big efficiency step.

Transparency and fact orientation through use of performance indicators

The key to transparency and fact orientation is target and performance measurement by means of adequate indicators. Quantitative and qualitative indicators can be developed that allow monitoring and controlling of process specific targets. The most important aspect is the measurability, which is quite intuitive for quantitative indicators. The intention, scale and responsibility of qualitative indicators need to be considered more thoroughly. Particularly, it should be clear whether the evaluation is done by the participants of the value-adding process (internal evaluation) or whether an additional audit takes place (external evaluation) and what the resulting consequences are. Further, indicators can be aggregated, but the purpose should remain clear while ensuring comparability. Indicators can be differentiated according to several classifications and levels (see Figure 6). On a first level, an indicator stands for itself and is often directly related to a certain action that has been imposed to improve the performance. The measurement of this indicator helps to retrospectively assess the action, if the causal relation is clear and unambiguous. Therefore, such independent indicators compare ex post actual values with ex ante estimations. On a second level, an indicator might be measured to observe development over time, but still within one project. On a third level, indicators help to compare several projects with each other. Because of the project's unique character this requires relativisation and scaling of the indicators to ensure comparability.

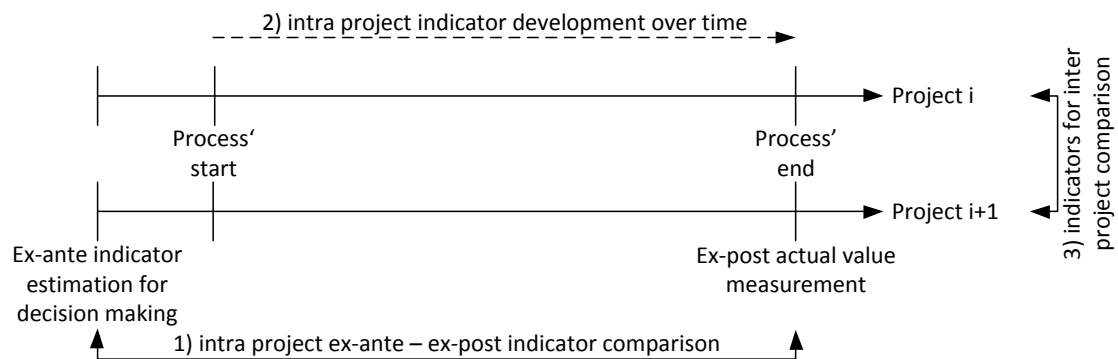


Figure 6: **Indicator categorization for strategic decision-making, e.g. regarding HR team composition for rational information acquisition**

Decision-making regarding HR team composition

The decision problem of whether to use internal or external human resources or a mixture is a multi-criteria decision analysis. To model and process the decision, the Analytic Hierarchy Process (AHP) is used as an example due to the ease with which several criteria as well as ordinal and cardinal criteria scales can be incorporated. Furthermore, it is relatively easy to implement. Figure 6 and 7 show a corresponding AHP problem for strategic decision-making concerning HR team composition. How an AHP works and how it can be solved, is shown in Girmscheid (2011). The exemplary weighting of the proposed three-leveled criteria in Figure 7 is the result of a pair wise comparison of these criteria on each hierarchy level using a common scale from 1 to 9. For example the sub criteria of “competence”, which are “special field cover ratio” and “relevant experience”, can be weighted 5:4, meaning almost equal importance. The standardized eigenvector of an according matrix leads to a weighting of 55.56 % for the criterion “cover ratio” and 44.44 % for the criterion “relevant experience”.

After this step of decision preparation, the actual data for decision-making (v_{ijkX}^{abs}) needs to be researched for each alternative (here: A to E) and each criteria. If quantitative, data for the alternatives will be transformed to a comparative vector through scaling. In case of qualitative data, a relative evaluation is executed for all alternatives. This way a comparable dimension is achieved. Finally a bottom-up aggregation takes place for all criteria (e. g. $\underline{v}_{5X}^{abs} = g_{5a}^{abs} \cdot \underline{v}_{5aX}^{abs} + g_{5b}^{abs} \cdot \underline{v}_{5bX}^{abs}$). On the criteria's top hierarchy level the aggregated relative evaluation of the alternatives is multiplied with the criteria weights to achieve a final score that

leads to the final decision ($\underline{b}_X^{\text{tot}1} = \underline{g}^{\text{abs}} \cdot \underline{v}_X^{\text{abs}}$). The chosen alternative is usually the one with the maximal aggregated value ($\underline{b}_{\text{opt}}^{\text{tot}1} = \max_X \underline{b}_X^{\text{tot}}$). Alternatively the criteria could be aggregated using

$$\underline{b}_X^{\text{tot}2} = \frac{\underline{v}_{1X}^{\text{abs}}}{\sum_{i=2}^4 \underline{g}_i^{\text{abs}} \cdot \underline{v}_{iX}^{\text{abs}}} \quad \text{and} \quad \underline{b}_{\text{opt}}^{\text{tot}2} = \min_X \underline{b}_X^{\text{tot}}.$$

The latter alternative would represent an

approximation of a cost-benefit ratio for decision-making and of course the minimal aggregated value would be optimal in this case.

AHP decision alternatives regarding team composition for rational information acquisition (strategic level)		
A) Purely internal HR	B) Mainly internal HR	C) Evenly mixed HR
D) Mainly external HR	E) Purely external HR	

AHP Problem	problem set-up = strategic information acquisition for decision problem = operational
Objective	Optimal HR composition (internal vs. external) for information acquisition of a quantitative holistic risk allocation model for PPP building projects
Alternatives	regarding team composition for information acquisition A) purely internal; B) mainly internal; C) evenly mixed; D) mainly external; E) purely external
Criteria	expected total HR cost: $C_{\text{tot}}^{\text{HR}} = C_{\text{tot}}^{\text{HR,int}} + C_{\text{tot}}^{\text{HR,ext}}$ $C_{\text{tot}}^{\text{HR,int}} = \sum_i c_i^{\text{HR,int}} \cdot h_i^{\text{HR,int}}$ $C_{\text{tot}}^{\text{HR,ext}} = \sum_i c_i^{\text{HR,ext}} \cdot h_i^{\text{HR,ext}}$ $\text{tot} \square \text{total}$ $\text{HR} \square \text{human resource}$ $\text{int} \square \text{internal}$ $\text{ext} \square \text{external}$ $c \square \left[\frac{\text{monetary unit}}{\text{hour}} \right]$ $i \square \text{HR no. } i, i \in \square$ restrictions: $\sum_i h_i^{\text{HR,int}} \leq \text{available internal HR capacities?}$ $\sum_i h_i^{\text{HR,int}} + \sum_i h_i^{\text{HR,ext}} \geq \text{minimal HR project requirements?}$ $C_{\text{tot}}^{\text{HR}} \leq \text{strategic resource availability?}$
1) expected total HR cost	$\geq \text{min. quality requirements (strategic restriction)}$
2) expected result quality	$\geq \text{min. competence requirements (strategic restriction)}$
3) competence	$= \text{all special fields covered with sufficient experience?}$
3a) special field cover ratio	≥ 1
3b) total relevant years of experience in the group	$\geq \text{min. requirements (for each category)}$
4) knowhow transfer	
4a) transfer external → internal	[% benefit plus]
= internal learning potential	
4b) transfer internal → external	[% benefit loss]
= drain threat	
5) organization	
5a) process organization	
5aI) loss of liability for results and consequences	[% benefit loss]
5aII) increased complexity of communication and administration	[% benefit loss]
5b) structural organization	
5bI) increased integration	[% benefit loss]
5bII) increased control	[% benefit loss]

Figure 7: AHP problem definition for strategic decision-making regarding HR team composition for quantitative information acquisition

Alternative X		A	B	C	D	E
Explicit description of team composition scenario		purely internal HR	mainly internal HR	evenly mixed HR	mainly external HR	purely external HR
i,j,k	$\underline{g}_i^{\text{abs}} \quad \underline{g}_j^{\text{abs}} \quad \underline{g}_{jk}^{\text{abs}}$					
1) expected total HR cost	$i = 1 \quad 31.03\%$	x	$\underline{v}_{1A}^{\text{abs}}$	$\underline{v}_{1B}^{\text{abs}}$	$\underline{v}_{1C}^{\text{abs}}$	$\underline{v}_{1D}^{\text{abs}}$
2) expected result quality	$i = 2 \quad 27.59\%$	x	$\underline{v}_{2A}^{\text{abs}}$	$\underline{v}_{2B}^{\text{abs}}$	$\underline{v}_{2C}^{\text{abs}}$	$\underline{v}_{2D}^{\text{abs}}$
3) competence	$i = 3 \quad 20.69\%$		$\underline{v}_{3X}^{\text{abs}} = \underline{g}_{3A}^{\text{abs}} \cdot \underline{v}_{3aA}^{\text{abs}} + \underline{g}_{3B}^{\text{abs}} \cdot \underline{v}_{3bA}^{\text{abs}}$	$\underline{v}_{3C}^{\text{abs}} = \underline{g}_{3A}^{\text{abs}} \cdot \underline{v}_{3aC}^{\text{abs}} + \underline{g}_{3B}^{\text{abs}} \cdot \underline{v}_{3bC}^{\text{abs}}$	$\underline{v}_{3D}^{\text{abs}} = \underline{g}_{3A}^{\text{abs}} \cdot \underline{v}_{3aD}^{\text{abs}} + \underline{g}_{3B}^{\text{abs}} \cdot \underline{v}_{3bD}^{\text{abs}}$	$\underline{v}_{3E}^{\text{abs}}$
3a) special field cover ratio	55.56%	x	$\underline{v}_{3aA}^{\text{abs}}$	$\underline{v}_{3aC}^{\text{abs}}$	$\underline{v}_{3aD}^{\text{abs}}$	$\underline{v}_{3aE}^{\text{abs}}$
3b) total relevant years of experience in the group	44.44%	x	$\underline{v}_{3bA}^{\text{abs}}$	$\underline{v}_{3bC}^{\text{abs}}$	$\underline{v}_{3bD}^{\text{abs}}$	$\underline{v}_{3bE}^{\text{abs}}$
4) knowhow transfer	$i = 4 \quad 13.79\%$		$\underline{v}_{4X}^{\text{abs}} = \underline{g}_{4a}^{\text{abs}} \cdot \underline{v}_{4aX}^{\text{abs}} + \underline{g}_{4b}^{\text{abs}} \cdot \underline{v}_{4bX}^{\text{abs}}$	$\underline{v}_{4C}^{\text{abs}} = \underline{g}_{4a}^{\text{abs}} \cdot \underline{v}_{4aC}^{\text{abs}} + \underline{g}_{4b}^{\text{abs}} \cdot \underline{v}_{4bC}^{\text{abs}}$	$\underline{v}_{4D}^{\text{abs}} = \underline{g}_{4a}^{\text{abs}} \cdot \underline{v}_{4aD}^{\text{abs}} + \underline{g}_{4b}^{\text{abs}} \cdot \underline{v}_{4bD}^{\text{abs}}$	$\underline{v}_{4E}^{\text{abs}}$
4a) transfer external → internal □ internal learning potential	33.33%	x	$\underline{v}_{4aA}^{\text{abs}}$	$\underline{v}_{4aC}^{\text{abs}}$	$\underline{v}_{4aD}^{\text{abs}}$	$\underline{v}_{4aE}^{\text{abs}}$
4b) transfer internal → external □ drain threat	66.67%	x	$\underline{v}_{4bA}^{\text{abs}}$	$\underline{v}_{4bC}^{\text{abs}}$	$\underline{v}_{4bD}^{\text{abs}}$	$\underline{v}_{4bE}^{\text{abs}}$
5) organization	$i = 5 \quad 6.90\%$		$\underline{v}_{5X}^{\text{abs}} = \underline{g}_{5aI}^{\text{abs}} \cdot \underline{v}_{5aIX}^{\text{abs}} + \underline{g}_{5aII}^{\text{abs}} \cdot \underline{v}_{5aIIX}^{\text{abs}}$	$\underline{v}_{5C}^{\text{abs}} = \underline{g}_{5aI}^{\text{abs}} \cdot \underline{v}_{5aIC}^{\text{abs}} + \underline{g}_{5aII}^{\text{abs}} \cdot \underline{v}_{5aIIC}^{\text{abs}}$	$\underline{v}_{5D}^{\text{abs}} = \underline{g}_{5aI}^{\text{abs}} \cdot \underline{v}_{5aID}^{\text{abs}} + \underline{g}_{5aII}^{\text{abs}} \cdot \underline{v}_{5aIID}^{\text{abs}}$	$\underline{v}_{5E}^{\text{abs}}$
5a) process organization	50.00%		$\underline{v}_{5aIX}^{\text{abs}}$	$\underline{v}_{5aIC}^{\text{abs}}$	$\underline{v}_{5aID}^{\text{abs}}$	$\underline{v}_{5aIE}^{\text{abs}}$
5aI) loss of liability for results and consequences	63.64%	x	$\underline{v}_{5aIA}^{\text{abs}}$	$\underline{v}_{5aIC}^{\text{abs}}$	$\underline{v}_{5aID}^{\text{abs}}$	$\underline{v}_{5aIE}^{\text{abs}}$
5aII) increased complexity of communication and administration	36.36%	x	$\underline{v}_{5aIIA}^{\text{abs}}$	$\underline{v}_{5aIIC}^{\text{abs}}$	$\underline{v}_{5aIID}^{\text{abs}}$	$\underline{v}_{5aIIE}^{\text{abs}}$
5b) structural organization	50.00%		$\underline{v}_{5bIX}^{\text{abs}} = \underline{g}_{5bI}^{\text{abs}} \cdot \underline{v}_{5bIX}^{\text{abs}} + \underline{g}_{5bII}^{\text{abs}} \cdot \underline{v}_{5bIIX}^{\text{abs}}$	$\underline{v}_{5bC}^{\text{abs}} = \underline{g}_{5bI}^{\text{abs}} \cdot \underline{v}_{5bIC}^{\text{abs}} + \underline{g}_{5bII}^{\text{abs}} \cdot \underline{v}_{5bIIC}^{\text{abs}}$	$\underline{v}_{5bD}^{\text{abs}} = \underline{g}_{5bI}^{\text{abs}} \cdot \underline{v}_{5bID}^{\text{abs}} + \underline{g}_{5bII}^{\text{abs}} \cdot \underline{v}_{5bIID}^{\text{abs}}$	$\underline{v}_{5bE}^{\text{abs}}$
5bI) increased integration	33.33%	x	$\underline{v}_{5bIA}^{\text{abs}}$	$\underline{v}_{5bIC}^{\text{abs}}$	$\underline{v}_{5bID}^{\text{abs}}$	$\underline{v}_{5bIE}^{\text{abs}}$
5bII) increased control	66.67%	x	$\underline{v}_{5bIIA}^{\text{abs}}$	$\underline{v}_{5bIIC}^{\text{abs}}$	$\underline{v}_{5bIID}^{\text{abs}}$	$\underline{v}_{5bIIE}^{\text{abs}}$
			$\underline{b}_{\text{opt}}^{\text{tot}1} = \underline{g}^{\text{abs}} \cdot \underline{v}_X^{\text{abs}}$			

Figure 8: AHP solution template for strategic decision-making pertaining to HR team composition for quantitative information acquisition

For performance measurements regarding the HR team composition decision, corresponding indicators need to be determined. On the first indicator level (see Figure 6) a strong relation to the earlier decision-making with AHP can be considered (see Figure 7 and 8). The AHP criteria of decision-making can be seen as ex ante estimations for the indicators that demonstrate ex post

how well the estimations were met in reality based on actual values evaluated after implementation of the decision. For example, the first AHP decision criterion is the estimated expected total HR cost for IA. This can be compared to the actual total HR cost for IA after finishing the process by contract signing. To derive actions from a difference between actual and estimated values, it would be useful to measure the total cost of internal and external HR considering respective man hours and cost per hour and then aggregate the information to the total HR cost. By doing so, the cause for differences can be identified and consequent actions can be taken more easily. Furthermore, an indicators' development can be observed over time, until the final value is reached on the second indicator level. In the given case it might be interesting for example to differentiate HR cost for risk identification and risk assessment. In particular, it might be interesting for the managerial level to compare several projects amongst each other on a third indicator level. To ensure comparability, a viable option could be to compare the difference between actual and estimated HR cost for every project at end of the bid phase and relate the total amount and difference to success in form of contract awarding and the project size. In any case, the chosen indicators must allow feedback, action derivation and action implementation in a reasonable amount of time.

CONCLUSIONS

Rational IA for decision-making is a complex and interdisciplinary task. Because of limited resources, the key to profit maximization is an optimal cost-benefit ratio for the company and / or specific project. In any case, better results can be expected from a systematic evaluation and planning than from a quick and dirty approach. This applies not only to PPP projects or the construction industry, but to rational decision-making in general.

The problem presented could not be solved completely, but was rather discussed to raise awareness for the subject matter. The main conclusion is to allocate the decision aspects to the right entrepreneurial level (strategic or operational). Because of the cost relevance, focus needs to be put on HR organisation in general and the decision regarding HR team composition in particular. The latter pertains to the decision, whether to use external and/or internal resources for IA. The specific organisation, controlling, etc. needs to be determined in correspondence with the respective circumstances. Ultimately, all actions improving the cost-benefit ratio against the background of rational IA must be realized. Although this concept is abstract and difficult to deal with in practice, any responsible person should keep the ideas in the back of one's mind, when making the according decisions. Only business decisions that are based on rational input data can be seen as sound.

Furthermore, Figure 4 provides specific instructions on how to conduct information acquisition in principle, by listing objectives, process elements, methodologies and threats for risk identification, assessment, classification and handling.

The rationally acquired information will be used as input into an implemented quantitative risk allocation model that considers the risk bearing capacity of the private party. The intention is to create a positive impact on PPP project's success through enhanced rationality, reduction of uncertainty as well as risk and cost minimization. The research was co-financed by the Swiss Commission for Technology and Innovation.

REFERENCES

- Andersen, A, LSE (2000) Value for Money Drivers in the Private Finance Initiative. The Treasury Task Force.
- Delmon, J (2009) Private sector investment in infrastructure project finance - PPP projects and risks. 2nd ed. Austin: Wolters Kluwer.
- Deming, W E (1989) Out of the crisis. 9th ed. Cambridge, Mass.: Massachusetts Institute of Technology.

- Girmscheid, G (2007) Forschungsmethodik in den Baubetriebswissenschaften. 2nd ed. Zürich: Eigenverlag des IBB.
- Girmscheid, G (2010) Strategisches Bauunternehmensmanagement - Prozessorientiertes integriertes Management für Unternehmen in der Bauwirtschaft. 2nd ed. Zürich: Springer.
- Girmscheid, G (2011) Bauproduktionsprozesse des Tief- und Hochbaus. 3rd ed. Zürich: Institut für Bau- und Infrastrukturmanagement ETH Zürich.
- Girmscheid, G, Pohle, T (2010) PPP - Stand der Praxis: Risikoidentifizierung im Strassenunterhalt und Risikoverteilungskonzept. Zurich: ETH Zurich.
- Jacob, D, Kochendörfer, B (2002) Effizienzgewinne bei privatwirtschaftlicher Realisierung von Infrastrukturvorhaben. Köln: Bundesanzeiger.
- Kostka, C, Kostka, S (2008) Der Kontinuierliche Verbesserungsprozess - Methoden des KVP. 4th ed. München: Hanser.
- Popper, K R (1987) Auf der Suche nach einer besseren Welt Vorträge und Aufsätze aus dreissig Jahren. 2nd ed. München: Piper.
- Von Glasersfeld, E (1997) Konstruktion der Wirklichkeit und des Begriffs der Objektivität. In: Von Foerster, H. (Eds.), Einführung in den Konstruktivismus. München: Piper.
- Yin, R K (2009) Case study research design and methods. 4th ed. Los Angeles, Calif.: Sage.

THAILAND'S NEW PUBLIC PRIVATE PARTNERSHIP LAW: A CURE TO THE PROBLEM?

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Thailand has implemented several infrastructure projects under the Private Participation in State Undertakings (PPSU) Act since its enactment in 1992. The law, essentially an anticorruption measure, appears to be an obstacle rather than a promoter of PPP implementation in Thailand. In recognition of this, a new Public Private Partnership (PPP) bill has been drafted and is now in the final stages of enactment. The new PPP bill is intended to improve the regulatory framework for implementing PPPs in Thailand and attract more private capital into infrastructure finance. Research into the current practices of the Thai government in administering PPP projects and comparison of the current and proposed PPP law are thus timely. The paper highlights the flaws of the current PPP regime and how they are addressed by the new bill. Concerns and challenges of implementation of the new PPP law by the Thai government are also discussed.

Keywords: PPP law, Public Private Partnerships, Infrastructure, Transparency.

INTRODUCTION

As Thailand's economy continues to expand, it increasingly depends for its regional competitiveness on sound infrastructure improvements. Thailand has been no stranger to public-private partnerships (PPPs) and the variety of project financing and delivery methods that may be utilized to combine public and private resources in the development of infrastructure.

Prior to 1992, the ability of the private sector to participate in public projects depended on the discretion of a sole person or agency and final decision by a concerned minister. There were no specific rules.

Examples of PPP projects undertaken before the PPSU Act include the Don Mueang Tollway, a 21-kilometres toll road from central Bangkok to Don Mueang Airport, the First Stage Expressway System, a 27-kilometres elevated toll road network, and the Second Stage Expressway System, a 38.5-kilometres elevated toll road network.

In the absence of specific rules governing PPP projects, results varied widely. Some high profile projects received negative attention, internationally as well as domestically. For example, the Second Stage Expressway suffered both from uncompetitive bidding and from expropriation. Five consortia initially procured the bidding documents, but only two entered bidding. One of those two was disqualified for lack of experience. Worse, in 1993, early in the operation of the project, the toll road was expropriated by a newly-elected government formed by a political party that had been in opposition when the bid was awarded. The expropriation came in ostensible response to public complaints over toll rate increases by the concessionaire.

In 1992, largely in response to perceived corruption in PPP projects (including the Second State Expressway), the Act on Private Participation in State Undertaking BE2535 (the PPSU Act) was enacted. This was Thailand's first PPP legislation and it addressed the weaknesses inherent in leaving PPP projects to the unfettered discretion of only one government agency (Ashurst 2009; Suwannoi 2012). Most PPP projects since 1992 in Thailand have been governed by the PPSU Act. There have been a number of successful PPP projects under the PPSU Act, such as mass rapid transit projects (such as the BTS sky-train and the underground mass rapid transit MRT), express

highways, elevated roads, and telecommunication systems (such as AIS mobile, Telecom Asia, and TT&T) (Susangarn 2007).

Despite successful implementation of several PPP projects under the PPSU Act, it has been criticized by the private sector, particularly foreign investors, for its lack of clarity on scope, definitions, project valuation methodologies, and for its lack of contract amendment procedures (Susangarn 2007). More importantly, the PPSU Act has no procedural time limits, which has all but ensured delays. In addition, the absence of clear arbitration provisions has aggravated uncertainty in the event of dispute.

These primary private sector concerns regarding Thailand's current PPP law have motivated investors and would-be investors to urge government reform of the PPP institutional framework and legislation in order to encourage financing of infrastructure projects in Thailand (World Trade Organization 2012). According to a joint report by the Economist Intelligence Unit and the Asian Development Bank (Economist Intelligence Unit 2012), Thailand was grouped into the "emerging" category in terms of "PPP-readiness," whereas Japan, Korea, and India were classified as "developed" and Australia and UK, "mature."

Recognizing that prompt reform is required to improve the PPP environment in Thailand and to promote sustainable private investment in Thailand's physical and social infrastructure, the Thai government has drafted a new PPP bill, containing 10 chapters with 64 sections (an expansion on the current law's four chapters with 24 sections). But more is not necessarily better, and a close reading of the current bill is required to determine whether the flaws of the current Thai PPP regime will, in fact, be cured.

The new PPP bill was approved by the Cabinet on April 10, 2012 and sent to the House of Representatives for their approval on a fast-track basis (Suwannoi 2012). The government believes that its implementation will improve PPP conditions in Thailand, which is currently ranked 18th in the world by the World Bank for ease of doing business (Economist Intelligence Unit 2013).

TREND OF PPP IN THAILAND

Thailand's economic growth (in terms of GDP) reached about 10 per cent per year since the implementation of the sixth National Economic and Social Development Plan, which covered the period from 1987 to 1991. Such a high growth rate created a profound demand for improved economic infrastructure to accommodate further growth and placed great strain on road, telecommunication and power networks. The Thai government was unable to meet this demand using conventional public finance. Opportunity for private sector participation in Thailand's public undertakings followed, chiefly in large infrastructure projects.

In the current global economic downturn, like many countries, the Thai government is spending heavily on infrastructure as a means of avoiding recession. Total infrastructure spending is projected to be approximately US\$67 billion over the coming decade. Limited tax revenues and the debt ceiling on public finance mean that Thailand will not fund this investment using conventional methods. For purposes of comparison, Thailand's entire tax revenues in 2011 was about US\$43 billion, and it is estimated that US\$53 billion is needed for investment in surface transportation alone over the coming decade. This financing gap requires alternative financing methods such as PPPs.

The required expansion of PPPs, as we have seen, require improvements to the legal regime undergirding PPP investment, particularly if foreign direct investment (FDI) is to be tapped for megaprojects such as conventional rail development (US\$6.56 billion), high-speed rail (US\$26.7 billion), and other key transport projects (about US\$14 billion over the next 28 years). In the domestic capital market, infrastructure banks have been given more attention as a new way to obtain private resources for infrastructure investments. For example, Krung Thai Asset Management, a unit of the state-owned Krung Thai bank, has detailed a plan to set up infrastructure funds of up to 20 billion baht (about US\$276 million) for investment in local

expressways. Several infrastructure funds have followed suit. For example, Kasikornbank is planning to launch its infrastructure fund, and has targeted a raise of about US\$158 million for investing in a solar farm developer.

RESEARCH METHODOLOGY

This research uses the comparative approach that consists of the systematic detection, identification, classification and interpretation of similarities and differences between the current and proposed PPP law. Major differences and improvements found in the proposed PPP bill are presented and discussed. Then, opinions about challenges and concerns over the proposed PPP law are provided. Recommendations are also given.

THAILAND'S CURRENT PPP LAWS

The goals of the current PPSU Act are to prevent corruption, to provide a structure for appropriate oversight of large PPP projects, and to ensure that projects are financially viable and carried out with regular procedures (Pongsiri 2011). As shown in Figure 1, the PPSU Act is divided into 4 main chapters and 24 sections: (1) general provisions; (2) submission of project; (3) project selection and implementation; and (4) project supervision and monitoring.

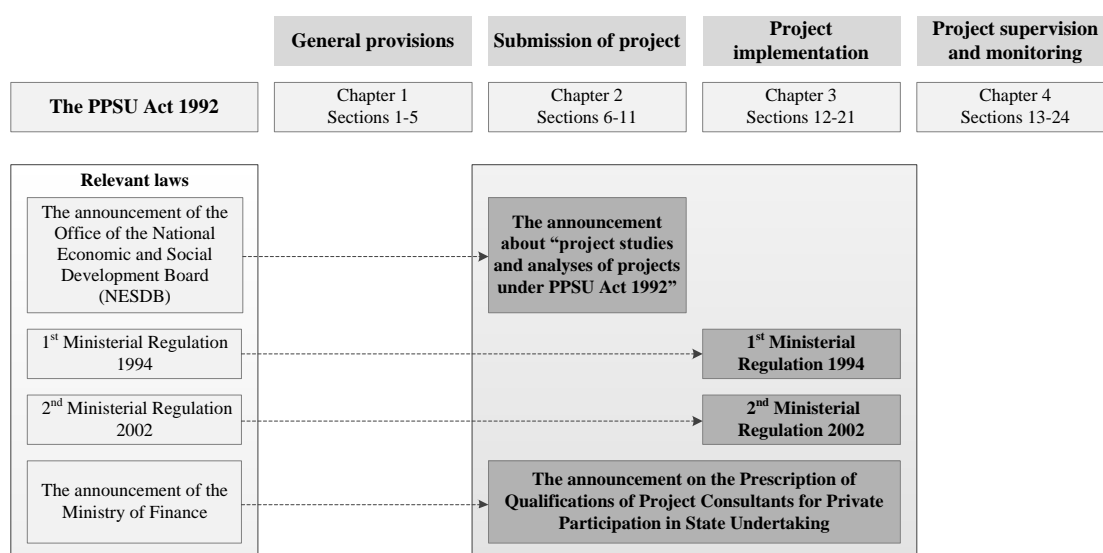


Figure 1: Structure of Thailand's current PPSU Act (4 chapters and 24 sections)

The internal government processes for handling PPP projects under the current law are set forth in Figure 2. Proposed projects with a value of at least 1000 billion baht are subject to the PPSU Act. However, as can be seen in Figure 2, the process is excessively fragmented. It requires the involvement of several government bodies, which must assume interlocking responsibilities for implementation of the project. On top of this, the Council of Ministers (the Cabinet) plays a direct and central role in approving the projects, both in principle and at the time for final approval. This fragmentation in management of PPP projects consumes substantial time and resources in wasteful coordination. Moreover, there is the cost of risk and uncertainty arising from the lack of any deadline for the Cabinet to make its approval decisions. The time for a PPP project approval is thus both unpredictable and lengthy, with an approximate average time for approval of two to three years.

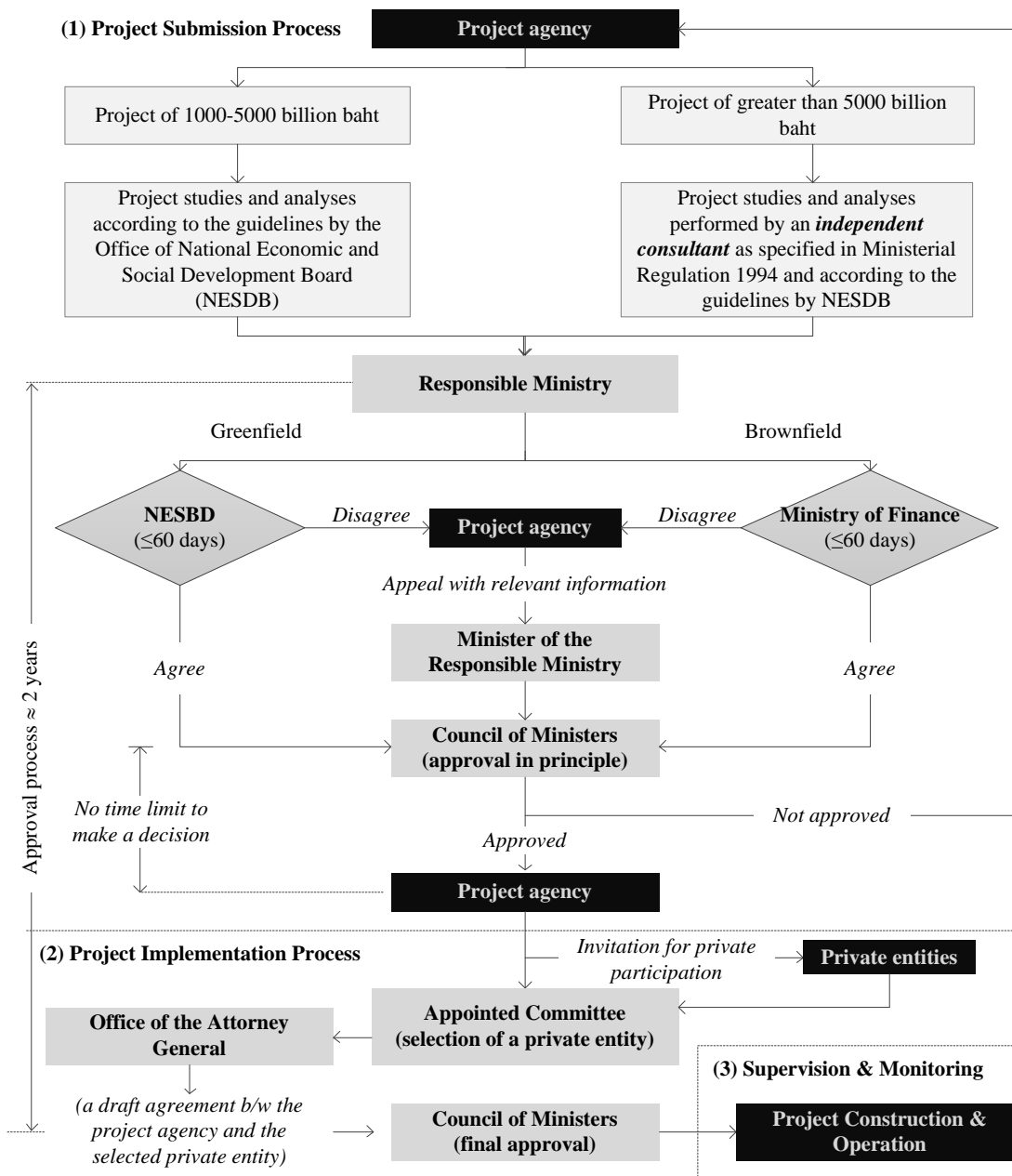


Figure 2: Flowchart of the submission, implementation, supervision and monitoring of a project taken under the current PPSU Act

PROBLEMS OF CURRENT PPP LAW

Private entities have described the main problems with the PPSU Act as follows (World Trade Organization 2012; Ashurst 2009; Asian Development Bank 2012; Susangarn 2007):

- lack of clarity on scope and definitions;
- lack of concrete valuation criteria for the assessment of PPP projects;
- fragmented authorities involved in the procurement process;
- absence of procedural time limits and concomitant delays (no time limit for the decision-making at ministry level);
- absence of clear arbitration provisions creates uncertainty in the event of dispute;
- lack of rules regarding proper risk allocation between the parties involved;

- absence of provision for unsolicited projects; and
- no provision for contract amendment.

THAILAND'S NEW PPP LAW

In this section, we review and compare the current PPP law with the newly proposed PPP bill, which was approved in May 2011 by the Cabinet and continued on legislation enactment process. The new PPP bill contains 10 chapters and 64 sections. New chapters included in this new bill are Chapters 2, 3, 7, and 8 (see Figure 3 for more details about each chapter). The structure of the new PPP bill is presented in Figure 3.

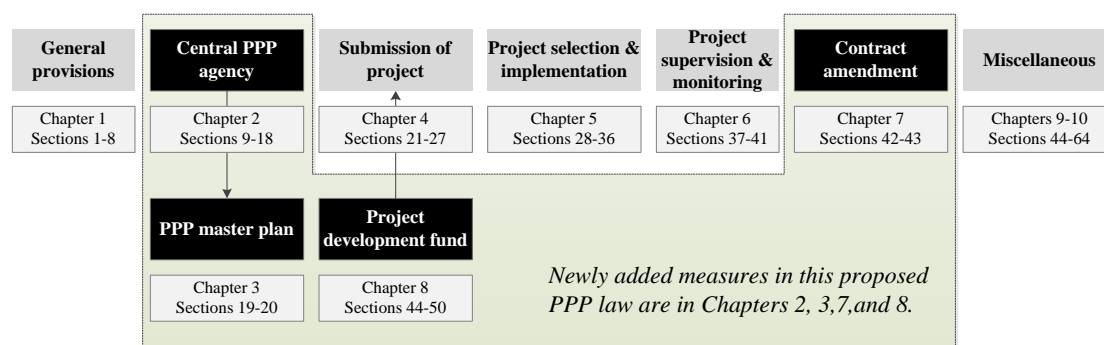


Figure 3: Structure of Thailand's newly proposed PPP bill (10 chapters and 64 sections)

The approval processes of proposing PPP projects under the new PPP bill is presented as shown in Figure 4. Major changes in the new PPP bill and administration of proposed PPP projects are summarized as follows.

- Value for Money (VfM)

Under the newly proposed PPP bill, the supervising agency is required to compare the value and effectiveness of traditional government procurement methods with PPP approaches, based on the concept of value for money. This is touted as a significant improvement over the existing PPP bill.

- Types of PPP arrangements

In reports of project studies and analyses, various types of PPP arrangements to be implemented must be detailed so that the PPP Committee can compare and select the best PPP arrangement for a proposed project.

- Central PPP Unit

A new governmental unit called Central PPP Unit, similar to the Private Investment Center of Korea or Partnership UK, will be established. Establishment of such a single agency, responsible for overseeing PPP policies and activities in Thailand, is a central objective of the new PPP bill. With the prime minister as chair, the committee of the PPP Unit will be appointed from several government agencies, including the minister of finance (MOF), undersecretary of the MOF, secretariat of the NESDB, director of budget bureau, and director of public debt management office, and up to five experts appointed by the cabinet: ten to fourteen members.

- Master Plan of "Strategic Projects"

The committee of the Central PPP Unit is charged with creation of Thailand's "PPP master plan" as specified in Chapter 3 of the new bill (see Figure 3), and also approve major PPP projects, replacing the cabinet in that role.

- Unsolicited Proposals for "Strategic Projects"

Projects included in the PPP master plan will be considered “strategic” PPP projects. Private sector participants will be entitled to submit unsolicited proposals to such strategic projects. However, the procedures for making, administering and evaluating unsolicited proposals are yet to be developed.

- Project development fund (PDF)

Project development fund (PDF) will be set up under Thailand’s Ministry of Finance to support the development of the master plan, project feasibility studies and the project development process. The fund will be managed by the fund committee and fund manager. The budget of the PDF will be allocated primarily from government funds, plus revenues from bidding document, proposal and consultant fees and charity.

- A more streamlined PPP processes

As presented in Figure 4, the approval process of a PPP project is more streamlined. The time for project approval is projected to be reduced from two to three years to just over one year.

(1) Project Submission Process

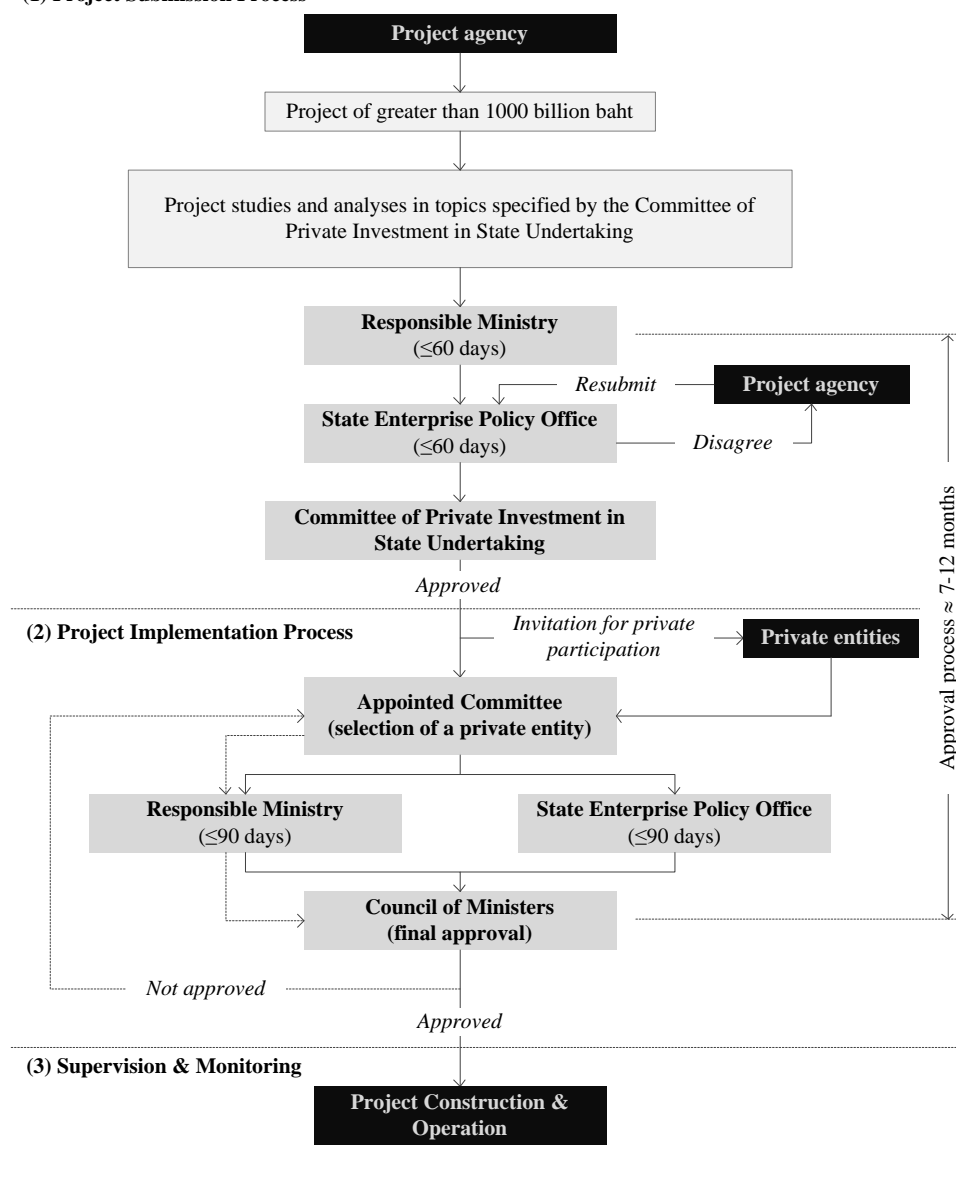


Figure 4: Flowchart of the submission, implementation, supervision and monitoring of a project taken under the newly proposed bill

THE PROBLEMS AND THE CURES: ARE THEY MATCHED?

The basic criterion for judging the new PPP bill is whether it addresses the shortcomings of the current PPSU Act. Table 1 highlights the main problems perceived by private entities with the current system and aligns the solutions proposed in the new PPP bill.

Table 1: Comparison of current issues with the newly propose PPP bill

Current Problems	Proposed PPP bill solutions
1. Lack of clarity on scope and definitions	The new PPP bill provides clearer and more expansive description of scope and definitions. The size of projects subject to the bill remains 1000 billion baht or more. In the new PPP bill, the definition of PPP is prescribed under the term “Participate”, is still unclearly defined as to “jointly invest with a private individual by any means whatsoever or entrust a private individual to invest solely by means of licensing or granting concession or granting rights in any manner whatsoever.” The term “Participate” should be further clarified into a more specific type of PPPs such as build/operate/transfer (BOT) or design/build/finance/operate (DBFO).
2. Lack of concrete valuation criteria for the assessment of PPP projects	No related change.
3. Fragmented authorities involved in the procurement process	A central PPP committee will handle the approval process. This committee will be chaired by Prime Minister. The approval process is streamlined and shortened.
4. Absence of procedural time limits causing delays (no time limit for the decision-making at ministry level)	The consideration procedure is also streamlined. In particular, time for consideration of several processes is set. Approval in principle is delegated to the committee, rather than the cabinet. Approval of the draft agreement between the project agency and the selected private entity by the Office of the Attorney General will no longer be required. Cabinet approval is only required at the end of project implementation. The entire process for approval of a PPP project may be reduced from two to three years to as little as seven to twelve months.
5. Absence of clear arbitration provisions causing uncertainty in the event of dispute	No related change.
6. Lack of rules regarding proper risk allocation between the parties involved	Risk analysis and management (Chapter 4, Section 22) must be studied before the submission of the project by the project agency. Types of PPP arrangements suitable for a project (BOT, DBFO, etc.) must be explored and compared. However, no guidelines are provided for risk analysis and management evaluation, nor is there guidance for comparison among alternative PPP approaches. Once the project is awarded to the concessionaire, both the project agency and the concessionaire are required to submit risk management plans to the State Enterprise Policy Office (SEPO) and the Committee. Government support is permitted following a qualified study by the Committee.
7. Lack of provision for unsolicited project	Private sector participants may submit proposals to participate in projects listed in the PPP master plan. However, the detailed procedures of how such unsolicited proposal will be administered and evaluated have not yet been developed.
8. No provision for contract amendment	Detailed guidelines for contract amendment and renewal are provided in Chapter 7 of the new PPP bill.

CONCLUSIONS

Since the 2006 military coup, Thailand has experienced increasing political instability. In fact, Thailand held two general elections since 2006, but political power has shifted several times between two opposition parties, the Democrat Party and the Phue Thai Party, which is backed by former Prime Minister Thaksin Shinawatra. Despite strong support from both political parties, investments in infrastructure have been occasionally disrupted, especially megaprojects such as rapid mass transit systems in Bangkok and domestic and international high speed rail lines. This is due to the governing party's intervention in or revision of investment plans to suit the interests of itself and its political base. So long as project approval is the responsibility of the cabinet, the success of PPP projects will be subject to political headwinds.

In the new PPP bill, the approval authority has partly shifted to the PPP Central Unit, which will be responsible for the evaluation of projects and determination of whether a project is to be approved in principle. However, as noted earlier in this paper, the Committee of this PPP Unit is chaired by the Prime Minister and committed by several governmental agencies, with no more than five independent experts appointed by the Cabinet. This committee therefore remains under political control. The authors believe that a majority-independent committee would better serve Thailand's infrastructure needs.

The size of projects subject to control under the new PPP bill remains at 1000 billion baht or more. However, one of the goals of the new PPP bill is to widen the scope of PPP implementation into social infrastructure (which more often has value less than 1000 billion baht). The utility of the new PPP bill with respect to social infrastructure is thus limited. For example, schools and prisons often cost less than 1000 billion baht to construct. Accordingly, the authors believe that a lower threshold is appropriate.

To increase transparency of concession companies, the authors encourage government certification, or a ratings regime, recognizing companies with a demonstrated track record of good conduct or public listing in the Thai stock markets. Listing such companies would encourage direct, nonbank investment in proven companies and encourage selections based on objective performance criteria.

The immediate challenge ahead is enactment of the bill. Further ahead, preparation of the PPP master plan and recruitment of personnel for the PPP Central Unit will be vital. There is also a pressing need for coordination among agencies responsible for promoting PPP development and the transition to the new PPP law. In the long run, the extended application of PPP arrangements into other types of public projects remains a thorny challenge that can only be met if the new PPP law is successful enough in its current context to justify extension to new types of projects, including social infrastructure. Management of the project development fund (PDF) also remains unclear and will continue to require discussion and development of proper standards and funding streams.

REFERENCES

- Ashurst (2009). Thailand's new PPP framework. Ashurstinsight: infrastructure opportunities, March 2009.
- Asian Development Bank (2012) *Thailand: Towards new PPP legislation*. Bangkok: Thailand.
- Economist Intelligence Unit (2012) Evaluating the environment for public-private partnerships in Asia-Pacific: The 2011 Infrascope. London: Economist Intelligence Unit.
- Economist Intelligence Unit (2013) *Doing Business 2013*. London: Economist Intelligence Unit.
- Pongsiri, N. (2011). Public-private partnerships and urban infrastructure development in Southeast Asia. *International Public Management Review*, 12(1), 48-60.
- Suwannoi, P (2012) Thailand's Newly Proposed Public-Private Partnership Law. *Informed Counsel*, August 17, 2012, 3.

- Susangarn, C (2007) Public Private Partnership in Thailand: Past Experiences and Future Prospect. *In: the Asia-Pacific Ministerial Conference on PPPs in Infrastructure*, 4-6 October 2007, Republic of Korea.
- Valentine, J (2008) Public-Private Partnerships in Infrastructure: Best-Practices from the International Experiences and Applications for Thailand. Thailand: The National Economic and Social Development Board (NESDB).
- World Trade Organization (2012) Trade Policy Review Body – Trade policy review – Report by Thailand. Geneva: Switzerland.

THE CREDIT CRUNCH IN INFRASTRUCTURE FINANCE: ASSESSING THE ECONOMIC ADVANTAGE OF RECENT POLICY ACTIONS

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The financial crisis has had a major impact on the cost and availability of finance for infrastructure. Against this background, many governments have introduced forms of ‘credit-enhancement’ in an attempt to reduce or eliminate default risk and attract additional capital into the sector. Other policies involve the creation of hybrid structures in which public sector liquidity substitutes for private sector debt. This paper describes and evaluates the various models being implemented. We argue that the cost and availability effects of the crisis stem from increased funding costs and capital constraints, rather than concerns about credit quality, and models of credit-enhancement therefore fail to target the sources of market failure. Such models are also undesirable since they distort the incentive structure associated with public-private partnerships, and increase the state’s exposure to risk. Most governments have abundant access to liquidity and are unaffected by capital adequacy regulations, and these are strong arguments for public financing. However, governments have little expertise in credit assessment and may lack the incentives to do it well. A solution that combines the provision of liquidity by the public sector with the risk-management expertise of the private sector is likely to optimal

Keywords: PPP, Credit Crunch, Policy Actions

INTRODUCTION

Four years since the collapse of Lehman Brothers in September 2008, even the mature infrastructure financing markets of Europe, North America and Oceania are operating in the context of severe credit crunch that has had a major impact on the cost and availability of project finance¹ (Burger *et al* 2009). In Europe, the aggregate volume of public-private partnership (PPP) transactions that reached financial close in the first half of 2012 totalled €6 billion, the lowest volume recorded over the last decade and approximately one-third of the volume in 2007 (EPEC 2012). In part, this reflects changes on the demand side, as the willingness and ability of public sector authorities to pay for new infrastructure has waned in the context of falling tax receipts. But there are also significant constraints on the supply side. Changes in financial sector regulation and concerns about the quality of assets held by banks have restricted long-term lending globally. New Basel III stability ratios, in particular, make long-term investment very expensive in terms of banks’ risk-weighted capital adequacy requirements (Revilglio 2012).² In response, banks are reducing risk-weighted assets, while tenors and amounts are scaled back. Loan margins have

¹ In this paper, we define *project finance* transactions as those in which private consortia raise capital from banks and/ or the capital markets in order to leverage equity investments in the construction and operation of infrastructure. Equity and debt investments are remunerated largely or exclusively by the cash-flows generated by the operation of that infrastructure, funded by a public authority and/ or from user charges. Project finance is the most frequently used contractual/ financial structure applied to asset-based PPP deals.

² The Basel regulations, under the control of the Bank of International Settlements, seek to ensure that banks’ long-term capital is sufficient to support the credit risks on their assets. The Basel III Accord will raise required capital ratios incrementally from 2013 to 2018, at which time they should increase to 10.5% from the current 8%. As Revilglio (2012) notes, banks are responding to these forthcoming requirements by reducing risk-weighted assets, the denominator in their capital ratios, rather than increasing equity capital, the numerator.

tripled relative to pre-crisis norms. At the same time, appetite for infrastructure assets – which require dedicated teams capable of assessing and monitoring credit risk - is limited among non-banking financial institutions such as pension funds, sovereign wealth funds and life insurance companies, due to information asymmetry, scarce data about project performance and the lack of specialist expertise within institutional investors (Croce 2011). Although Canada has been successful in attracting institutional investment into infrastructure on an ‘unwrapped’ basis, with such assets now accounting for around one-fifth of the asset allocations of insurance and pension funds, the country is an outlier in this respect as most institutional investors require at least single-A ratings. Forthcoming Solvency II regulations³ are likely to make the holding of infrastructure assets more expensive in terms of regulatory capital requirements in the European Union (Standard & Poor’s 2011).

Against this background, many governments - and some supranational institutions, such as the European Commission - are facilitating the introduction of new models of *credit-enhancement* within infrastructure projects in an attempt to create a low-risk asset class and thus attract additional debt capital into the sector. These models come in various guises, but common to all is an attempt to insulate debt-holders from credit default risk (i.e. the quantified possibility that the actual returns on a loan may be lower than forecast) by allocating more risk to one or more of the other parties involved in PPP transactions: principally, the state and equity investors. Alongside this, there are initiatives by some governments to develop hybrid structures in which the scope of private financing is more limited than in the conventional PPP model, with state-provided liquidity (sourced via taxation or borrowing) substituting for what would normally be commercial debt.

Underpinning much of this activity is the recognition that additional infrastructure investment – financed off the government balance sheet, and therefore not captured by the headline estimates of sovereign deficit and debt - can perform a useful role in stimulating demand while contributing to economic growth in the long term.⁴ However, it is important to acknowledge that the fundamental role of private finance in infrastructure is to improve the quality of investment decisions (relative to what is achieved via public capital) while enhancing the cost-efficiency of construction and operational services.⁵ In some cases, forms of credit enhancement and/ or state guarantees may create a risk profile resembling that of conventional public financing, undermining the private sector’s incentives to monitor, control and minimise project risk. In this case, the higher cost of private finance represents an element of poor value for money, hard to justify from an economic perspective. The potential for private finance to enhance the efficiency of infrastructure provision will be especially important in the coming years, as the willingness and ability of society to pay for infrastructure services - via taxation or user charges – is likely to be constrained. Bearing this in mind, the objectives of this paper are to:

- examine the various credit-enhancement and hybrid solutions being implemented; and
- evaluate their likely impact on the quality of investment decisions, and their potential to deliver cost-efficiency in the provision of infrastructure services.

We argue that the current hiatus in deal-flow stems from high funding costs and capital constraints, rather than concerns about credit quality. Models of credit-enhancement therefore fail to target the sources of market failure. Such models are also undesirable since they distort the

³ Solvency II, which codifies long-standing EU directives, introduces, for the first time, a minimum capital requirement for insurance companies. Similar principles are likely to be adopted by pension fund regulators.

⁴ For example, Britain’s Office for Budget Responsibility estimates that the fiscal multiplier (i.e. the ratio of a change in national income to the change in state spending that causes it) associated with increased capital expenditure is 40% higher than on increases to current expenditure (Office for Budget Responsibility 2010).

⁵ In this paper, we define a cost-efficient outcome as one in which the required output has been produced at the lowest possible cost.

incentive structure associated with PPPs, and increase the state's exposure to risk. As most governments have abundant access to liquidity and are unaffected by capital adequacy regulations, a greater proportion of public finance in the capital structure of PPPs makes sense. However, governments have little expertise in credit assessment, credit contracting and post-lending monitoring and probably also lack the incentives to undertake these tasks effectively. A solution that combines the provision of liquidity by the public sector with the risk-management skills of the private sector is likely to be optimal.

POLICY ACTIONS

In this section we describe various initiatives that have been implemented by policy-makers (in both national and supranational contexts) in order to stimulate greater lending into project finance transactions. In our view, each of these initiatives fits into four broad categories:⁶

1. A guarantee from the state to pay debt principal and interest in the case of default
2. Provision of subordinated debt by the state, enhancing the credit of the senior debt
3. State commitment to repay lenders if sponsors fail to refinance the loan at maturity
4. State provision of project (debt) finance, with or without a private sector guarantee

Of these instruments, category (1) is the most common, at least in Europe. This involves a government committing to make scheduled payments of debt principal and interest in the event that the project company fails to do so. This is the approach undertaken by the European Investment Bank (EIB) and the European Commission in relation to the Loan Guarantee Instrument for Trans-European Transport Network Projects (TEN-T projects). This instrument was established in 2008 with the aim of attracting greater private sector participation in the financing of TEN-T projects (EPEC 2011). The facility enables the transfer of some important elements of demand risk (i.e. the risk that revenue will undershoot that expected) during the early years of operation. A variant of this approach has been pursued by French and Germany policy-makers under the *Cession de créances* and the *Forfaitierungsmodell*, respectively. Under these mechanisms, the state guarantees that the service charge it has undertaken to pay to a project sponsor during operations will not fall below the threshold required to allow them to pay their debts, irrespective of performance under the contract. The result is that the debt, or a large portion of it, is *de facto* guaranteed so that both sponsors and creditors are insulated from availability risk (i.e. the risk that a facility will be in a fit state for use by the public sector purchaser).⁷ In all these approaches, construction risk is borne by the private sector party, but the guarantee enhances the credit of the senior debt tranches and reduces the impact on regulatory capital. According to prominent industry practitioners, these instruments have had a positive impact on the availability of bank finance while also reducing loan margins (Waterston 2012; Abadie 2012).

Policy actions under category (2) operate in much the same way as state guarantees, and they have broadly the same objective – i.e. to attract a highly risk-averse banking sector back into the project finance market. However, in this case, the mitigation is provided by the state through investing subordinated debt into the deal. This is reimbursed by the project sponsor over time from the cash-flows available *after* senior debt service, but *prior* to cash-flows to equity. Therefore, subordinated debt occupies an intermediate layer within the capital structure - less risky than equity, more risky than senior debt. The existence of this layer should in principle reduce the probability of senior debt default and mitigate the loss to lenders in the event of a default. The European Union's 2020 Project Bond Initiative (PBI), which will draw on EU and European Investment Bank (EIB) funds to provide up to 20% of the total financing required on a deal, is the pre-eminent example of this form of intervention. Here, the aim is to create debt assets with a

⁶ We recognise that a much broader array of state guarantee models exist in project finance markets in different sectors. However, our focus here is on policy actions specifically aimed at stimulating debt markets.

⁷ A similar situation is reached through lease-based PPP contracts in Italy (Vecchi and Hellowell, forthcoming).

strong and stable credit rating, in order to attract investment from insurance companies and pension funds.⁸ All three of the main international ratings agencies have said this instrument will enhance the credit of senior debt assets (Moody's 2011, Standard & Poor's 2011, Fitch 2011), though more recent analysis (Fitch 2012) concludes that the achievement of a "single-A" rating would not be guaranteed under PFI, and notes that anything less than this would make institutional investor involvement uneconomic in the context of Solvency II capital adequacy regulations.⁹

The aim of policy actions in category (3) is to mitigate refinancing risk - i.e. the risk that existing project debt will not be repaid from a new borrowing or other refinancing because the terms of such new borrowing or refinancing are uneconomical. Refinancing risk has become a major issue in countries such as Australia and Canada, in which shorter loan tenors and "mini-perm" structures have become more common (Waterson 2012). In a mini-perm, the tenor of the project's senior debt is significantly less than the duration of the contract, so that a refinancing is necessary after five-to-seven years. At this point, the majority of the loan is still outstanding and the project sponsor faces an event of default if it is not refinanced. Reflecting this, Standard & Poor's (2009) states that a project sponsor with no refinancing risk is likely to have a stronger credit profile than one exposed to such risk. Refinancing risks are also likely to be aggravated by the higher funding costs and lower availability of long-term debt in the new financial environment. The result is that the public sector pays a premium for the uncertainty in the future cost of finance.¹⁰ With a refinancing guarantee, such as those now being provided in Australia and Canada, public authorities undertake to repay the lenders if the project company cannot refinance. They may also commit to compensating project companies if a refinancing results in less favourable terms. In doing so, the state assumes substantially more risk, but has a lower initial periodic payment than would otherwise be the case.

The fourth category of policy intervention is conceptually distinct from those discussed above, as the focus is on substituting public for private debt, rather than enhancing the credit quality of the latter. The United Kingdom is the policy entrepreneur in this category, having utilised government liquidity in various forms to support the Private Finance Initiative (PFI) programme, through which contracts with a Net Present Cost of £120 billion have been signed (HM Treasury 2012a). The first experiment with this approach was introduced before the financial crisis, in 2004, under the *Credit Guarantee Finance* initiative (CGF) (HM Treasury 2004). The CGF involved the UK government lending to PFI project companies the sums required to finance the senior debt portion of the funding solution and securing a guarantee of repayment from banks or monoline insurers. The lending rate was set at the prevailing market rate for PFI projects funded by commercial debt (Hellowell 2010). However, after payment of the fee required by the guarantor, the government generated a surplus that was larger than its cost of funding the loan through the issue of gilts. At the time (i.e. during the credit boom period when loan margins were at historically low levels), this surplus represented a net saving for the UK Treasury of approximately 0.5%.

Two hospital PFI projects reached financial close on a CGF basis, both with commercial banks providing the credit wrap. In 2005, the UK Treasury estimated the whole-life saving from CGF relating to these two schemes at some £70 million (HM Treasury 2005). However, the scheme was abandoned when it was discovered that projects funded in this way appeared twice on the government's balance sheet (KPMG 2009). CGF was also unpopular with the big spending departments which, as lending rates were set *pari passu* with the market, captured no upside from the initiative but were presented with extra complexity and transaction costs. These factors may explain the failure of the concept to re-emerge during the credit crunch of 2007-09, despite the

⁸ An alternative option (now approved by statute) is the provision of an unfunded partial guarantee of senior debt service – i.e. a category 1 instrument in our terms.

⁹ Under a deal agreed by MEPs and EU member states in the summer, the EU has set aside €230 million from existing budgets to pilot the Project Bond Initiative (European Parliament and Council 2012).

¹⁰ Alternatively, under the "soft" mini-perm structure that has become common in the UK, the public sector tends to pay the high cost of finance dictated by 'ratchets' – increases in the interest rate - and only benefits from a proportion of the saving if that is reduced in a refinancing (due to refinancing gain sharing mechanisms in the standardised PFI contracts).

apparent potential of CGF to address market funding problems while preserving the risk transfer benefits of the traditional project finance model. Instead, in March 2009, HM Treasury announced the establishment of a new private limited company, the Treasury Infrastructure Finance Unit (TIFU), which would, as with CGF, provide state loans to projects on prevailing commercial terms (HM Treasury 2009). Unlike CGF, the intention was not to reduce funding costs, but to provide support for PFI projects that were unable to secure the required amount of lending from commercial sources. The intervention was also intended to be short term, with TIFU withdrawing from the market once projects could be refinanced and state-provided liquidity was no longer required. In the event, only one project – a large and complex waste management scheme in Manchester – received a TIFU loan. In 2010, the new coalition government perceived that the lending market had recovered and TIFU was closed down.

Then, in July 2012, the UK Treasury announced that it would once more begin lending directly to PFI projects. An estimated £6 billion worth of projects due to proceed in the next 12 months are eligible, though loans will only be made alongside existing commercial lenders and for a minority of the senior debt requirement (HM Treasury 2012b). As with the TIFU initiative, the intention is that the facility will be available for a temporary period and that loans – priced at market rates – will be refinanced as market conditions improve. This model appears to be gaining some momentum, at least in the EU. In Italy, for example, *Cassa Depositi e Prestiti*, the financial arm of the Treasury department, has also established a financial facility that works under a *pari passu* approach.

EVALUATION

In this section we evaluate the policy actions described above in terms of (i) their likely impact on the quality of capital investment decisions, and (ii) their potential to generate cost-efficiency benefits in the provision of infrastructure assets and services. First, we consider together the policy actions in categories (1) and (2), incorporating simple loan guarantees, minimum revenue guarantees and the provision of subordinated debt by governments or government-supported supranational entities, in the case of the European Union/ European Investment Bank. As each of these interventions works by reducing the degree of construction and/or operational risk borne by lenders while increasing the state's exposure, it is reasonable to assume that they will have similar impacts on the incentives faced by lenders,¹¹ and therefore analogous consequences for projects' efficiency outcomes.

However, a critique of these interventions must begin by acknowledging a fundamental anomaly. Each of these instruments is intended to enhance the credit quality of transactions, making them more attractive to banks and/or institutional investors from an *asset management* perspective. Yet, as noted, the credit quality of project finance assets is not the principal barrier to investment in most cases. Indeed, the credit quality of project finance assets is strong by comparative standards, and has not materially declined since 2008. In a recent study of 3,533 bank loans originated between 1990 and 2010, Moody's found that the 10-year cumulative default rate for infrastructure finance transactions is, at 4.72%, consistent with 10-year default rates for corporate bond issuers of low investment-grade / high speculative-grade credit quality (Moody's 2012). However, for loans identified as relating to PFI/PPP contracts,¹² the report found a much better historical performance, with a 10-year cumulative default rate of 3.83%, and a maximum 0.5% probability of default in any given year during the first 10 years of the deal, after which default rates declines to zero. In addition, analysis of survey data by the UK National Audit Office (2012) found a high degree of cash-flow predictability among project sponsors, while the volatility around expected

¹¹ Moody's (2011) evaluates the impact of the EU Project Bond Initiative, carrying out analyses of both of the options then being considered (and since approved): i.e. the unfunded partial loan guarantee and the use of EC/EIB-provided subordinated debt. It found that these two options would generate approximately the same degree of credit enhancement by insulating the senior lenders from both construction and operational risk.

¹² The criteria used for categorising projects as such is not recorded in the report, though the definition must be somewhat broad since the sample includes projects from Eastern Europe, Oceania, and South East Asia.

returns was weighted to the upside. Reflecting this, in 84 of the 118 contracts surveyed by auditors, sponsors were forecasting Internal Rates of Return that exceeded (often significantly) those expected at financial close. Therefore, it seems clear that the absence of debt capital is more likely to reflect concerns from a funding cost and capital adequacy perspective, than on the asset management side.¹³ The implication is that interventions that address directly (i) the liquidity shortfall and (ii) the regulatory barriers to long-term investments are more likely to be more successful. We return to this point below.

The theoretical advantages of transferring project risks to private investors (equity and debt)¹⁴ are at the core of the microeconomic case for private finance in infrastructure (Dewatripont and Legros 2005). When an investor bears a risk it has a strong incentive to manage it, monitor it, and take steps to avoid any adverse impact from it. If these tasks are performed effectively, then *ceteris paribus* the outturn costs of infrastructure projects will be lower than otherwise. Conversely, when an investor is insulated from risk, so that this is retained by taxpayers and/ or service users, the additional cost of private over public finance is a deadweight welfare loss (Helm 2011). Table 1 identifies the processes of risk management undertaken by debt and equity investors. These processes are broken down into the two key phases of an infrastructure project's life – construction and operations. An equity-holder has a lower priority claim on cash flows, and if the project is delivered at a higher cost than that forecast at financial close, or the outturn revenues are lower than expected, it may fail to achieve its expected return. Therefore, equity investors have a strong incentive to act as integrators and managers of construction and operations, ensuring these are delivered to time and to budget. A debt-holder has a higher priority claim on cash flows and can also typically “step in” to claim the assets of the project sponsor where sustained poor performance by sponsors is placing debt service at risk. However, in cases where the costs of construction and operations depart significantly from those expected at financial close (or where revenues fall short of expectations, in the case of a usage-based contracts), sponsors may default on their debt with serious implications for the value of debt assets. Therefore, debt investors have a *regulatory* role and a strong incentive to carry this out assiduously – assessing the robustness of project planning before and after financial close, ensuring that risks are allocated to the appropriate firm within the private sector counterparty, monitoring performance and stepping in to manage problems.

Table 1: The processes of risk management undertaken by debt and equity investors

	Construction	Operations
Debt	Discipline in risk analysis/allocation	Discipline in risk analysis/allocation
	Due diligence (upfront)	Due diligence (ongoing maintenance)
	Monitor and provide discipline on equity	Monitor and provide discipline on equity
	(Step-in)/sort out failing projects	(Step-in)/sort out failing projects
Equity	Integration of design and build	Integration of design, build and operate
	Management of construction risk	Long-term performance management
	Dealing with problems on failing projects	Dealing with emerging problems
	Commit additional equity if required	Commit additional equity if required

One outcome of these risk management processes has been, relative to conventional public procurement, enhanced project management performance in terms of post-contractual cost

¹³ Specifically, institutions have (i) less ability to attract deposits and/or access the inter-bank market at rates that match their lending commitments, and (ii) less capital due to the forthcoming capital ratio regulations.

¹⁴ For clarity, equity assets are the fundamental ownership units of the firm – usually a special purpose vehicle (SPV) – sponsoring a project. An equity claim entitles the holder to claim any cash flows left in the SPV after meeting all costs and paying contracted debt obligations. In contrast, debt is not an ownership interest in the firm, but entitles the holder to a contracted stream of cash flows in the form of interest and capital repayment.

certainty (National Audit Office 2009; Allan Consulting 2007).¹⁵ This is also reflected in the stability and predictability of equity returns and the low default rates on loans recorded above. Given the good performance of project finance loans (especially PFI loans) historically, it might be argued that the quantum of risk inherent to these projects is limited, and therefore the state's increased exposure to risk under category (1) interventions will be minimal. This, however, is to ignore the *moral hazard* problem created by these forms of credit enhancement. These may jeopardise lender incentives to perform their functions - appraising the project, eliminating optimism bias from financial models, and monitor the project performance throughout the life of their loan - with the necessary assiduity. To avoid moral hazard, the design of interventions should leave the private sector with sufficient risk at the margin (EPEC 2011). However, even a partial guarantee weakens the incentives on lenders to mitigate and monitor risk, with the result that guarantees are more likely to be called. Similarly, the existence of a layer of state-provided subordinated debt makes a credit default more likely than would be the case in its absence. Owing to the moral hazard problem, the probability that (i) contingent liabilities will become actual liabilities and/ or (ii) subordinated debt stakes will be lost is surely non-negligible.

The risks created by policy actions in category (3), whereby the state commits to repay lenders if sponsors fail to refinance the loan at maturity, can also be substantial. Whether the state commits to re-pay the initial lender the outstanding debt at maturity, or compensates the project sponsor for any adverse change in its cost of debt, such guarantees weaken the motivation of investors to ensure good project performance in terms of asset design, construction and maintenance. Without such a guarantee, a lender has an incentive to ensure that the design and build process is well managed, and that maintenance work is undertaken in line with life-cycle requirements. If this is not the case, it is less likely that the project sponsor will be able to access low-cost debt capital - i.e. since changes in debt pricing will reflect both general market conditions *and* project outcomes - and the lender may be unable to exit the transaction. Similarly, the project sponsor has less incentive to perform these management functions well if the extent of lender monitoring is less and any additional debt costs owing to underperformance are met by the state purchaser.

In addition, as refinancing risks are often borne by individual public authorities, as distinct from central government, these will often raise affordability issues. A public authority that bears refinancing risk may, upon the maturity of the initial loan, be forced to buy out the debt or pay the cost of a more onerous loan. The first option may not be viable for many public authorities (e.g. a municipality or an individual health care provider), given the high value of debt that will normally be outstanding at this stage in the project. The second option also raises significant implementational challenges in terms of project appraisal and budgeting. During the planning stage, the authority will have to forecast future margins and underlying interest rates, and make assumptions about the tenors and amortisation profile that will apply to the debt after the refinancing. All these elements could significantly increase the periodic charge payable by the public authority and therefore its ability to achieve financial balance.

From a public finance perspective, the concern is that authorities will assume such risks (on behalf of taxpayers and service users) without taking due account of their potential impact. Recent experience in the English health sector PFI programme indicates that in the absence of alternative financing options public authorities will often enter into contracts that are fundamentally unaffordable, even engaging in what Flyvbjerg (2009) calls 'strategic misrepresentation' (lying) to ensure central government approval of business cases. In some cases, contracts have also been structured in such a way as to present unacceptable risks for future taxpayers and service users (Hellowell and Pollock 2010). For example, some authorities have attempted to ease affordability constraints in the early years of operation by index-linking the full periodic payment to RPI, with the result that the indexed proportion of the payment is larger than the inflation-sensitive element of a sponsor's cost base (Hellowell and Vecchi 2012). Over-indexing in this way enables the sponsor to agree to a lower *initial* periodic payment (since extra revenue in later years enables the

¹⁵ It should be noted that post-contractual cost-certainty should not be taken as the overall arbiter of cost-efficiency - or 'economic advantage' in the terms of this conference. An authority that pays a premium for cost certainty - through a PPP or a fixed-price construction contract - may be getting a bad deal if the price of that certainty is too high.

payment of debt service and the equity return to be back-ended), easing affordability in the short term.¹⁶

Through this process, authorities also speculated on future price changes, generating significant additional costs and risks for future taxpayers and service users.¹⁷ In the event, it is now known that business case forecasts of inflation were systematically underestimated by authorities, and many are now obliged to pay significantly higher periodic fees than had originally been budgeted for (Cuthbert and Cuthbert 2011). The strategic misrepresentation and the speculative activities of some authorities have had negative consequences now that projects are operational, and a significant number of health care providers in England have experienced financial difficulties as a consequence of their PFI costs. One such provider, the South London NHS Trust, has recently been placed into administration, ostensibly due to unsustainable accumulated debts (Stacey and Kuchler 2012). The experience suggests that, while refinancing guarantees may present unacceptable risks for taxpayers and service users, some authorities may nevertheless offer such guarantees, and policy-makers will need assiduously to monitor and regulate the commitment of such guarantees public by authorities.

Finally, we consider policy actions in category (4), which relates to the direct provision of liquidity by the public sector, either with a private sector guarantee (as in the UK Treasury's CGF initiative) or without such a guarantee. As noted at the beginning of this section, the shortfall in lending is primarily the result of (i) a liquidity shortfall and (ii) a regulatory framework that penalises long-term investments. Given that (most) governments have abundant access to liquidity and are not subject to international financial regulations on capital adequacy, this category of intervention is the one that provides the most direct (and least distortionary) response to the problems that underpin the credit crunch in project finance. In the previous section, we noted two models of intervention within this category: a CGF-style intervention, in which the private sector guarantees the government its expected cash-flows; or the provision of liquidity without a guarantee. Which of these is pursued by governments will depend on the objectives of policy. The latter model is essentially a short-term measure, as the intention is usually to sell the debt stake in the project after two or three years, or, preferably, if market indicators specified in the clause reach pre-crisis levels (Burger *et al* 2009). In this way, policy addresses a short- to medium-term problem with a short- to medium-term solution and does not commit the state to long-term financing.

If the government was to finance a project in total, this would increase the exposure of government significantly, undermining the due diligence benefits of lender involvement and leaving only the equity stake at risk. For this reason, in general, government liquidity is used to finance only a portion of the debt required on a project. This has the advantage of allowing the state to free-ride on the risk management activities of the commercial lenders that provide the balance of funding. The downside to this, however, is that public authorities continue to be charged an interest rate set on the basis of high inter-bank and funding prices, along with a risk premium determined not by the credit quality of the transaction but by liquidity and capital management risks to which governments are not subject.

It is in this respect that the CGF instrument offers some notable benefits. The provision of a private guarantee preserves the aspects of project finance that has demonstrably led to good

¹⁶ On a transaction in which revenues increase over time at the rate of inflation, the lenders' cover ratio (i.e. the excess of cash-flow over scheduled debt payments) can be met within the context of a lower initial unitary charge than would pertain with proportional indexation. Over the period of the contract, the charge remains level in real terms but in later years will be higher in nominal terms than would be the case for non-indexed funding. This reflects the facts that: (i) the loan is being paid more slowly; and (ii) more interest is paid in total.

¹⁷ Recognising this, it is common for investors and banks to mitigate inflation risk via inflation-indexed loans and/or RPI swaps. The latter solution significantly increases the public sector's cost of terminating the contract (i.e. because breakage costs increase over the contract period) and involve the payment of additional fees and premiums. The cheapest and most risk-free way of dealing with inflation is to balance the period fee between fixed and inflation-linked proportions which match the SPV's own exposure to fixed and inflation-linked costs.

project outcomes – i.e. by ensuring that lenders bear project risks and are incentivised to undertake credit assessment and credit monitoring activities with due diligence. Although the assessment of net savings from the CGF initiative in the UK were small, in an era in which liquidity shortfalls and capital ratio management risks are driving higher spreads (Waterston 2012), such savings could now be considerable. There is a strong argument that, unlike the UK's CGF approach, such savings should be passed directly to project companies (in the form of a lower interest rate) which would ultimately lower prices for public sector purchasers, limiting the financial impact of capital investments on future recurrent budgets.¹⁸ This approach would also likely generate substantial savings in terms of transaction costs. For example, since 2008 swap credit margins (a fee paid for interest rate hedging derivatives) have increased from a low of 5 basis points per annum to some 30-50 basis points per annum. The public sector's ability to tap fixed-rate funding without recourse to hedging derivatives would provide significant savings for governments with large project finance programmes.

CONCLUSION

At the beginning of this paper, we noted that the fundamental role of the private sector in infrastructure is to improve the quality of investment decisions while enhancing the cost-efficiency of construction and operational services. This is the 'economic advantage' that properly-structured PPPs have the potential to offer, and that potential has been realised – at least insofar as enhanced cost-certainty for the public sector and stable returns for private investors can be regarded as indicators of success. However, when governments act to enhance the attractiveness of projects to the financial markets, they often create distortions that may, in some cases at least, undermine the very incentives that have led to good project management outcomes. When risk is not allocated to the private partner it is retained by the government, which may be left with high exposure that could persist or intensify over time. Where public accounting standards are not well developed, the financial impact of credit support instruments may only be recorded in government accounts *after* a contingent obligation materialises. For governments aiming to reduce the headline measures of debt and deficit, or public authorities seeking to invest in the context of falling public capital budgets, there is a strong incentive to create such liabilities without due regard to their potential costs. Whether such an approach will enhance fiscal sustainability in the long-run is doubtful.

In this paper, we have argued that a different category of intervention is likely to provide a greater degree of economic advantage – being both (i) more efficacious in enabling currently stalled projects to reach finance close, and (ii) less distortionary in its effect on market behaviour and outcomes. A model in which a government provides liquidity (to which most have abundant access) while commercial lenders provide risk management (utilising their unique skills and a generation of experience) retains the pro-efficiency features of PPPs, addresses the current sources of market failure directly and has the capacity to lower the cost of capital. This, of course, is exactly the opposite of what is being proposed by most governments, underlining the extent to which the "illusory fiscal benefit" (Irwin 2012, p.9) of private finance drives the design of policy actions.

REFERENCES

- Abadie, R (2012) *The Future of PPP Financing*, Presentation to the Joint EC-EIB/ EPEC Private Sector Forum, Brussels, 6th June.
- Allen Consulting (2007), *Performance of PPPs and Traditional Procurement in Australia*. (Allen Consulting, Melbourne).

¹⁸ Waterston (2012) estimates that the range of credit margins (i.e. the premium on a loan above the cost of fixed rate funding) on project finance loans is now 2.5% to 4.5%, compared to a range of 0.5% to 1% pre-crisis.

- Burger, P, Tyson, J, Karpowicz, I, Delgado Coelho, M (2009) *The Effects of the Financial Crisis on Public-Private Partnerships*, IMF Working Paper: WP/09/144, 1st July. (International Monetary Fund, Washington DC).
- Croce, R. D. (2011) Pension Funds Investment in Infrastructure: Policy Actions, *OECD Working Papers on Finance, Insurance and Private Pensions*, No. 13, (OECD, Paris).
- Cuthbert, J and Cuthbert, M (2011) The Effect of PFI Commitments on Local Authority Finances', *Fraser of Allander Economic Commentary*, 34 (3), 42-47.
- Dewatripont, M and Legros, P (2005) Public-private partnerships: contract design and risk transfer', In Reiss, A (ed.) 'Innovative financing of infrastructure: the role of public-private partnerships', *EIB Papers*, 10 (1), 120-145. (European Investment Bank, Luxembourg)
- EPEC (European PPP Expertise Centre) (2011) State Guarantees in PPPs: A Guide to Better Evaluation, Design, Implementation and Management, 12th May (EPEC, Brussels).
- EPEC (European PPP Expertise Centre) (2012) *Review of the European PPP Market: First half of 2012*, 12th September (EPEC, Brussels).
- European Parliament and Council (2012) The pilot phase of the Europe 2020 Project Bond Initiative, *Official Journal of the European Union* 31/07, (European Commission, Brussels).
- Fitch (2011) Fitch Comments on EU Project Bonds Initiative, *EMEA Special Report*, 27th April, (Fitch Ratings, New York).
- Fitch (2012) EU scheme could help catalyse European project bonds, *EMEA Special Report*, 24th May, (Fitch Ratings, New York).
- Hellowell, M and Pollock, A (2010) The private finance initiative: policy, performance and prospects', *Economic Affairs*, 29(1), 13-19.
- Hellowell (2011) NHS Cuts and PFI, *British Medical Journal*, 343. d6681.
- Hellowell, M and Vecchi, V (2012) An evaluation of the projected returns to investors on 10 PFI projects commissioned by the National Health Service, *Financial Accountability and Management*, 28(1), 77-100.
- Helm, D (2011) *PFI's and the RAB model*, Memorandum to the House of Commons Treasury Select Committee, 20th June. Available at: <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmtreasy/1146/1146we06.htm>
- HM Treasury (2004) Credit Guarantee Finance Technical Note and Draft Documentation, (The Stationery Office, London).
- HM Treasury (2005) *PFI: strengthening long-term partnerships*, (The Stationery Office, London).
- HM Treasury (2009) Treasury lending to PFI projects and the Treasury's Infrastructure Finance Unit, 5th May, (The Stationery Office, London).
- HM Treasury (2012) *PFI current projects list March 2012*, (The Stationery Office, London).
- Irwin, T (2012) Accounting Devices and Fiscal Illusions, IMF Staff Discussion Note, 28th March, (International Monetary Fund, Washington DC).
- KPMG (2009) *The use of mini-perms in UK PFI Passing fad or here to stay?* 12th June, (KPMG Infrastructure Advisory, London).
- Moody's (2011) Europe 2020 Project Bond Initiative, *Moody's Investor Service: Special Comment*, 28th June, (Moody's, London).
- Moody's (2012) Default and Recovery Rates for Project Finance Bank Loans, 1983-2010', *Moody's Investor Service: Special Comment*, 31st January, (Moody's, London).

- National Audit Office (2009) *Performance of PFI Construction*, (The Stationery Office, London).
- National Audit Office (2012) *Equity investment in privately financed projects*, (The Stationery Office, London).
- Office for Budget Responsibility (2010) *Budget Forecast 2010*, (The Stationery Office, London).
- Reviglio, E (2012) *Global perspectives for project financing*, Presentation to the Joint EC-EIB/ EPEC Private Sector Forum, Brussels, 6th June.
- Stacey, K and Kuchler, H (2012) NHS Trust to be placed into administration, *Financial Times*, 26th June. Available at:
<http://www.ft.com/cms/s/0/05128428-beea-11e1-8ccd-00144feabdc0.html#axzz26uUID9v7>
- Standard & Poor's (2009) Summary of Standard & Poor's Criteria Methodology for Refinancing risk In PPP/PFI Projects, 28th October, (Standard & Poor's, London).
- Standard & Poor's (2011) How Europe's initiative to stimulate infrastructure project bond financing could affect ratings over the next decade, *Credit FAQ*, 31st May (Standard & Poor's, London).
- Vecchi, V and Hellowell, M (forthcoming) (2013) Leasing by public authorities in Italy: Creating economic value from a balance sheet illusion', *Public Money and Management*, TBP 2013.
- Waterston, (2012) *Financing Future Infrastructure*, Presentation to the Joint EC-EIB/ EPEC Private Sector Forum, Brussels, 6th June.

DESIGN THE TENDERING PROCESS IN PPPS: A TRANSACTION COST-BASED PERSPECTIVE

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The present paper aims at developing a decision model for choosing the tendering procedure in public private partnerships (PPPs) that minimizes the transaction costs borne by the public sector. The paper proposes a baseline conceptual model that relates the level of transaction costs and the information managed during the tendering process and identifies the tendering procedure that minimizes the transaction costs. The results show that, from a transaction costs-based perspective, the best procedure includes the phase of tenderers' prequalification and the bid evaluation carried out by using complex methods, i.e. multi-criteria and composite methods, etc. Furthermore, the application of the proposed conceptual model to contexts characterized by different values of project size, project complexity, and number of bidders reveal that the choice of the tendering procedure is strongly affected by these factors. This paper provides a new conceptual tool to support the contracting authority in the design and choice of the tendering procedures in PPPs. Such a decision process is driven by the level of transaction costs borne by the public sector and aims at the minimization of the transaction costs.

Keywords: PPP, Tendering process, Transaction costs

INTRODUCTION

In last decades, due to the public budget constraints and the severe need for new or upgraded infrastructure, more and more Governments have fostered private sector involvement in public investment projects. For this reason, Public Private Partnerships (PPPs) have become a major scheme in delivering public infrastructure (Walker and Smith, 1995). The adoption of PPPs is also supported by the believe that PPPs can bring cost and time-savings and efficiencies on project delivery and operations (FHWA, 2007). Governments can in fact exploit the private technical expertise and managerial competences in managing public infrastructures. Generally, the private party of a PPP is awarded by means of a public tender. The tendering processes of PPP reveal more complicated and more costly than those of conventional procurement for two main reasons. First, the transaction in PPP involves not only the design and construction of the infrastructure but also the operations and finance, this requires that the evaluation and selection are based on a wide set of parameters. Second, governments should assure competition among private participants, this increases the number of potential bidders to be evaluated. Birnie (1997) found that tender costs for PFI projects in the UK ranged from 0.48-0.62% of the total project costs, which are higher than those for conventional procurement (i.e., design-build projects (0.18-0.32%) and traditional design-bid-build projects (0.04-0.15%)). Other estimates about impact of tendering on total PPP cost are even much higher, until to 10% (Zhang, 2005b). Furthermore, the inner characteristics of PPP, such as the huge amount of investments, the long life cycle of the agreements, the uniqueness of each project, increase the uncertainty of the transaction and require a great effort in the contract drawing and monitoring. Therefore, although PPPs can help government to fill the gap between available public finance and needed resources and may offer considerable benefits and significant savings over the entire life cycle of the project, they may increase the cost of procuring, monitoring and enforcing contracts, i.e. transaction costs, much more than traditional procurement of public investment projects (Soliño and de Santos, 2010). In fact, transaction costs vary on the basis of the amount of information to be processed and codified during the procurement process. The higher the amount of information to be managed, the higher the level of transaction costs. PPPs are characterized by a greater uncertainty and complexity than

the conventional procurement, and then by a higher level of information to be managed (Soliño and de Santos, 2010). The rationale for PPPs lies in finding ways to minimize transaction costs that can erode the cost savings achieved through them and thus undermine efficiency gains (Soliño and de Santos, 2010). For this reason, contracting authorities have to design opportunely the tendering process, in order to maximize their outcomes: by increasing the competition in the market; by shortening the time of the entire procedure, and by keeping low the transaction costs (Kwak *et al.*, 2009). Focusing on the transaction costs, Soliño and de Santos (2010) compare negotiated procedures with the open procedure and found that it is difficult to justify the employment of negotiated procedures in most PPP contracts. However, some issues are still open: how to structure the tendering process in PPP for minimizing transaction costs? Which phases and awarding methods should be used in the tendering process? How specific factors, such as the size of the project, the number of bidders, the complexity of the project, affect the choice of the tendering procedure?

In order to answer to these questions and focusing on the transaction costs borne by the public sector, the present paper develops a decision model for choosing the tendering procedure in PPP that minimizes the transaction costs. To reach this aim we develop a conceptual model that explains the relationship between transaction costs and the level of information. According to the amount of information characterizing different types of tendering procedures in PPP, the model allows the identification of the tendering procedure that minimizes transaction costs. This baseline conceptual model is also used to analyze the effect of specific factors, namely the size of the project, the number of bidders, and the project complexity, on the choice of the tendering procedure.

The paper is structured as follows. First section presents the relevant aspects characterizing the structure of tendering process in PPP. Section 2 discusses the transaction costs generally associated to PPPs. Section 3 and 4 present the baseline conceptual model to choose the tendering procedure that minimizes transaction costs and its application to contexts characterized by different values of specific factors affecting the level of transaction costs. Conclusions end the paper.

PROCEDURES FOR PPP TENDERING

An overview of the existing literature on the theme shows two relevant aspects characterizing the structure of tendering process in PPP. The first one concerns the phases of tendering process; the second concerns the awarding methods used to rank candidate partners for PPP and choose the best one. By choosing the features of these aspects it is possible to design different types of tendering procedures. As regards the first aspect, the following three main phases can be distinguished in the tendering procedure (Tiong and Alum, 1997):

- **Prequalification of tenderers.** The aim of the prequalification phase is to reduce the number of interested tenderers to a shortlist, which consists only of reputable and experienced tenderers, which are able to take over project risks. Unnecessary tendering costs of weaker bidders are avoided.
- **Bid evaluation.** This phase consists in the selection of one or more among qualified bidders. Tenderers on the shortlist are invited to submit detailed proposals that are evaluated in accordance with the predefined evaluation criteria.
- **Negotiation with preferred tenderers.** This phase consists in the negotiation prior to the final awarding with one or a few preferred tenderers. At this stage, provisions in agreements are carefully reviewed. Once the agreement is signed, a contract award notice will be published and the contract is implemented.

The literature provides also a set of methods that can be used for tenderer pre-qualification and in the bid evaluation (Table 1).

Table 1: Methods for bidder pre-qualification and bid evaluations

	Significant methods	Sources
Prequalification	• Binary method	Zhang (2004)
	• Simple scoring	
	• Multi-attribute methods	
Bid evaluation	• Simple scoring	Kwah et al. (2009), Zhang (2004), Zhang et al. (2002), Wang and Dai (2010)
	• NPV	
	• Multi-attribute analysis	
	• Two envelope method	
	• NPV+simple scoring	
	• Binary method + NPV	
	• Lowest price	
	• Shortest concession period	
	• Kepner-Tregoe technique	
	• Least Present Value of Revenues	

The above methods can use different evaluation criteria on which basing the selection of private partner. Many authors have proposed different set of criteria for choosing the best among the candidate partners for a PPP project. Also in this case, some authors focused on prequalification criteria, while many else proposed criteria to be satisfied for the bid evaluation. Table 2 shows a summary of significant criteria selected in the literature.

Table 2: Criteria for bid evaluations.

	Significant criteria	Sources
Financial and Economical criteria	<ul style="list-style-type: none"> • Sound financial analysis • Reasonable source and structure of funds • Innovation of financing method • Net present value • Tariff/toll setting up and adjustment mechanism • Ability to address commercial risk (e.g., supply and demand risks) • Minimal financial risks to the client • Internal rate of return • Financial strength of the participants in the project company • Financial guarantee • Total investment schedule • Concession period • Strong financial commitments from shareholders • Pay-Back Period • Profitability Index 	Zhang (2005a), Rudzianskaite et al. (2010)
Technical criteria	<ul style="list-style-type: none"> • Qualifications and experiences of key design and construction personnel • Experience in similar projects • Conforming to client's requirements • Competencies of designer/sub-designers • Contractor/subcontractors • Conforming to design requirements • Construction programs and abilities to meet them • Design and construction quality control schemes • Use of advanced technologies • Maintainability • Design life • Design standard • Quality management and assurance systems 	Zhang (2005a), Wang et al. (2007)
Safety, Health, and Environmental Criteria	<ul style="list-style-type: none"> • Qualifications/experience of relevant personnel • Management system of safety, health and environment • Conformance to laws and regulations • Construction/demolition waste disposal • Control of air and water pollution • Past environmental performance • Protection of items of cultural/archeological values • Management safety accountability • Noise reduction and dust reduction 	Wang et al. (2007), Zhang (2005a), Rudzianskaite et al. (2010)
Social Criteria	<ul style="list-style-type: none"> • Importance of the project for public transport 	Rudzianskaite et al. (2010)
Managerial Criteria	<ul style="list-style-type: none"> • Project management skills • Constitution of the management, their qualification and experience • Coordination system within the consortium • Success rate of cooperation among private consortium • Leadership and allocation of responsibilities in the consortium • Effective project controlling system • Working relationship among participants 	Zhang (2005a), Wang et al. (2007)

TRANSACTION COSTS IN PPP

The international literature reports several definitions about transaction costs. Coase (1937) who firstly introduced this concept defines transaction costs as the costs of using price mechanism due to the need for specifying, negotiating and enforcing contracts. Wallis and North (1986) define transaction costs as the costs for making exchanges among people. Niehans (1969) defines transaction costs as the costs associated with the transfer of ownership from one individual to another. Williamson (1985) uses transaction costs to explain the different forms of organization and contractual arrangements. He defines transaction costs as the costs of drafting, negotiation and safeguarding an agreement, and also the costs of haggling, costs of governance, bonding costs to secure commitments (Williamson, 1985). Transaction costs are usually divided into two categories: 'ex-ante' or front-end transaction costs and 'ex-post' or back-end transaction costs (Arrow, 1974; Williamson, 1985; Soliño and de Santos, 2010). Ex-ante transaction costs refer to the tasks of defining, negotiating, and maintaining an agreement. They include search and information costs, i.e., transaction costs incurred in determining whether the required good is available on the market, its lowest price and so on, and bargaining costs, i.e., costs to reach an agreement and draft an appropriate contract. Ex-post transaction costs include the monitoring and enforcing costs, due to the need for monitoring that the other party fulfils the terms of the contract and taking an appropriate action if not.

In public procurement transaction costs borne by public sector can be divided into two main categories: initiation / procurement costs and contract management costs. Initiation and procurement costs are related to the first two phases of the procurement process and are mainly due to the activities prior to signing the contract. Contract management costs are mainly related to the activities that occur after closing out procurement of the contract (after signing the contract) such as operations and maintenance quality controls, contract enforcement, and dispute resolutions (Farajian and Cui, 2010). Transaction costs related to the various procurement situations vary on the basis of the amount of information to be processed and codified. The higher the customization (i.e., uniqueness and uncertainty) of the supply, the more its transaction needs the exchange and sharing of uncoded (or less coded) knowledge and information. Quantity and level of codification, and therefore transaction costs, varies significantly according to what is transacted (Costantino and Pietroforte, 2005). In fact, if we consider commodities (e.g., standard supplies), their procurement process is characterized by a reduced amount of information flows with high levels of codification, a decreased risk of contractual hazard and opportunistic behavior. On the other hand, if we consider customized supplies, their procurement process is characterized by an increased amount of information flows with varying extents of codification and an increased risk of contractual hazards and opportunistic behavior.

Focusing on PPPs, their characteristics, such as the rare occurrence of contracts, the long life-cycle of the agreements, the complex revenue streams, the uncertain demand, and the uniqueness of each project, determine procurement situations that are much more uncertain than those associated with conventional procurement, thus increasing the level of information to be managed (Soliño and de Santos, 2010). This can often cause significant transaction costs (Ho and Tsui, 2009). In PPPs, several entities with different goals participate to the transaction, so increasing the probability that opportunistic behaviors rise from all sides and making the negotiations more expensive. The complexity and uncertainty of trade relationships imply that it is impossible to plan for every potential contingency and that, even if every contingency could be predicted, it would be probably difficult to write down these plans in a contract between two parties that is enforceable by law. In other words, the contracts are incomplete and therefore must constantly be revised or renegotiated as time goes on (de Bettignies and Ross, 2004). Dudkin and Valila (2006), focusing on PPPs in UK, find that the costs related to the only process of procurement will amount on average to well over 10 percent of the capital value of the project. There are other major transaction costs that are hidden and not easily assessed, such as the opportunism costs due to renegotiation and hold-up problems (Ho, 2006). All these costs may potentially erode the savings achieved through PPPs undermining the expected benefits in PPPs. Therefore, an important challenge in PPP implementation is to reduce these transaction costs to an acceptable level.

A BASELINE CONCEPTUAL MODEL FOR CHOOSING PPP TENDERING PROCEDURES: A TRANSACTION COSTS–BASED APPROACH

As described in Section 2, during the selection of the private party the contracting authority can design different types of tendering procedures by choosing the phases to be implemented in the tendering process and the awarding methods for ranking candidate partners with the evaluation criteria. The resulting different types of tendering procedures will require different amount of information to be managed (Lingard *et al.*, 1998). It is possible to classify three main types of tendering procedures on the basis of the phases included and the methods adopted.

- *Single Phase Procedure (SPP)*: including only the phase of bid evaluation carried out by using simple methods, i.e. simple scoring method and best price;
- *Dual Phase Procedure (DPP)*: including two phases: i) the prequalification of tenderers and ii) the bid evaluation carried out by using complex methods, i.e. multi-criteria and composite methods, etc.;
- *Three Phase Procedure (TPP)*: including all the three phases: i) the prequalification of tenderers, ii) the bid evaluation carried out by using complex methods, i.e. multi-criteria and composite methods, etc., and iii) negotiation with preferred tenderers.

The identified tendering procedures are characterized by a different level of information. In particular, procedure *SPP* deals with a low level of information before the partner selection. In absence of the prequalification phase, there is no need for reviewing the competences of all prospective bidders, thus causing the likelihood of having ex-post adaptation and changes to be an important feature of the transaction, and the need to manage ex-post a great amount of information. Procedures *DPP* and *TPP* deal with a greater amount of ex-ante information since the prequalification phase requires the collection of prospective bidders' performance. In addition for *TPP* the negotiation with preferred tenderers brings to a more detailed contract. The greater the ex-ante information to be managed, the lower the amount of ex-post information requirements and the probability of ex-post adaptation and changes. Figure 1 shows the amount of ex-ante and ex-post information characterizing each type of tendering procedure.

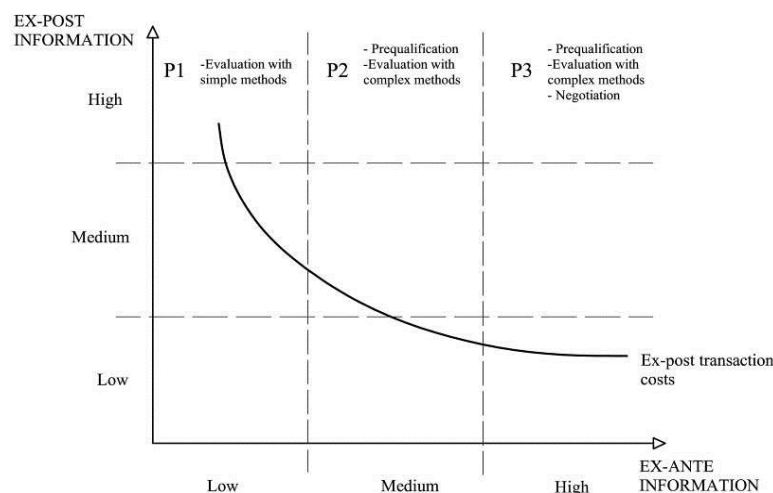


Figure 1: Ex-ante and ex-post information characterizing tendering procedures

As highlighted in Section 3, information can be considered as a prime source of transaction costs (Cassom, 1994; Holstrom and Tirole, 1989). Therefore, each tendering procedure is characterized by different levels of transaction costs according to the amount of information managed. On one hand, *TPP* is characterized by high costs for collecting information on all prospective tenderers for the purpose of making a partner selection decision (high level of ex-ante transaction costs). Gathering great amount of information surely increases bargaining costs (costs to reach an

agreement and draft an appropriate contract). Contrarily, the ex-post costs for monitoring and eventually enforcing the contract will be reduced, since the incompleteness of the contracts is reduced and the selected partner would be less likely to engage in opportunistic behavior. On the other hand, *SPP* manages little information about prospective tenderers prior to the award of the contract causing a low level of ex-ante transaction costs. However, it is likely that ex-post costs will be high, due to the need for close monitoring of private party activities and the increased possibility of costly legal disputes and claims. Figure 2a and 2b show the trend of ex-ante and ex-post transaction costs associated to each tendering procedure.

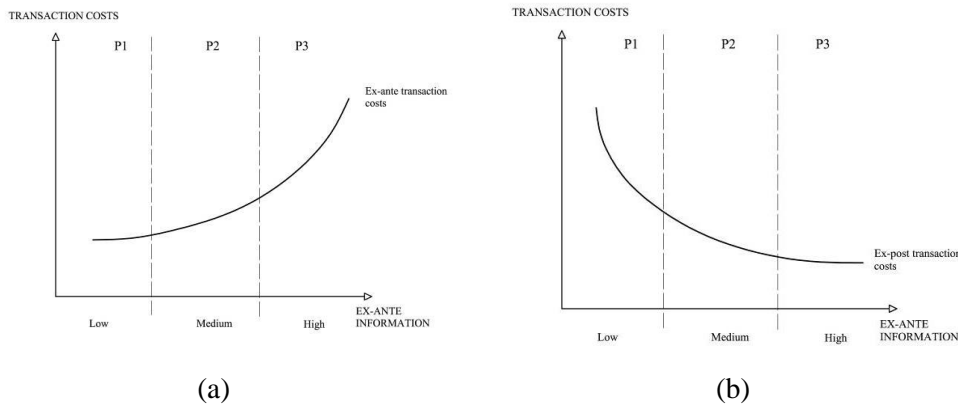


Figure 2: Ex-ante (a) and ex-post (b) transaction costs for different tendering procedures

Considering the total transaction costs as the sum of the two components, the tendering procedure that minimizes the transaction costs is DPP, as shown in Figure 3.

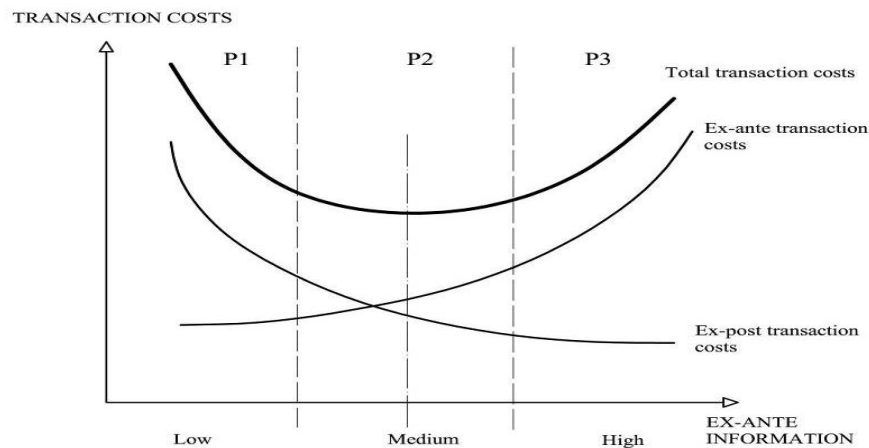


Figure 3: Tendering procedure that minimizes the transaction costs

FACTORS AFFECTING THE CHOICE OF THE PPP TENDERING PROCEDURE

The level of transactions costs in PPP projects is strongly affected by several factors, such as the size of the project, the number of bidders, the level of complexity of the project (Farajian and Cui, 2010). The proposed baseline model has been used to choose the tendering procedure in contexts characterized by different values of these factors with the aim of minimizing the transaction costs, as discussed in the follow.

The project size

The project size can be measured in terms of investments required by the project. According to the data collected on projects financed by the European Investment Bank, the level of transaction costs in the procurement of infrastructure in PPP projects are, on average, about 10 percent of the

capital value of the project, and the overall transaction cost of the project for the public sector is about 2-3% of the capital value of the project. Empirical studies reveal that the ex-ante transaction costs borne by the public sector for small size projects (capital value below £25 million) are significantly higher than those for bigger projects in terms of the percentage of the total capital value of the project (Dudkin and Vålilä, 2006; Farajian and Cui, 2010). Such an inverse relationship occurs because many of the transaction activities included in the tendering procedure stay the same, no matter what the size of the project. Therefore, the larger is the size of the project, the lower is the incidence of ex-ante transaction costs. This is coherent to the widely accepted notion that the high transaction costs characterizing PPPs necessitate a minimum project size for a partnership to be a financially and economically viable option. On the contrary, ex-post transaction costs increase when the project size increases, due to a greater effort posed by the public sector in the monitoring process (Torres and Pina, 2001). Figure 4 depicts the effect of the project size on the transaction costs and reveals that when the project size increases the tendering procedure that minimizes the transaction costs is *TPP*.

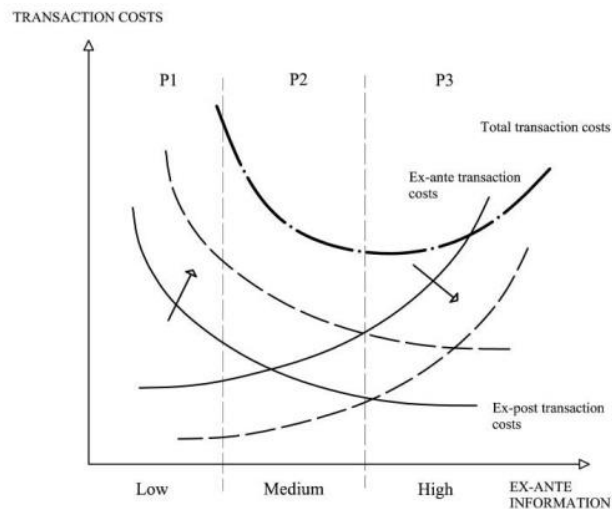


Figure 4: The effect of the project size on the transaction costs

The number of bidders

Ex-ante transaction costs could be expected to increase when the number of bidders increases because of an higher amount of information to be managed during the project initiation and procurement process. Ex-post transaction costs are generally higher when the number of bidders is low, because the consequent absence of competition is likely to result in a higher probability of contract renegotiation during the project life cycle. At the same time, ex-post transaction costs increase with the number of bidders, because the high level of competition reduces the effort of the participants in preparing the bid as they perceive a low probability of winning the tender. There is a U-relationship between the ex-post transaction costs and the number of bidders (Dudkin and Vålilä, 2006). Empirical studies on real PPP projects show that the average number of participants in a bidding process ranges mostly from 2 to 4 (Dudkin and Vålilä, 2006; Estache *et al.*, 2008). This is the reason why the rising part of U-relationship has been not considered. Figure 5 depicts the effect of the number of bidders on the transaction costs and reveals that when the number of bidders increases the tendering procedure that minimizes the transaction costs is *SPP*.

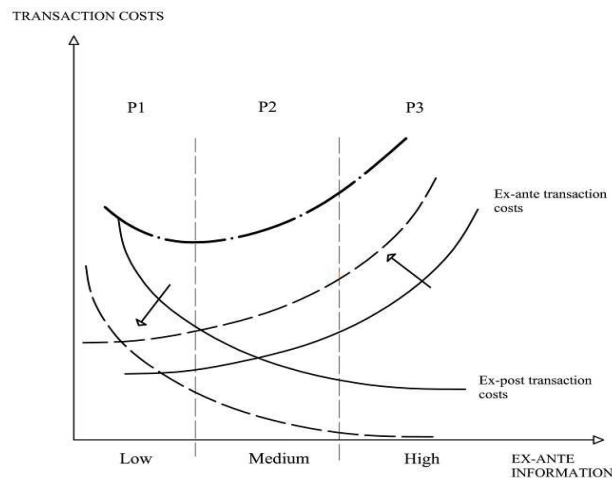


Figure 5: The effect of the number of bidders on the transaction costs

The Project Complexity

The project complexity depends on a wide range of factors, namely technical, legal, political, and economic, embedded into the entire PPP project life-cycle (De Meyer *et al.*, 2002; Luhmann and Boje, 2001; Müller and Gerald, 2007; Remington *et al.*, 2009; Williams, 2002). However, it is possible to identify two primary sources of complexity (Boushaala, 2010; Gerald, 2008; Gidado, 1996; Ng and Loosemore, 2006):

- difficulty: the complexity of the infrastructure project itself due to the design and technological complexity of the construction process;
- uncertainty: the complexity of the operating phase due to the long time-frame of concession contracts that increases the uncertainty in the business forecasting (revenue, costs, volume, etc.).

The complexity related to the design and construction process will require a great amount of information to be managed in the first phase of the procurement process (ex-ante information). The complexity of the operating phase will increase the effort in the monitoring process and the likelihood of having ex-post adaptation and changes (i.e., renegotiation). These increase the need to manage ex-post a great amount of information. As a result, the project complexity increases transaction costs. Three different scenarios can be hypothesized:

1. Ex-ante and ex-post transaction costs increase in the same manner assuming a same level of complexity in the construction process and operating phase: The best tendering procedure that minimizes the total transaction costs is *DPP* (Figure 6a);
2. Ex-ante transaction costs increase more than ex-post transaction costs, assuming that the complexity of the construction process is higher than the complexity of the operating phase: the best tendering procedure that minimizes the total transaction costs is *SPP* (Figure 6b);
3. Ex-post transaction costs increase more than ex-ante transaction costs, assuming that the complexity of the operating phase is higher than the complexity of the construction process: the best tendering procedure that minimizes the total transaction costs is *TPP* (Figure 6c).

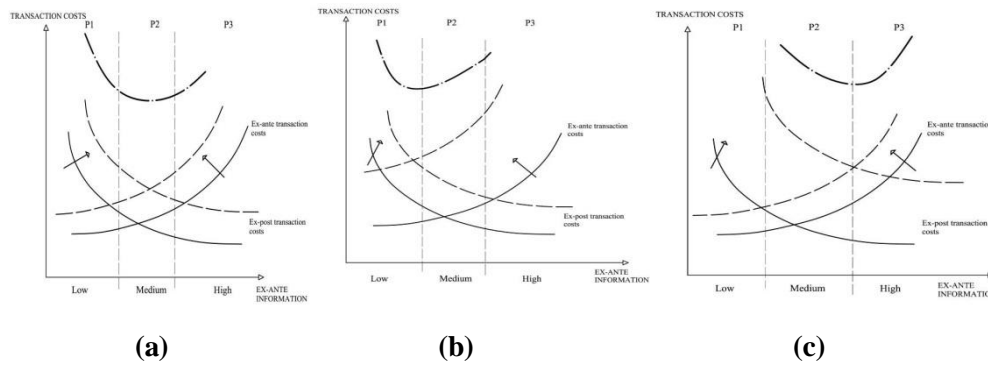


Figure 6: The effect of the project complexity on the transaction costs

CONCLUSIONS

PPP is chosen as a delivery method of public infrastructures when it allows the achievement of cost-savings if compared to conventional procurement. However, it is widely recognized that the tendering process in PPP requires a greater effort in terms of time, resources, and costs. For this reason, contracting authorities have to design opportunely the tendering process, in order to maximize their outcomes: by increasing the competition in the market; by shortening the time of the entire procedure, and by keeping low the costs of procuring, monitoring, and enforcing contracts, i.e., transaction costs. This paper provides a conceptual tool to support the contracting authority in the design and choice of the tendering procedures in PPPs. The driver of such decision process is the level of transaction costs borne by the public sector and its aim is the minimization of the transaction costs. On the basis of two relevant aspects characterizing the structure of tendering process in PPP, namely the phases of tendering process and the awarding methods used to rank candidate partners for PPP and choose the best one, we have identified three main tendering procedures, each dealing with a different amount of information. We have developed a baseline conceptual model that relates the level of transaction costs and the information managed during the tendering process and identifies the tendering procedure that minimizes the transaction costs. We found that the best procedure includes the phase of tenderers' prequalification and the bid evaluation carried out by using complex methods, i.e. multi-criteria and composite methods, etc. (*DPP*). We have further applied the proposed conceptual model to contexts characterized by different values of project size, project complexity, and number of bidders. The results show that when the project size increases, the tendering procedure that minimizes the transaction costs includes all the three phases: the prequalification of tenderers, the bid evaluation carried out by using complex methods, and negotiation with preferred tenderers (*TPP*). We found that when the number of bidders increases the best tendering procedure includes only the phase of bid evaluation carried out by using simple methods, i.e. simple scoring method and best price (*SPP*). Finally, as concerns the effect of the project complexity on the choice of the tendering procedure, three scenarios have been identified on the basis of the level of complexity characterizing the construction process and the operating phase:

- *Scenario 1*: same level of complexity in the construction and operations;
- *Scenario 2*: complexity in the construction higher than in operations;
- *Scenario 3*: complexity in operations higher than in the construction;

The optimal procedures are DPP, SPP, and TPP in Scenarios 1, 2, and 3 respectively.

The main contribution of this study lies in offering a new conceptual approach, based on transaction costs, for supporting the public authority in the decision-making process about the tendering procedures in PPPs without imposing the selection of a specific tendering. The main limitation of this study is due to the conceptual nature of the proposed model. The on-going work on this topic aims at empirically testing the model. To do this we are defining an analytical relationship between the transaction costs and the level of information and how this relationship is affected by the three factors, namely the size of the project, the number of bidders, and the

complexity of the project. Further researches will be devoted to test the developed model on real cases.

REFERENCES

- Arrow, K.J. (1974), *The limits of organization*. New York: Norton.
- Birnie, J. (1997), Risk Allocation to the Construction Firm within a Private Finance Initiative (PFI) Project, ARCOM Conference Proceedings, pp. 527-534.
- Boushaala, A.A. (2010) Project Complexity Indices based on Topology Features, *World Academy of Science, Engineering and Technology*, Vol. 69, pp. 49-54.
- Casson, M. (1994) Why are firms hierarchical?, *Journal of the Economics of Business*, Vol. 1, pp. 47-76.
- Coase, R.H. (1937) The Nature of The Firm, in *Economica*.
- Costantino, N. and Pietroforte, R. (2005), The diffusion of B2B in the construction market: organizational and technological determinants, CIB 2005, Helsinki, Joint Symposium.
- de Bettignies, J.E. and Ross, T.W. (2004), The Economics of Public-Private Partnerships, *Canadian Public Policy*, 30 (2), pp. 135-154.
- De Meyer, A., Loch, C.H. and Pich, M.T. (2002), "Managing project uncertainty: From variation to chaos", *MIT Sloan Management Review*, Vol. 43 No. 2, pp. 60-67.
- Dudkin, G., and Väililä, T. (2005), "Transaction Cost in Public Private Partnerships: A First Look at the Evidence", *European Investment Bank*.
- Estache, A., Guasch, J.L., Iimi, A. and Trujillo, L. (2008), "Multidimensionality and Renegotiation: Evidence from Transport-Sector Public-Private- Partnership Transactions in Latin America", *World Bank Policy Research Working Paper*, N. 4665.
- Farajian, M. and Cui, Q. (2010), "Estimating Transaction Cost in Public-Private Partnerships", *AEC Innovation Conference*, June 9-11, State College, PA.
- FHWA, J. D. (2007), *Hearing on Innovative Contracting in Public-Private Partnerships before the Committee on Transportation and Infrastructure Subcommittee on Highways and Transit US House of Representatives*.
- Geraldi, J. (2008), "Patterns of complexity: The thermometer of complexity", *Project Perspectives 2008*, The Annual Publication of International Project Management Association, pp. 4-9.
- Gidado, K.I. (1996), "Project complexity: The focal point of construction production planning", *Construction Management and Economics*, Vol. 14, pp. 213-225.
- Ho, S. P. (2006), "Model for Financial Renegotiation in Public-Private Partnership Projects and Its Policy Implications: Game Theoretic View", *Journal of Construction Engineering and Management*, Vol. 132 No. 7, pp. 678-688.
- Ho, S.P. and Tsui, C.W. (2009), "The transaction cost of Public Private Partnerships: Implications on PPP Governance Design", *LEED 2009*, Colorado.
- Holmstrom, B.R. and Tirole J. (1989), "The theory of the firm", *Schmalensee, R. and Willig, R.D., Handbook of Industrial Organization*, Vol. 1, Elsevier Science Publishers, Amsterdam.
- Kwah, Y.H., Chih, Y-Y. and Ibbs, C.W. (2009), "Towards a Comprehensive Understanding of Public Private Partnerships for Infrastructure Development", *California Management Review*, Vol. 51 No.2, pp. 51-78.
- Lingard, H., Hughes, W. and Chinyio, E. (1998), "The impact of contractor selection method on transaction costs: a review". *Journal of Construction Procurement*, Vol. 4 No. 2.

- Luhman, J., and Boje, D. (2001), "What Is Complexity Science? A Possible Answer from Narrative Research", *Emergence: Complexity and Organization*, Vol. 3 No. 1, pp. 158–168.
- Muller, R., and Geraldi, J. G. (2007), "Linking complexity and leadership competences of Project Managers", IRNOP VIII Conference (International Research Network for Organizing by Projects), Brighton.
- Ng, A. and Loosemore, M. (2006), "Risk allocation in the private provision of public infrastructure", *International Journal of Project Management*, Vol. 25, pp. 66-76.
- Niehans, J. (1969), "Money in a Static Theory of Optimal Payments Arrangements", *Journal of Money, Credit, and Banking* (November), pp. 706–26.
- Remington, K., Zolin, R. and Turner, R. (2009), "A model of project complexity: distinguishing dimensions of complexity from severity", *Proceedings of the 9th International Research Network of Project Management Conference*, 11–13 October 2009, Berlin
- Soliño, A.S. and de Santos, P.G. (2010), "Transaction Costs in Transport Public–Private Partnerships: Comparing Procurement Procedures", *Transport Reviews: A Transnational Transdisciplinary Journal*, Vol. 30 No. 3, pp. 389-406.
- Tiong R.L.K. and Alum J., (1997), "Evaluation of proposal for BOT projects", *International Journal of Project Management*, Vol. 15 No. 2, pp. 67-72.
- Torres, L. and Pina, V. (2001), "Public-private partnership and private finance initiatives in the EU and Spanish local governments", *The European Accounting Review*, Vol. 10 No. 3, pp. 601-619.
- Walker, C., and Smith, A. J. (1995), "Privatized Infrastructure", American Society of Civil Engineers, New York, NY.
- Wallis J. and North, D. (1986), *Measuring the transaction sector in the American economy, 1870-1970*, in: S. Engerman, R. Gallman (eds), *Long-term Factors in American Economic Growth*, NBER Studies in Income and Wealth, vol. 51, The University of Chicago Press, Chicago, 1986.
- Wang, D. and Dai D. (2010), "Research on the Concessionaire selection for Build-Operate-Transfer Projects", *Proceedings of International Conference on Management and Service Science (MASS)*, Wuhan (China), 24-26 August.
- Wang, W-X., Li, Q-M., Deng, X-P., Li, L-H. and Cai, Y. (2007), "Selecting Optimal Private-Sector Partner in Infrastructure Projects under PPP Model", *Proceedings of International Conference on Management Science and Engineering (ICMSE 2007)*, Harbin (China), 20-22 August.
- Williams, T. (2002), *Modelling Complex Projects*, John Wiley & Sons, Ltd.
- Williamson, O.E. (1985), *The Economic Institutions of Capitalism*, New York Free Press, New York Mac Millan.
- Zhang X., Kumaraswamy M.M., Zheng W. and Palaneeswaran E., 2002, *Concessionaire Selection for Build-Operate-Transfer Tunnel Projects in Hong Kong*, *Journal of Construction Engineering and Management*, Vol. 128, No. 2, pp. 155-163.
- Zhang, X. (2004), "Concessionaire Selection: Methods and Criteria", *Journal of Construction Engineering and Management*, Vol. 130 No. 2, pp. 235-244.
- Zhang, X. (2005a), "Criteria for Selecting the Private-Sector Partner in Public–Private Partnerships", *Journal of Construction Engineering and Management*, Vol. 131 No. 6, pp. 631-644.
- Zhang, X. (2005b), "Critical Success Factors for Public–Private Partnerships in Infrastructure Development", *Journal of Construction Engineering and Management*, Vol. 131 No. 1, pp. 71-80.

A CRITICAL ANALYSIS OF PFI PROJECTS IN THE UK HEALTH SECTOR

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The Private Finance Initiative (PFI) has become a popular tool used by governments in the UK and elsewhere for procuring infrastructure and other facilities. In recent times, there have been opposing views on the merits of the PFI in relation to other procurement routes. In the UK, for example, government functionaries and interest groups such as the Confederation of British Industry (CBI) and Infrastructure UK have extolled the virtues of PFI as an effective tool for governments to deliver projects, especially in times of public budgetary constraints. On the other hand, groups like the British Medical Association (BMA), UNISON and Globalise Resistance have criticised the approach mainly for not providing value for money. The aim of this study therefore was to investigate the views of some stakeholders on the use of PFI in the UK health sector which is one of the sectors affected most by the current public sector spending cuts which the present Coalition Government has implemented since 2010. Data obtained from a questionnaire survey and interviews with respondents in Northwest England were analysed using percentage scores and Relative Importance Index (RII) with the aid of the SPSS software. The findings showed that the life time maintenance of facilities which PFI provides is the key motivation for using PFI. Over 90% of the respondents agreed that PFI provides value for money. The main issue raised against PFI was the high lifetime “mortgages” which NHS institutions have to pay in addition to operational, refurbishment and other cost.

Keywords: Critical success factors, Health sector, Private Finance Initiative, Value for money, UK.

INTRODUCTION

Private finance initiative (PFI) is a form of public private partnership (PPP) which liberalises the way public services are procured. According to Broadbent *et al.*(2003), this approach opens up the provision of public services so that they can be procured not only from public sector organisations but also from both the public and private sectors in some form of partnership between the two sectors. Under the PFI arrangement, the public sector engages the private sector to finance, design, construct and operate a facility to provide a required service to satisfy public demand. In the UK, this arrangement has been used for a variety of projects including the Channel Tunnel rail link and the Parc Prison in Bridgend, Wales(Kirk and Wall, 2001). PFI has been used extensively in the health sector in the UK under the National Health Service (NHS). It has enabled NHS Trusts to deliver healthcare services without owning and managing the physical infrastructure in which the services are delivered. According, to Froud and Shaoul (2001), the Trust typically enters an agreement for 25 to 35 years and pays a service charge (mortgage) annually to a private sector provider who also services the facilities. This arrangement has been touted as the solution to years of under-investment in the provision of facilities in the NHS. It is therefore not surprising that successive governments (both Labour and Conservative) in the UK have embraced the system (Froud and Shaoul, 2001).

EVOLUTION OF PFI IN THE UK

Before the 1990s, UK governments were not keen on the idea of allowing private capital to finance public sector projects. This position was entrenched in the Ryrie Rules which were established in 1981 by the National Economic Development Council (NEDC) under the leadership of Sir William Ryrie. In February 1998, the rules were revised to allow for the introduction of mixed public-private sector funding and partnership schemes in public sector projects. According to Allen (2003), the two fundamental grounds for private finance in public sector projects were to offer cost effectiveness and for the government to include them in public expenditure planning. The Ryrie rules were replaced in 1992 by the Private Finance Initiative proposed by Norman Lamont. Lamont, the then Chancellor of the Exchequer, emphasised that the operation of PFI should ensure a sensible balance between the need to protect taxpayers' interests and taking full advantage of investment opportunities in the public sector (Allen, 2003).

PFI was introduced to achieve closer public-private sector partnerships in project delivery with the key aim of transferring risks from the public sector to the private sector to ensure value for money. When Kenneth Clarke was the Chancellor of the Exchequer in 1993, he decided to develop it further by creating a Private Finance Panel (PFP) whose role was to encourage the participation of both sectors in PFI and identify areas of need in the public sector where the private sector could help (Allen, 2003). The use of PFI in the UK has undergone several reviews by governments since the Clarke years. According to Allen (2003), the Bates review of 1997 made 27 recommendations, including the creation of a task force within the Treasury Department to help foster PFI expertise in government. Yet another review by Sir Bates in 1999 led to the creation of Partnership UK which was charged with the responsibility of sourcing development funding for PFI projects.

THE USE OF PFI IN THE NHS

According to Shaoul *et al.* (2008), PFI is at the root of the UK government's healthcare modernisation agenda to renew the nation's aging health facilities. In this regard, it is claimed by the government that PFI will provide more value for money (VFM) over the life of the projects on the premise that the private sector is more efficient and innovative than the public sector in managing both resources and risks. PFI enables NHS Trusts to lease their new or refurbished facilities, and procure all their non-clinical services from private sector partners for a period of up to about 30 years, instead of owning their own hospitals (Shaoul *et al.*, 2008). According to Treasury (2006), cited in Shaoul *et al.* (2008), the capital value of the 155 PFI projects promoted by the UK government stood at about £8.8b by 2006. Shaoul *et al.* (2008) also report that the first NHS PFI contract was signed in 1997 and the first PFI hospitals were commissioned in the year 2000. They add that since 1997, nearly all the new NHS hospitals in England have been procured with PFI.

The key findings of a report by the National Audit Office (2010) indicate that most PFI projects in the NHS have performed satisfactorily and even exceeded the expectations of the Trusts in some cases. However, several research reports indicate that the situation is not as rosy as the National Audit Office paints it. For example, Shaoul *et al.*, (2008) have reported that NHS Trusts' annual payments to private sector PFI project partners are higher than expected and are taking 11% of their budgets. They add that PFI charges create budget inflexibilities and are increasing the pressure on the NHS to cut their largest cost, which include staff pay and welfare costs. The British Medical Association in a press briefing in 2010 provided a list of reports highlighting what it called "money wasted as a result of market-driven reforms in the NHS" and focusing on NHS's PFI projects (BMA, 2010). It added that the NHS was expected to come under funding pressure after 2011 as a result of its very high payments for PFI projects, and this may lead to reductions in spending on health. This inevitably will lead to job losses, and negatively impact working conditions and the quality of service provided to the taxpayer. Liebe and Pollock (2009) have also contended that the cost of finance under PFI is higher compared with conventional procurement. In addition, they provide evidence to show that returns to private sector partners in PFI were about 2.4% above what they could earn under conventional investments. Hellowell and Vecchi (2012)

have also argued that the NHS cannot afford to continue to pay excessive rates of return to private investors in their PFI projects. In fact, according to Torjesen (2012), as many as 22 NHS trusts are currently experiencing serious financial problems as a result of expensive PFI projects. This seems to be the basis of the contentious issue and criticisms that the private sector is profiteering in PFI (Dawson, 2001; Davis and Dowdeswell, 2003).

CRITICAL SUCCESS FACTORS AND VALUE FOR MONEY IN PFI PROJECTS

Rockart (1982), cited in Bing *et al.* (2005), 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’. In an international comparative study of factors contributing to the success of PPP/PFI projects, Cheung *et al.* (2012) identified and ranked 18 factors ranging from ‘Stable macro-economic condition’ to ‘Thorough and realistic assessment of the cost and benefits’. They found the 3 most important factors in the UK to be ‘Strong and good private consortium’, ‘Appropriate risk allocation and risk sharing’, and ‘Available financial market’. The least important factor was ‘Social support’.

The Office of Government Commerce (OGC), cited in Ruane (2010), asserts that the aim of PFI is to deliver better value for the taxpayer by challenging projects on deliverability, affordability and value for money. This claim is highly contested due to the exceptionally high cost of finance entailed in PFI (Liebe and Pollock, 2009). Hellowell and Pollock (2009) also contend that profiteering by private investors in PFI is evidence of bad value for the public sector. On the other hand, Allen (2003) believes that the main benefit of transferring risk to the private sector may be eroded as risk and reward go hand in hand; the higher the perceived risk carried by the private sector, the greater the risk premium that will be charged by private sector investors to compensate for the risk exposure. This will seem to suggest that transferring risk to the private investor may not necessarily yield benefits to the public sector client.

AIM OF THE RESEARCH

Opposing views on value for money in PFI projects in the NHS have been discussed in the previous sections. It is clear from these discussions that both sides of the debate have very strong opinions in their support for and opposition to the continued use of the PFI procurement approach. It is against this background that this research sought to investigate the views of both private and public sector stakeholders on the merits and demerits of the extensive use of PFI by the NHS. The aim of the study was to identify the key elements of that promote and diminish value for money in NHS PFI projects.

RESEARCH METHODOLOGY, DATA ANALYSIS AND RESULTS

The researchers adopted a mixed methods research approach to obtain both quantitative and qualitative data. Using a convenience sampling approach based on their knowledge of the construction industry in Cumbria and Lancashire in north west of England, the researchers sent questionnaires to 50 respondents online in February 2011 using the SurveyMonkey© web-based tool. Of the 24 the respondents who completed and returned the questionnaires, 3 were found to have no knowledge of PFI at all and were hence excluded from the analysis. The 21 responses used for the analysis was rather low and would not permit any generalisation of the results. To minimise the effect of this weakness, interviews were conducted with 3 participants representing the public sector client organisation (NHS) and the private sector contractor organisation.

The data collected from the questionnaire survey were analysed using frequency analysis, percentage scores and relative importance index (RII). RII was used to rank the critical success factors for PFI and some of the perceived problems associated with PFI. These factors and problems were evaluated using a Likert scale ranging from 1= very significant, to 5= very insignificant. RII is given by the formula:

$$RII = \frac{1}{5n} \left[\sum_{i=1}^{i=5} W_i \times f_i \right],$$

where W_i is weight given to i^{th} rating; $i = 1, 2, 3, 4$ or 5 , f_i = response frequency of the i^{th} rating; and n = total number of responses.

Respondents' Distributions and Profiles

The background profile of the companies and respondents from which information was obtained is presented in Table 1.

Table 1: Profile of Respondents

Profile	Frequency	Percentage
Type of organisation		
Private sector	14	67%
Public sector	7	33%
No. of years of experience of respondents		
Less than 1 year	3	14.3%
1-5 years	5	28.8%
5-10 years	4	19.0%
Over 10 years	9	42.9%

Evaluation of Critical Success Factors and the Problems Associated with PFI.

The respondents were asked to assess some critical success factors and problems associated with PFI in NHS on a 5-point Likert scale ranging from "Very significant" to "Very insignificant".

Table 2 reveals that the life maintenance of facilities provided by PFI is perceived as the main attraction for PFI. The transfer of risk to the private sector is also very important. The least important is the re-financing arrangement which PFI can accommodate.

Table 2: Ranking of success factors in PFI Projects*

Factor	RII	Rank
Life time maintenance	0.30	1
Transfer of risk	0.32	2
Expertise of the private sector	0.33	3
Penalties for non-provision of services	0.52	4
Competitive procurement process	0.55	5
Facility for re-financing	0.62	6

*1= very significant, 5= very insignificant

In Table 3, the results indicate that the long-term payments the client has to make constitute the main problem respondents associate with PFI projects in the NHS. Obviously this cannot be avoided if the client would continue to enjoy the long-term maintenance offered by the PFI provider: the client cannot eat his cake and have it.

Table 3: Ranking of problems associated with PFI

Factor	RII	Rank
Life time contract	0.43	1
Cost cutting by NHS to cope with payments for PFI	0.69	2
Public perception of PFI as waste of taxpayers' money	0.70	3
High tender costs	0.72	4

Perception of Value for Money in PFI

The respondents were asked to indicate their agreement with the statement the that “PFI offers value for money to the NHS”.

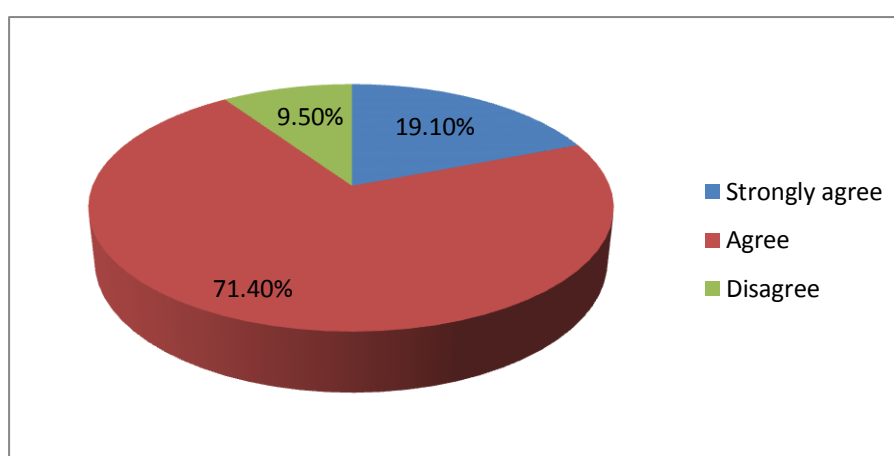


Figure 1: **Perceptions of value for money in PFI**

The results in Figure 1 show that a large majority of the respondents (90.5%) agree that PFI provides value for money for the NHS.

Based on the small sample used for this study, it will not be appropriate to generalise these findings as representing the general perception of PFI.

THE INTERVIEW RESULTS

In order to get more in-depth understanding of respondents' views on the subject of this study, interviews were conducted with 3 interviewees who have been involved in PFI projects. Interviewee 1 works in NHS while Interviewees 2 and 3 work in private sector organisations.

Interviewee 1

When asked if PFI provided money for his organization, he explained that taking everything into consideration, PFI gave value for money. He added that PFI built hospitals that are amazing to look at; and this standard is maintained over the life of the contract. He compared PFI hospitals with old traditionally procured hospitals which do not enjoy the same level of maintenance as PFI hospitals and incur huge refurbishment costs to the NHS. He pointed out that the mortgage payments over a long period are an issue and added that the NHS uses benchmarking from Her Majesty's (HM) Treasury as a guide for assessing value for money in PFI projects.

Interviewee 2

Interviewee 2 agrees with the views expressed by Interviewee 1 although they represent different sides in the PFI equation. He admitted that the figures involved in PFI projects are quite staggering compared to traditionally procured projects, but he added that this is only because life cycle costs are often not taken into consideration when PFI projects are assessed by the public. He added that, as private providers, they are subject to penalties when they fail to provide the services they contract to deliver in PFI. He also confirmed that the private sector providers are subject to the same HM Treasury value for money guidelines. In this regard, the private sector providers have affordability parameters they use to fix the mortgage charges to be paid by the NHS.

Interviewee 3

While agreeing largely with the views of Interviewees 1 and 2, Interviewee 3 stressed the point that the hospitals are maintained to a standard that represents the “as built” throughout the duration of the PFI contract. On the negative public perception that some PFI hospitals cost more than traditionally procured hospitals and yet have fewer beds, he said this was as result of the improved level of efficiency that the new PFI-procured hospitals require to operate. He attributed most of the media criticisms of PFIs to lack of public awareness of the amount of money spent annually by the private sector PFI partners on maintaining the facilities.

CONCLUSIONS

This study has explored some of the main issues that inform public perception of PFIs. While the results confirm that PFI is not without its drawbacks, the overwhelming verdict is that it enables the NHS to procure and maintain facilities at a rate that would be otherwise impossible without private sector involvement. The negative public perception and bad press that give it a bad name can be overcome if the ordinary man becomes more aware of its operations. The overwhelming evidence from this study is that PFI provides value for money in NHS projects. However, due to the small sample size used in this study, the results cannot be generalised to represent the true picture of the issues surrounding PFI. It is expected that this study will be expanded to cover a more nationally representative sample to provide more reliable conclusions.

REFERENCES

- Allen, G (2003) The private finance initiative (PFI). *Economic Policy and Statistics Section. Research paper 03/79*, London: House of Commons Library.
- Bing, L, Akintoye, A, Edwards, P J and Hardcastle, C (2005) Critical success factors for PPP/PFI projects in the UK construction industry, *Construction Management and Economics*, (23)5, 459-471.
- BMA (2010) NHS spending and the role of the private sector, Available at http://bma.org.uk/-/media/Files/Word%20files/News%20views%20analysis/pressbriefing_NHS%20spending.doc [Accessed November 2, 2012]
- Broadbent, J, Gill, J and Laughlin, R (2003) Evaluating the private finance initiative in the National Health Service in the UK, *Accounting, Auditing & Accountability Journal*, 16(3), 422-445.
- Cheung, E, Chan, A P C and 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), 45-58.
- Davis, M and Dowdeswell, B (2003) Evolution of the private finance initiative: squaring the tax, spending and pensions circle, In: *Proceedings of United Kingdom – Australia Seminar on Federalism, Financing and Public Health*, 14-16 September 2003, Old Parliament House, Canberra, Australia, 60-76.

- Dawson, D. (2001) The private finance initiative: a public finance illusion? *Health Economics*, 10, 479–486.
- Froud, J and Shaoul, J (2001) Appraising and evaluating PFI for NHS hospitals, *Financial Accountability and Management*, 17(3), 247-270.
- Hellowell, M and Pollock, A (2009) The private financing of NHS hospitals: politics, policy and practice, *Journal of the Institute of Economic Affairs*, 29(1), 13-19.
- Hellowell, M and Vecchi, V (2012) An Evaluation of the Projected Returns to Investors on 10 PFI Projects Commissioned by the National Health Service, *Financial Accountability & Management*, 28(1), 0267-4424
- Kirk, R J and Wall, A P (2001) Substance, form and PFI contracts. *Public Money and Management*, 21(3), 41-46.
- Liebe, M and Pollock, A (2009) The experience of the private finance initiative in the UK's National Health Service. Available at http://allysonpollock.co.uk/research/CIPHP_2009_Liebe_NHSPFI.pdf [Accessed October 12, 2012].
- National Audit Office (2010) The performance and management of hospital PFI contracts. Available at http://www.nao.org.uk/publications/1011/pfi_hospital_contracts.aspx [Accessed September 22, 2012]
- Ruane, S. (2010) Corporate and political strategy in relation to the Private Finance Initiative in the UK, *Critical Social Policy*, 30(4), 519-540.
- Shaoul, J, Stafford, A and Stapleton, P (2008) The cost of using private finance to build, finance and operate hospitals, *Public Money & Management*, 28(2), 101-108.
- Torjesen, I (2012) Cash strapped NHS trust will be first to be placed in administration, *BMJ*, 344:e4416

DEVELOPING PUBLIC-PRIVATE-PEOPLE PARTNERSHIP (4P) FOR POST-DISASTER INFRASTRUCTURE RECONSTRUCTION

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Current post-disaster reconstruction practices have failed to fully exploit the fresh opportunities that arise amidst adversity, e.g. for rethinking and reshaping future trajectories of economic growth, vulnerability reduction and sustainable development of the disaster affected regions. To improve the outcomes from post-disaster reconstruction projects, a Public-Private-People Partnership (4P) concept and a corresponding approach are proposed and developed for integrating a 4th P - 'people' into Public Private Partnerships (PPP) to procure public infrastructure, targeting better value for money and sustainability. 'People' refer to major stakeholders in reconstruction, namely Non-Governmental Organizations (NGOs), local communities, academia, professional groups and media. Semi-structured interviews, questionnaire surveys and a case study were conducted to investigate the potential for involving such 'people' earlier and more efficiently. The empirical findings indicate that 4P has greater potential to deliver better and more sustainable outcomes in certain types of infrastructure reconstruction projects. Thus a three-stage procurement framework is developed to structure the proposed 4P procurement processes. To tackle the complex relationships/partnerships among multiple participants, a partnership framework is also established for relationship management in 4P. Taken together, the procurement framework and the partnership framework constitute the envisaged 4P framework. Validated through a focus group meeting, a 4P approach through this 4P framework could contribute in appropriate reconstruction scenarios, to achieve better performance and sustainable development, as well as provide a basic methodology and conceptual foundation for future development in general disaster management.

Keywords: Disaster management, People, Public-Private-People Partnership (4P), Sustainability, Value for Money.

INTRODUCTION

The apparently increased vulnerability of humankind to natural disasters has destroyed or disrupted human lives more frequently in recent years. In 2011 for example, Swiss Re (2011) estimated a \$350 billion economic loss related to catastrophe, which is the highest in history. Followed by any natural disaster, the recovery of disaster affected regions should be well-planned, aiming at 'Build Back Better' (BBB). BBB implies utilising fresh opportunities in post-disaster scenarios to improve communities' social, economical, physical resilience and sustainability (Mannakkara 2012). However, previous investigations into the 2004 Indian Ocean Tsunami, 2005 Hurricane Katrina, 2008 Sichuan Earthquake and 2011 Haiti Earthquake suggested that pitfalls were rampant in post-disaster reconstruction practices around the world (Rotimi et al. 2006; Sun and Xu 2011; Wiek et al. 2010; Zuo et al. 2008). For example, the tendering mechanisms in Sichuan reconstruction have been criticized for selecting the lowest tenderers without further consideration, accompanied by cheating to exclude competition, leading to cost and time overruns and poor quality construction.

To improve the outcomes of reconstruction, efforts are needed from various angles, ranging from legislation and policy making, capacity building of local communities to updating building codes and enhanced relevant political support. This research particularly targets better reconstruction

through developing an innovative and alternative procurement strategy from a construction management point of view. Public Private Partnerships (PPP), demonstrating superior performance in Value for Money (VfM), risk allocation and whole life cycle cost than the traditional approach in appropriate infrastructure projects, is proposed to deliver suitable components in reconstruction with necessary modifications. The major modification is in integrating 'people' – key stakeholders in reconstruction into PPP to establish a Public-Private-People Partnership (4P) approach for post-disaster infrastructure delivery (Kumaraswamy 2008). 'People' refer to those key stakeholders who usually become involved and contribute in reconstruction but usually in an ad hoc and inefficient manner. These 'people' include Non-Governmental Organizations (NGOs), communities, professional groups, academia and media.

The next section describes the 4P approach, including the functions and roles 'people' can play, the core value and aim of 4P. A methodology section then introduces the research design and research methods applied. Major findings are next presented covering reconstruction practices, PPP for reconstruction, role and value of 'people', and the 4P mechanism. The 4P framework and its validation are then presented followed by a conclusion.

PUBLIC-PRIVATE-PEOPLE PARTNERSHIP (4P)

PPP, procuring services rather than merely assets, synergize the advantages of both public and private sectors in long-term comprehensive partnerships. According to a number of studies, PPP projects performed more on time (HM Treasury 2003; NAO 2003; 2005; Thomson et al. 2005) and within budget (Graham 2009; HM Treasury 2003; Mott-Macdonald 2002) than traditionally procured projects. Its performance incentive feature and concentration on whole life cycle cost enable the achievement of enhanced overall value and sustainability.

When focusing on infrastructure reconstruction, a major characteristic is that 'people' play critical roles and should receive greater attention in post-disaster scenario. For instance, NGOs participate widely and deeply in disaster relief and rescue by providing professional medical services and living essentials to victims. Therefore, these major stakeholders were proposed to be integrated into PPP to form the 4P approach. Although not based on a purely 'humanistic' approach, some 'humanistic' elements seem needed in such scenarios. These are injected through 'people' who would not normally be actively mobilised in mainstream infrastructure projects. A few assumptions are made in this 4P approach: (i) the private sector is still market/profit-oriented, but 4P provides the opportunity to achieve their goals while also demonstrating their Corporate Social Responsibility (CSR), if not mobilizing some altruism; (ii) NGOs, professional organizations and academia are not-for-profit organizations that have corresponding objectives of their own, such as promoting education and alleviating poverty. But the common goal with the public bodies is to deliver best value services to the general public.

Therefore, 4P aims to combine the advantages of PPP together with benefits from mobilizing 'people' to achieve better VfM and sustainable infrastructure reconstruction. 'People' are identified as NGOs, local communities, professional groups, academia and media. Figure 1 presents the expected principle participants in 4P and its basic concept.

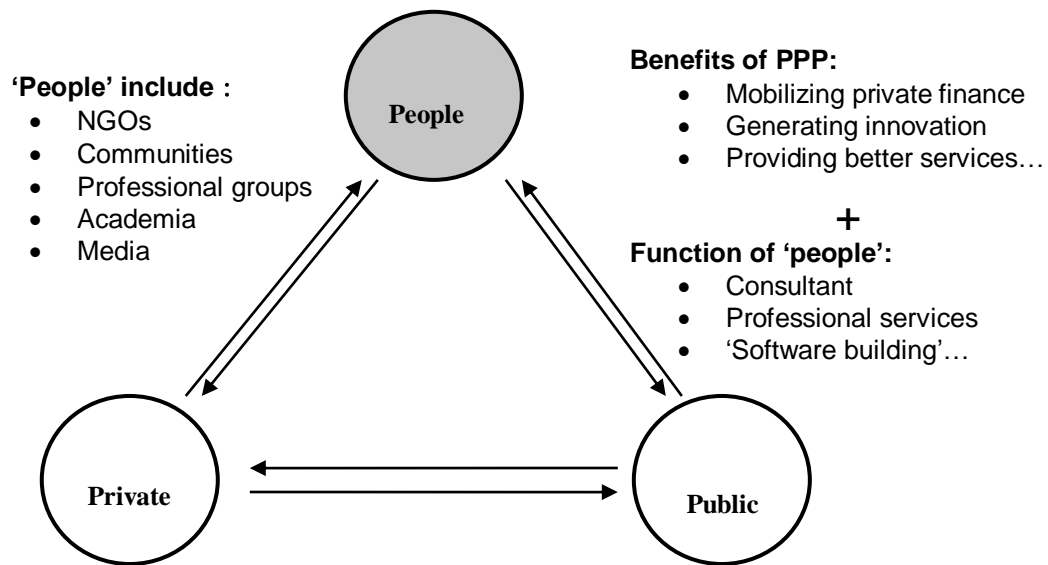


Figure 1: 4P participants

In 4P, local communities would be involved from the very beginning in pre-disaster planning phase to be consulted on local history, culture and customs, as well as their needs and requirements in reconstruction projects. In addition, through such participation, general public's awareness on disaster preparedness and mitigation could be raised to reduce future vulnerability. NGOs would further extend their roles in 'software building' in 4P, targeting social, economical, educational and health advances to complement the 'hardware' in rebuilt physical infrastructure to meet the end-users' needs more efficiently and comprehensively. This could be achieved through systematic and organized training and mobilizing of volunteers by NGOs with the support of public sector and private organizations. Professional groups and academia would serve as expert consultants in reconstruction, as well as playing a mediator role between various participants with their independent and non-profit position. Although media may not be included in a formal 4P contract, media's role in public oversight/supervision, especially new media's immediate and broad interactive functions could positively enhance the delivery of 4P projects. To test, validate and improve the 4P concept and its feasibility/applicability, a battery of multiple of research methods were applied, as introduced in the following section.

METHODOLOGY

A relational/partnering approach (RA/PA) provides a theoretical foundation to manage the partnerships in 4P. In addition to relationship building and management, it mobilizes social capital to develop synergies, enhance core competencies and add value (Zou et al. 2012). Integrating RA/PA into PPP projects and the newly developed 4P approach fulfils essential needs and yields mutual benefits (Zou et al. 2012).

Moving from the theoretical foundation to the practical implications of this study, the major research problems are: (I) whether it is feasible and practical to utilize 4P to procure infrastructure reconstruction; and (II) how 4P procurement can achieve VfM and sustainability. The above two questions are further broken down into four specific issues to be particularly explored, which are: (i) What are the characteristics of reconstruction projects compared to common construction projects? (ii) What are the advantages and concerns in applying PPP for reconstruction? (iii) What are the values, benefits and concerns in involving 'people'? (iv) How to exploit the benefits of PPP and 'people' in 4P, while at the same time overcoming the concerns?

To increase the credibility and validity of this research, triangulation was used to collect more comprehensive, detailed and balanced data. The first round of 14 semi-structured interviews were conducted to invite general comments and suggestions from both disaster management (DM) and PPP professionals on the 4P concept and its feasibility. Consolidated with literature review, two

sets of questionnaires were designed and distributed separately among DM and PPP professionals targeting a broader audience, receiving 81 responses worldwide. Derived from above findings, a preliminary 4P framework was developed and further improved through second-round interviews. To probe into the role of 'people' more deeply and practically, a case study of 'Project Mingde' was implemented, which studied three school projects including one Sichuan reconstruction project after the 2008 Sichuan Earthquake in China. Based on the above research, a 4P framework was developed, then validated through a focus group meeting. The next section presents the major findings corresponding to the four specific issues to address the major research problems.

MAJOR FINDINGS

PPP interviewees and respondents cover both PPP academia and practitioners from public sector, private sector, financial institutions and consultancies. While DM interviewees and respondents are DM academia, key personnel in renowned NGOs, project managers, engineers and government officers with reconstruction experience.

Questionnaires were distributed worldwide. However, interviews mainly focused on reconstruction practices in China with a large portion of interviewees based in HK and Mainland China with Sichuan reconstruction experience. Sichuan reconstruction was chosen, since it is large scale, representative, nearly complete as well as with easier access to information from Hong Kong. Project Mingde, the case studied, is also a HK-based non-profit programme aiming at improving Mainland's rural educational environments through HK university students' participation in school construction. Therefore, some findings have to be viewed in the context of their specified scope.

Interview transcripts were compiled and summarised in narrative mode and were mostly tested through the questionnaire. Questionnaire response results are analyzed by the Statistical Package for Social Sciences (SPSS) by calculating the mean, standard deviation (SD), ranking of importance and agreement. One sample t-test was conducted for comparison between mean score and the neutral value; two samples comparison were examined through independent t-tests. Detailed results are not shown due to the limited space, but could be referred in other relevant papers (Zhang and Kumaraswamy 2012; Zou et al. 2012).

Post-disaster reconstruction

According to the questionnaire survey results, reconstruction projects tend to be more complex and dynamic, with multiple projects proceeding at the same time. More diverse participants are involved in post-disaster reconstruction, such as public authorities, private sector, overseas and local NGOs and volunteer groups etc. In addition, infrastructure reconstruction is mainly financed by government funding and donations. In all, rather than common construction projects, reconstruction is more dependant on administrative, political, social, economical and cultural contexts, especially in large scale reconstruction.

Some major concerns in reconstruction were also identified and consolidated. They are: (i) lack of systematic recovery plans; (ii) cost and time overruns are common; (iii) lack of adequate relevant policies and legal systems; (iv) economically or politically powerful groups/persons dominate planning and decision making processes; (v) lack of communication and coordination among stakeholders; (vi) sacrifice of sustainable long term development for rapid and visible solutions; and (vii) corruption and lack of transparency.

The above findings were summarized on a worldwide base. Probing into the practices in the Sichuan reconstruction revealed many 'real' problems, while inspirations were derived within their own context. An innovative paired assistance mechanism was applied in Sichuan, which mobilized 19 provincial administrations assisting 19 seriously affected counties. The outcomes seemed quite remarkable and could be referenced and promoted in other regions after large-scale disasters as well. However, the lack of systematic planning and being excessively influenced by political entities also led to serious problems. For instance, some newly rebuilt buildings in landslide prone area were soon swept out by landslides; and a HK donated school building was

demolished for property development without notification and agreement from the HK government.

PPP for reconstruction

Comments from PPP professionals suggest that PPP has great potential to procure certain types of projects in reconstruction to achieve superior performance and sustainable infrastructure. Compared to the traditional approach, PPP's advantages in procuring reconstruction projects are: (i) speedy once started; (ii) performance incentive; (iii) sustainable development by considering the whole life cycle cost of reconstructed infrastructure; (iv) better risk transfer and sharing; (v) efficient and cost effective; and (vi) sufficient funding from the government and donations. These advantages arise from PPP's basic features of output specification, long-term partnership and procuring services, rather than only assets.

On the other hand, although six major concerns were identified in applying PPP for reconstruction, only two were accepted and agreed by respondents in the questionnaire survey, which are (i) long time to prepare and complex negotiation; and (ii) high costs in tendering. Usually, long-term, large scale and complex PPP infrastructure need longer lead time than the straightforward traditional approach, which contradicts with the urgent need of reconstruction to quickly recover normal lives of the victims. It is reasonable that complex negotiation and preparation bring higher tendering costs, which is the second concern.

Respondents agreed that all seven major concerns in post-disaster reconstruction, listed in the previous section, could be addressed to a certain extent through the PPP approach. PPP could help to reduce (ii) cost and time overruns; (v) communication and coordination problems; and (vi) sacrificing sustainability for rapid and visible solutions. Other problems could also be partially reduced; however, since they are more affected by government behaviours and policies, PPP's contribution is relatively weak.

In all, if properly developed and adjusted, PPP's nature and characteristics could produce fruitful benefits and overcome some of the main pitfalls in reconstruction.

The role and value of 'people'

'People' have already played significant roles in post-disaster scenarios. 'Community-based approach' is a widely accepted and promoted concept to stress the importance of involving local communities in disaster preparedness, mitigation and post-disaster recovery (Jahangiri et al. 2011; Ofori 2001; United Nations 1987); NGOs harness their flexibility, non-profit and independent features, play key roles in rescue and rehabilitating human lives. In Sichuan reconstruction, minority gathering regions have invited contributions from local residents to satisfy their requirements by fully understanding their culture, history and customs. There is a case in Sichuan to show the 'software building' potential of NGOs in post-disaster recovery. A 'stand tall' program led by a HK NGO, aiming to help amputation victims to stand up again, has trained 1200 medical staff and helped 400 victims 'stand up again' in over four years time (Mak 2012).

The case study of Project Mingde, which mobilized approximately 200 students, alumni and teaching staff from The University of Hong Kong, has helped the construction of three school buildings in rural China from 2004. Students were deeply involved and entirely or partly responsible for site investigation, surveying, design of structure, preparing tendering documents, site supervision and quality control. One of their designs has won an environment-friendly award and been promoted to the whole province. This case suggested that 'people' have great potential to contribute through innovative ways in the condition of clear identification and verification the extent and scope of the involvement of 'people'.

In all, bringing key stakeholders – 'people' into PPP is necessary and valuable to achieve end-user satisfactory and sustainable reconstruction.

The 4P mechanism

To overcome the slow start of PPP, in the 4P approach tailored for infrastructure reconstruction, all interviewees agreed to establish a pre-disaster mechanism in advance. This pre-disaster mechanism is led by the government to pre-qualify a number of private sector organizations and NGOs in advance and link these potential partners through framework agreements (FA). A FA sets out terms and conditions between public authorities and private sector organizations under which specific purchases can be made throughout the term of the agreement on successive projects (OGC, 2008). Reaching framework agreements in advance with pre-qualified partners in 4P could save time in post-disaster procuring processes. In addition, FAs encourage collaborative long-term cooperation that could achieve greater efficiency, cost effectiveness, reduction in disputes and innovations (Garcha 2010), which are consistent with the core values of 4P.

4P FRAMEWORK

A 4P framework was developed aiming to provide a theoretical foundation of how to effectively and efficiently procure and deliver 4P projects. It is comprised of a procurement framework and a partnership framework. The procurement framework presents the major mechanisms and procedures to procure typical 4P projects. While the partnership framework aims to guarantee the smooth execution of 4P to further add value and overcome the obstacles caused by numerous participants through good relationship/partnership management. This 4P framework was validated through a focus group meeting with seven participants from academia, a client department, a financial institution and a consultant in the construction industry. Such focus group exercises gathering expert researchers and practitioners to discuss and comment on the research topic are widely applied for triangulation and validation (Gibbs 1997; Morgan 1988). The following are descriptions of the procurement framework, partnership framework and consolidated findings from the validation exercise.

The procurement framework

The three major stages of procuring 4P projects are shown in Figure 2. As a component within the DM cycle, the first two stages are preparation work in the pre-disaster phase for future swift and effective reconstruction. The third stage is the actual delivery and implementation of 4P.

The first stage aims to select the appropriate procurement strategy. Infrastructure projects would be categorized according to their location, complexity, scale and type (economic/social/special infrastructure) for more specifically and deeply study. Thus enables to allocate each group of infrastructure to a corresponding client department for standard evaluation and analysis. Business cases would be developed for each group of infrastructure as reference projects. Qualitative analysis covering project scope, needs, criteria, strengths, weaknesses, threats and opportunities as well as quantitative analysis such as Public Sector Comparator (PSC) and VfM would be conducted to select a procurement strategy that is the most likely to deliver good VfM and achieve sustainability. If certain projects are identified and proven to be suitable to be procured by 4P, the following stages (i.e. stage 2 and 3) would be initiated.

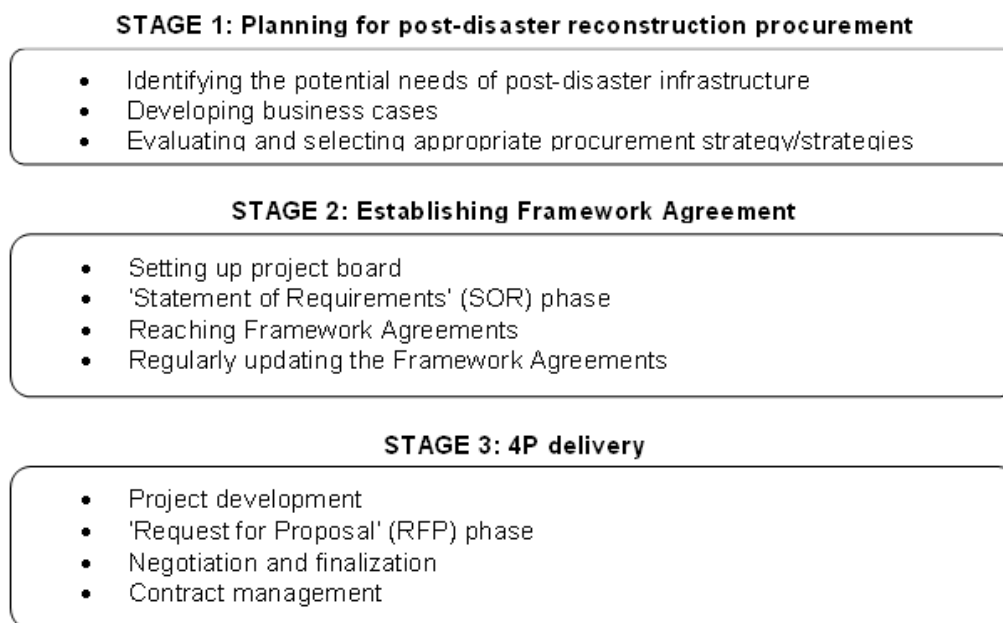


Figure 2: **The procurement framework**

Project boards would be established to be responsible for the procuring, managing and delivery of corresponding types of 4P infrastructure. They would prepare and issue documents of 'statement of requirements' to describe some basic information and standard requirements of potential 4P projects to invite bidders. The evaluation standards would be more focused on the financial, technical, managerial capacity and past performance and reputation of the bidders, rather than the price, which can not be calculated at this stage. Three to five groups of bidders could be selected to enter into FAs, in which general terms such as quality standards, payment mechanisms and risk allocation strategies will be laid out. During the uncertain period before large scale disaster occurs, the FAs should be updated every four to six years.

4P delivery would be commenced for suitable projects only, immediately after any disaster happens. Issuing the 'request for proposal' containing the comprehensive and detailed project profile, required services and outputs to the pre-qualified candidates, bidders will be selected according to their financial plan, construction and operation schemes and other technical, safety and sustainable parameters. Successful bidders will enter into a further negotiation phase to finalise specific contracts based on their general FA, thus to move faster into the design and construction stages of 4P.

THE PARTNERSHIP FRAMEWORK

The 4P contract is signed between the public sector and the selected Special Purpose Vehicle (SPV), whose composition could be private sector organizations and NGOs or other 'people' depending on the project needs. The partnership refers to the relationships between the public sector and SPV, within SPV between major players, among SPV with its advisors, contractors, suppliers etc., as well as non-contractual relationships between SPV and the general public, communities and media.

Thus the partnerships are complex and long-term in 4P projects. The responsibilities to investigate, evaluate, promote 4P concept and procure, supervise and support the delivery of 4P projects rest with the government agencies. The private sector organizations burden the delivery of non-core services, which are the physical construction, throughout design, construction, operation, maintenance and transferring back. Some core services traditionally delivered by the public sector such as education and medical/health services could be transferred to NGOs, professional groups, academia and integrated local communities, starting from the planning phase.

The uncertainties and complexities in the long-term 4P raise the possibilities and risks of conflicts and disputes, hence heightening the need for the better management of relationships to improve their cooperation and interaction for enhanced overall value. As the theoretical foundation of relationship management (RM) in 4P, the RA/PA embraces open and cooperative relationship, mutual trust, respect, commitment and teamwork to increase the core competencies and achieve enhanced overall value through RM (Ryan 2007; Smyth and Edkins 2007). Glover (2008) argued that this relationship-based approach would generate trust, cooperation and enthusiasm that will increase the efficiencies far beyond the reach of traditional contracting.

Besides the strategic and theoretical RA/PA, some specific strategies and factors in RM were identified and summarized from interviews and questionnaires. They are grouped into institutional strategies related to contractual, structural, legal and institutional arrangements and relational strategies that mobilize social and cultural capital in relationship building. Recommended institutional strategies are transparency, clear contract arrangements, relevant policies and regulations and strategic, tactical and sustainable foresight. Critical relational factors are commitment from staff, effective communication, mutual trust, collaborative team and cultural identity.

Validation of the 4P framework

A focus group meeting was held to validate the 4P framework and its benefits and limitations. The procurement phases/stages in the procurement framework are generally applicable and accepted by participants. The major concern is that establishing FAs before disasters by pre-qualification would involve many uncertainties. For example, the specification of contracts before disasters without real data is complex and difficult. Another tricky question is on who is to bear the costs during pre-qualification processes and the regular updating of FAs in the non-predictable period before disasters.

The importance of relationship/partnership management in 4P was highlighted and recognized in the focus group as well. The discussion focused on how to enhance the efficiency of 4P procurement and delivery through integrating 'people' rather than to reduce efficiency or create more disputes and obstacles. Suggestions are to clearly identify and define each participant's role in 4P and develop suitable risk allocation strategies to handle the risks and uncertainties in long-term multiple-participant 4P projects. For example, on the one hand, in upstream decision making processes, NGOs could manage and supervise the financial arrangements directly and transparently, protecting end-users' interests and expressing their priorities and preferences. On the other hand, they would provide 'software building' and supports in down-stream delivery of projects.

While the procurement and partnership frameworks present the 4P concept and underlying philosophy, their applicability must be enhanced by making reference to various types of guidelines, policies and real cases. However, the 4P framework is still relatively conceptual and needs further scrutiny and development within clearly identified scope areas e.g. of specific disaster-prone regions and particular kinds of infrastructure e.g. 'social infrastructure' such as school and hospitals.

CONCLUSION

Spotlighting the pitfalls and gaps in current post-disaster reconstruction practices, leads to clarion calls for more effective and innovative procurement strategies. 4P is thus proposed by integrating 'people' - key stakeholders in any post-disaster scenario into an enhanced PPP procurement mode, to achieve better performance and sustainable development of infrastructure reconstruction through partnerships between public, private and 'people'. A 4P framework was developed comprising of a procurement framework and a partnership framework. The 4P concept and 4P framework were validated as valuable and applicable in general. This provides the methodological and conceptual foundation for future development in post-disaster scenarios as well as giving pointers for deriving fruitful partnerships among public, private and 'people' in other (non-

disaster) scenarios, such as in general infrastructure procurement. Therefore two propositions were derived for future research: (i) ‘people’ are important and have great value throughout infrastructure life cycles; (ii) particular countries, regions and particular kinds of infrastructure e.g. ‘social infrastructure’ such as school and hospitals could be identified as more suitable for 4P and future research focus.

REFERENCES

- Garcha, J (2010) Partnering framework agreements - for the good times only? Maxwell Winward.
- Gibbs, A (1997) Focus groups. *Social Research Update*. Department of Sociology, University of Surrey, England. Available at: <http://sru.soc.surrey.ac.uk/SRU19.html>.
- Glover, J (2008) Framework agreements: practice and pitfalls. Fenwick Elliott.
- Graham, D (2009) *Value for Money in PPP procurement*. New South Wales Treasury.
- HM Treasury (2003) PFI: Meeting the investment challenge. HMSO, Norwich.
- Jahangiri, K, Izadkhah, Y and Tabibi, S J (2011) A comparative study on community-based disaster management in selected countries and designing a model for Iran. *Disaster Prevention and Management*, **20**(1), 82-94.
- Kumaraswamy, M M (2008) Ex-ante frameworks for disaster mitigation. In: Santosa, H, Faqih, M and Yuniastuti, E (Eds.), *Workshop on International Technology and Knowledge Flows for Post Disaster Reconstruction*, 8-10 January 2008, Surabaya, Indonesia. Eindhoven University, Netherlands, 86-102.
- Mannakkara, S and Wilkinson, S (2012) Build back better in Japan – lessons from the Indian Ocean Tsunami experience in Sri Lanka. In: Kakimoto, R and Yamada, F (Eds.), *International Conference on Disaster Management 2012*, 24-26 August 2012, Kumamoto, Japan. International Institute for Infrastructure, Renewal and Reconstruction (IIIR), 24-32.
- Mak, C K (2012) Summary notes from Engineering Centenary Distinguished Lecture *Passion, professionalism and collaboration – in support of Sichuan reconstruction*. The University of Hong Kong, Hong Kong.
- Morgan, D L (1988) Focus groups as qualitative research. London: Sage.
- Mott-Macdonald (2002) *Review of large public procurement in the UK*. London: Mott-Macdonald.
- NAO (2003) *PFI: construction performance*. National Audit Office, report by the Comptroller and Auditor General, HMSO, London.
- NAO (2005) *PFI: construction performance*. National Audit Office, report by the Comptroller and Auditor General, HMSO, London.
- Ofori, G (2001) *Construction in disaster management*. Department of Building, National University of Singapore.
- OGC (2008) *Framework agreements: OGC guidance on framework agreements in the procurement regulations*. Office of Government Commerce, UK. Available at: <https://update.cabinetoffice.gov.uk/sites/default/files/resources/ogc-guidance-framework-agreements-sept08.pdf>.
- Rotimi, J O B, Masuriera, J L and Wilkinsonb, S (2006) The regulatory framework for effective post-disaster reconstruction in New Zealand. In: Alexander, D (ed.) *Third International Conference on Post-Disaster Reconstruction: Meeting Stakeholder Interests*, May 17-19 2006, Florence, Italy. Firenze University Press, 119-26.
- Ryan, B (2007) Continuous improvement in BAA procurement strategy, British Airport Authority. Available at: http://www.apm.org.uk/sites/default/files/Continuous_improvement.pdf.

- Smyth, H and Edkins, A (2007) Relationship management in the management of PFI/PPP projects in the UK. *International Journal of Project Management*, **25**(3), 232-40.
- Sun, C and Xu, J (2011) Estimation of time for Wenchuan Earthquake reconstruction in China. *Journal of Construction Engineering and Management*, **137**(3), 179-87.
- Swiss Re (2011) Sigma – preliminary estimates for 2011: natural catastrophes and man-made disasters caused economic losses of USD 350 billion and cost insurers USD 108 billion.
- Thomson, C, Goodwin, J and Yescombe, E R (2005) *Evaluation of PPP projects financed by the EIB*. European Investment Bank.
- United Nations Centre for Human Settlements (UNCHS) (1987) *Global report on human settlements*. NY: Oxford University Press.
- Wiek, A, Ries, R, Thabrew, L, Brundiers, K and Wickramasinghe, A (2010) Challenges of sustainable recovery processes in tsunami affected communities. *Disaster Prevention and Management*, **19**(4), 423-37.
- Zhang, J Q and Kumaraswamy, M M (2012) Public-Private-People Partnerships (4P) for disaster preparedness, mitigation and post-disaster reconstruction. In: Kakimoto, R and Yamada, F (Eds.), *International Conference on Disaster Management 2012*, 24-26 August 2012, Kumamoto, Japan. International Institute for Infrastructure, Renewal and Reconstruction (IIIRR), 407-16.
- Zou, W W, Zhang, J Q and Kumaraswamy, M (2012) Developing sustainable relationships through Public Private People Partnership (4P) projects. In: Senaratne, S and Sandanayake, Y G (Eds.), *World Construction Conference 2012 - Global Challenges in Construction Industry*, 28-30 June 2012, Colombo, Sri Lanka. Department of Building Economics, University of Moratuwa, Sri Lanka, 452-9.
- Zuo, K and Wilkinson, S (2008) Supply chain and material procurement for post disaster construction: the Boxing Day tsunami reconstruction experience in Aceh, Indonesia. In: Haigh, R and Amaratunga, D (Eds.), *CIB W89 International Conference on Building Education and Research (BEAR 2008)*, 10-15 February 2008, Heritance Kandalama. School of the Built Environment, University of Salford, UK, 1116-33.

IMPLEMENTING SUSTAINABLE CONSTRUCTION IN PFI PROJECTS

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There is a lack of agreement on the interpretation of Sustainable Construction (SC) both within the industry, as well as in academic literature. Further evidence point at a gap between the technological abilities of the construction industry and what is actually achieved in terms of SC. Therefore, it appears that the problem may lie with the understanding of and the effective implementation of SC at project level. This paper presents an emergent model of the process of implementing SC within a PFI project environment. Case study methodology and the principles of grounded theory analysis were used in order to allow for an understanding on the process of implementing SC to emerge at project level. Three case studies were selected from PFI healthcare projects and semi-structured interviews were conducted with representatives from four different stakeholder groups (i.e. client, contractor, design team and facilities management) within each case. The paper first discusses the wider contextual factors affecting the process of implementing SC in PFI projects. The theory developed through the grounded theory process has been presented in the form of a phased model consisting of four main phases. In-depth discussions on each of these phases are also provided. At project level, there is a need to consider SC as an integral part of the construction process itself rather than something superfluous or extra that has been necessitated through mandatory legislations and regulations.

Keywords: Case studies; Grounded theory, Implementation, Private Finance Initiatives (PFI), Sustainable Construction (SC).

INTRODUCTION

The intense international focus on sustainable development has resulted in making it a central issue when it comes to policy development in many countries, including the UK. At present, the UK's commitment to certain aspects of sustainable development has gone beyond being mere policy objectives to legal obligations. One example is the target to reduce the GHG emissions by at least 80% by 2050. The high level of emphasis that has been placed on sustainable development at national level in the UK during the past two decades is being continued by the coalition government. There is expressed commitment by the coalition to take SD from being a 'separate green issue' that is the focus of a few government departments to a core strategic issue (DEFRA, 2012).

All of this attention towards sustainable development, both at global and national levels, has resulted in a high level of focus been placed on the construction industry in attaining the goals of sustainable development. Within the UK, a number of key industry reports (for example, Low Carbon Innovation and Growth Team, 2010 and UK Green Building Council, 2009) have stressed the need for best practice within the industry in order to ensure that the aforementioned sustainable development goals are met.

Accordingly, there is growing amount of pressure on the construction industry to apply the principles of sustainable development within its activities (i.e. Sustainable Construction – SC). However, the present economic climate means that the construction industry is required to take on various initiatives to address SC, whilst at the same time facing a slowdown of the economy. There is evidence that the current economic climate has indeed affected the construction industry activities negatively. For instance, as the largest client of the industry, the spending cuts in

government has meant that around 280,000 jobs has been lost since 2008 in the sector (GVA, 2011). Despite this slowdown of the economy, the pressures remain for the industry to address SC issues, particularly in the face of legally binding commitments. In order to achieve this, Augenbroe et al. (1998) to call for a 'fundamental paradigm shift' in the way we approach construction itself, stating, that widespread disconnected initiatives alone, are not sufficient to achieve SC. The success of construction processes relies upon the interactions among many different stakeholders in a 'complex network of relations' (Atkinson et al., 2009). The effective integration, communication and co-operation amongst these different stakeholders, become essential when it comes to implementing SC.

There are also indications that the available technological expertise seem to be under-utilised, as evidenced by the gap between the levels of technological ability and the actual performance of the building stock (Ozorhon et al., 2010; Rohrer, 2001). This has led to some authors to state that technical solutions are only a minority solution to the challenge of SC (see Rohrer, 2001; van Bueren and Priemus, 2002). Far more important are the 'social embedding' and the 'social interactive process' that must be followed throughout the construction life-cycle to achieve SC (Rohrer, 2001). In this respect, the implementation of SC is not just dependent upon the technological practices, but also the industry structure, communication channels, and the 'organisation and strategic orientation of its constituent actors' (Boden cited Rohrer, 2001).

The aim of this paper is therefore, to provide an in-depth understanding of the process of implementing SC within a construction project environment. The paper first provides a discussion of PFI procurement within the UK context and its suitability in considering SC aspects. It then goes on to discuss the methodology adopted in the study. The discussions on the findings commence with a review of the wider contextual factors affecting the process of implementing SC in PFI projects. The theory developed through the grounded theory process has then been presented in the form of a phased model consisting of four main phases.

THE FOCUS ON PFI

Execution of a construction project requires the formation of 'temporal virtual organisations' that involves a variety of people from different professional backgrounds and different priorities and expectations working together (Brown et al. 2001; Hughes, 1990). The type of procurement system adopted has a significant impact on how these people are organised systematically and the roles, responsibilities, and interrelationships between them. For example, Love et al. (1998) defines a procurement system as '*an organisational system*' that '*assigns specific responsibilities*' to the project parties and '*defines the relationships*' between them. Hence, it is clear that different procurement approaches will have different types of impacts on the process of implementing SC at project level.

The initial drivers for the UK government to take up PPP/PFI schemes mainly included concerns regarding the availability of public finance. These schemes provided a means for the government to keep the infrastructure costs off the public balance sheets, thereby, cutting public spending, whilst maintaining high levels of investment and avoiding public sector borrowing limits. Nowadays, PPP/PFI schemes are being pursued more and more for their capacity to accommodate novel methods of risk allocation (Bing et al., 2005).

In the European PPP market, UK remains the most active user of the PPP/PFI procurement in terms of the number of deals (European PPP Expertise Centre - EPEC, 2010). These contracts are typically long term (in general, 25-30 year periods) and are high valued. Consequently, this has led to a general increase in commitment towards good procurement practices within PPP/PFI projects, which in turn has been broadened to incorporate SC/sustainable procurement. There is higher emphasis upon establishing business cases and rigorous review processes, leading to clear focus on project objectives (The Chartered Institute of Purchasing and Supply - CIPS, 2008). The PFI contracts embrace the design, construction, maintenance and operation of the procured facility. Given that capital costs are on average only 5.5% the lifetime value of a built asset, this gives contractors, in theory, an incentive to design using operational efficiencies at every stage

(Green Alliance, 2004). In other words, there is higher incentive within PFI schemes for taking whole life costs into consideration in decision making, as the contractors have control over aspects of service provision (for example, energy strategies, water provision, etc.) and there is a higher possibility of inducing them to invest in front end solutions that will result in lower operational costs (The Chartered Institute of Purchasing and Supply - CIPS, 2008). In addition, PFIs have a greater focus on identification, assessment, and allocation of risk, which provides an avenue for various risks related to SC options to be accurately identified and allocated to parties most suited to manage them (Bing et al., 2005; The Chartered Institute of Purchasing and Supply - CIPS, 2008).

PFI procurement also provides room for 'programme effect' in procurement (Green alliance, 2004). This means that as contractors may be bidding into several projects, so there is potential for developing increasingly sophisticated bids. Sponsoring departments and local authorities can signal their expectations on sustainability performance across a whole programme, increasing the incentive for contractors to invest in appropriate supply-chain management and research and development to gain market share. Moreover, since there are relatively few key players in terms of contractors and funders, there is more opportunity for penetration of guidance and spread of successful ideas.

Accordingly, it could be argued that PFI procurement presents a number of opportunities to address sustainability issues over other forms of construction procurement. Therefore, they present an opportunity to obtain rich data on the issues of uptake and implementation of SC which is the focus of this research. For this, it is important to select projects that have been recognised as being 'sustainable' or implementing sustainable practices. This was achieved by limiting the focus to projects that have been rated as 'Excellent' or 'Very good' by BREEAM, which is the most commonly used rating system in the UK to assess SC performance.

PFI procurement projects in the UK are mainly used in the procurement of the following types of facilities; i.e. transport, healthcare, fire and police stations, waste treatment plants and schools. Out of these, this research was focused on the PFI procurement projects in the healthcare sector. This was due to several reasons, including the high capital value of healthcare sector projects and the increased level of attention given to PPP/PFI procurement in the health sector.

METHODOLOGY

This research used case study methodology together with Grounded Theory (GT) analysis to allow for an understanding on the process of implementing SC to emerge at project level. 'Case study' is a common strategy of qualitative inquiry used to study a particular experience in-depth, providing greater insight. Case studies focus upon one or few instances of a phenomenon under scrutiny in order to provide 'an in-depth account of events, relationships, experiences, or processes occurring in that particular instance' (Denscombe, 2007). Within the healthcare sector, the selection of case studies was limited to acute care hospitals, as they involved large scale PFI projects. The narrowing down of the research focus to one particular sector (PFI in healthcare) helped to reduce variations between projects due to differences in sectors and in turn increased the homogeneity of the selected case studies. There are differences in the PFI procurement process depending on the capital value of contracts. Hence, selecting large scale projects (i.e. over 25 million in capital value) helped to avoid discrepancies in findings due to such procedural variations.

Research outputs from case studies combined with grounded theory analysis can have important strengths such as, novelty, testability, and empirical validity due to intimate linkage with empirical evidence (Eisenhardt, 1989). According to Turner (1983 cited Denscombe, 2007) the 'novelty of GT lies not in the mode of investigation associated with it, but in the manner in which the collected information is analysed'. The data analysis in GT comprise of qualitative coding, which represents an analytic process through which whole-text data are fractured, conceptualised and integrated to form theory. Data collection and analysis processes were conducted interactively.

The project stakeholders interviewed within each of the case study project belonged to four different groups (see Table 1); (i) Client organisation (i.e. NHS Trust), (ii) Contractor organisation (i.e. main PFI partner), (iii) FM organisation and (iv) Design team (contracted by the PFI project company). All respondents interviewed held positions of responsibility for their respective organisations/project. Semi-structured interviews with open ended questions were used as they provided a means of obtaining the required information, while providing the interviewees with a level of flexibility to provide their own insight.

Table 1: Codes assigned for interview respondents

Respondent's organisation	Generic code for the respondent	Case study code		
		CS1	CS2	CS3
Trust/Client organisation	CL	CL1	CL2	CL3
Contractor organisation	CT	CT1	CT2	CT3
Design team	DT	DT1	DT2	DT3
Facilities management	FM	FM1	FM2	FM3

The interviews were then manually transcribed and analysed using the processes of open coding, axial coding and selective coding developed by Strauss and Corbin (1998). QSR Nvivo qualitative data analysis software was used to aid in this process. Open coding was carried out during the first pass through the data. Once the saturation point was reached, the open codes were reviewed to establish patterns and relationships (i.e. axial coding). Once satisfaction was reached regarding the saturation of this activity, the activity of category formulation began in order to develop the shape of the research findings through its display as categories. Selective coding was deployed at this point in order to develop the depth of each of the categories and assess for codes previously missed. Each of the aforementioned activities was continually revisited until saturation was reached, both individually and as a phase as a whole. In addition, the revisiting of the first phase of the process occurred at numerous occasions, as patterns emerged during this phase required further investigation during the interview process. This emphasised the need for an iterative process between data collection and analysis that constantly revisited previous activities.

IMPLEMENTING SC IN PFI PROJECTS – THE WIDER CONTEXT

Each construction project exists within a context. Accordingly, there are wider contextual factors that need to be understood, which can affect the uptake and implementation of SC at project level.

At the highest level amongst these contextual considerations are the global developments in relation to SD and the widespread recognition of the significance of the construction sector in achieving the goals of SD. These global level developments have in turn been reflected in the EU and the UK national level policies. The construction industry specific advisory documents on SC have in turn been published taking into consideration the above macro level developments. When it comes to construction project level, these generic industry level considerations are filtered through sector specific policies, guidance and regulations. The case study projects selected for the purposes of this research were in the health sector. Therefore, the Department of Health (DoH) and NHS advisory documents acted as a filter in linking these national level issues to the project level. During the interviews, the respondents referred to several sector specific documents. These included, NHS Carbon Reduction Strategy, Health Building Notes (HBN) / Hospital Technical Memoranda (HTM) and BREEAM Healthcare.

The HBNs set out the DoH's best practice standards in relation to planning and design of specific departments and service requirements of healthcare facilities. They are often used to support the economic case for investments by demonstrating value for money (VFM) when formulating business cases for new construction projects. HTMs on the other hand, set out the requirements in terms of standards for building components (e.g. windows) and the design and operation of engineering services (e.g. fire safety requirements). These HTMs are again supported by other technical guidance such as, the Model Engineering Specifications. The case study interviews revealed that the stringent regulations laid out in these documents in the health sector, can sometimes act as a constraint in implementing certain SC practices. One example of this was

found in CS3. Here the design of windows put forward by the design team did not meet the HTM criteria in relation to sill height and maximum allowed opening. The window design has been carried out to allow for maximum day light penetration and natural ventilation. A key issue here was the interpretation of the regulation by the two parties (i.e. client or the Trust and the design team). The argument of the design team was that the regulation applies only to the patient rooms. In contrast, the Trust's interpretation was that it applied to the whole building including offices. One of the design team members noted that;

'Guidance isn't there, it doesn't say that. But their interpretation of the guidance is very rigid. It was a bit of a fight, but we managed to win that one' – DT3

In addition, the respondents also noted that BREEAM healthcare is a key document when implementing SC at project level. The DoH requirements state that all new build and refurbishment projects within the NHS estate must use BREEAM to assess their environmental performance. New build projects are required to achieve an 'Excellent' rating and refurbishment projects are required to achieve a 'Very Good' rating. However, the analysis revealed that this mandatory approach has opened up certain pitfalls that the project team members must avoid. For instance, some interviewees noted that on occasion, contractors or designers tend to use BREEAM to guide their designs rather than to assess them, resulting in unfavourable outcomes.

It was interesting to note that none of these documents (may be with the exception of BREEAM Healthcare) were directly addressing SC as a concept within the healthcare sector. Even BREEAM, although often used as a measurement tool for SC, is primarily an environmental assessment technique. Despite this, the requirements set out in these strategies, guidelines and regulations have a significant impact upon the decisions made at project level in relation to issues such as, which SC considerations should be addressed and to what extent should these considerations be addressed.

During the time of the research there was a high focus on modernising the healthcare sector in order to supply the public with improved and more responsive healthcare. As a result, a high level of attention was given to the refurbishment of outdated hospitals that had a backlog of maintenance requirements. This provided the Trusts with a useful opportunity to justify SC requirements within the business case for projects. Indeed, they were required by the political climate to address sustainability issues in developing the business cases. However, despite the high level attention on the need to modernise the facilities, there was a lack of public funds available to achieve this. This meant that on all three of the selected case studies, Trusts had no option but to select PFI to procure the facilities. The respondent from the Trust in CS1 noted;

'It was either PFI or nothing or don't do it. Theoretically, there was an alternative, in practice there wasn't. There were no public money available. There was no other way we could get procurement where we could bring money in that would allow us to do it.' - CL1

Likewise, the project stakeholders did not have any choice in selecting a procurement approach for these projects giving due considerations to issues such as VFM or availability of expertise. One issue with this obligatory selection of PFI schemes was the lack of the number of contractors, who had the necessary expertise and capabilities to bid for the projects. The clients in CS1 and CS2 both faced difficulties in attracting the stipulated minimum number of three contractors at the negotiation stage to bid for the project. This was a major drawback for CS1, as the client did not have the opportunity to select a contractor giving due consideration to aspects such as contractor's past experiences (e.g. experience in relation to SC).

THE SC IMPLEMENTATION PROCESS – AN EMERGENT MODEL

It is important to highlight that the implementation process discussed here relates specifically to SC implementation rather than the project procurement process. It is acknowledged that these two processes are closely related. In fact, in order to ensure successful implementation, SC should be embedded within the activities of the generic construction project process itself. However, the focus within this paper is on discussing the activities particularly in relation to implementing SC.

The grounded theory analysis revealed that the activities within the process of SC implementation could be divided into four distinct phases. These are; (i) conceptual phase, (ii) idea development / negotiation phase; (iii) construction phase and (iv) hand over/operation phase. The activities in relation to implementation of SC within each of these phases suggest that there is a need to expand the traditional construction process activities to incorporate SC considerations. The four phases of the SC implementation process as mentioned above emerged as distinctive due to several reasons. Firstly, the activities within each of these phases allocated varying levels of responsibility to the different project parties in relation to addressing SC. Within the context of this study, the project parties are used to refer to the four main groups of construction project team members that were selected for the semi-structured interviews.

In addition to the above, the four phases are further characterised by specific outputs. Fulfilment of each of these outputs signifies the end of each phase. In order to ensure the success of the SC implementation process, these outputs need to satisfy particular criteria. These outputs also act as linkages between phases. For example, in order to reach the end of the first phase of the implementation process, i.e. the conceptual phase, agreement must be reached within the client organisation in relation to establishing the SC requirements for the project. These requirements should be incorporated into the project brief. This is then transformed into an output specification. The latter inter-links activities within this phase to those of the next phase, i.e. the idea development/negotiation phase, by providing the potential bidders with an insight to the client's SC requirements.

Activities within each of these phases are in turn affected by influence factors that either facilitate or inhibit the effective implementation of SC. Some of these influence factors include the wider contextual factors discussed within the previous section. The grounded analysis revealed that the main factors influencing the implementation of SC at project level could be divided into two main categories. These are; internal factors (i.e. within the control of the project parties) and external factors (i.e. outside the control of the project parties). Accordingly, proper management interventions were identified as necessary throughout the implementation process to control the negative effects and capitalise on the positive effects of these factors. Whether these internal and external factors acted as enablers (also referred to as drivers or facilitators) or barriers (also referred to constraints or impediments) depended upon the specific context of each case study. This further highlights the importance of contextual considerations in the uptake and implementation of SC that has been stressed throughout this thesis.

Figure 1 below depicts the above described emergent model for the SC implementation process. The figure shows the four main phases of the SC implementation process and how these phases are affected by the internal and external factors.

The first phase of the SC implementation process was identified to include two main types of activities. These were; (i) activities in relation to establishing and prioritising client's requirements in terms of SC and (ii) activities in relation to communicating these requirements to potential bidders. The first set of activities described above relates to establishing and prioritising client requirements in relation to SC. Within the PFI procurement process, the second category included activities such as, developing the strategic business case, obtaining outline planning permission, and placing OJEU notice.

The second stage of the implementation process is called the negotiation/ idea development stage. The activities within this phase falls into the following three main categories; (i) selection of a project team that is facilitating or supportive towards SC (ii) agreement between project parties on the SC issues to be addressed and (iii) agreeing upon the extent to which these SC issues will be addressed and setting performance measurement targets. In order to ensure the success and satisfactory completion of this phase, all three categories of the aforementioned actions need to be fulfilled.

The third phase of the SC implementation involves the physical construction phase. The activities within this phase could be divided into three main categories; i.e. (i) activities in relation to developing and implementing programmes and methodologies to address the SC objectives, (ii)

activities in relation to gaining commitment and involvement of other stakeholders (e.g. suppliers, sub-contractors, local community) and (iii) activities in relation to monitoring, reporting on and improving performance levels in relation to addressing SC.

The final and the fourth stage of the process is called the hand over/operational stage. Although this has been introduced as a separate phase, following the completion of the construction phase, given the type and scale of all three case studies, significant overlapping of the construction and operation phases could be observed. However, as previously mentioned, the generic nature of the activities within this phase remained the same. The activities during this phase can be categorised into three main types. These were; (i) activities in relation to providing training and improving engagement of building users to ensure the sustainable operation of the facility, (ii) activities in relation to continuously improving the sustainable performance levels of the completed facility and (iii) activities in relation to dissemination of knowledge and experience gained in relation to SC implementation process.

The emergent model of the SC implementation process, brought to light the interconnected nature between the activities within the process phases and the influence factors that affect the success of these activities. The lack of attention given to fulfilling all the activities within the phases and effectively managing the influence factors, were observed to bring about poor levels of achievements in terms of SC.

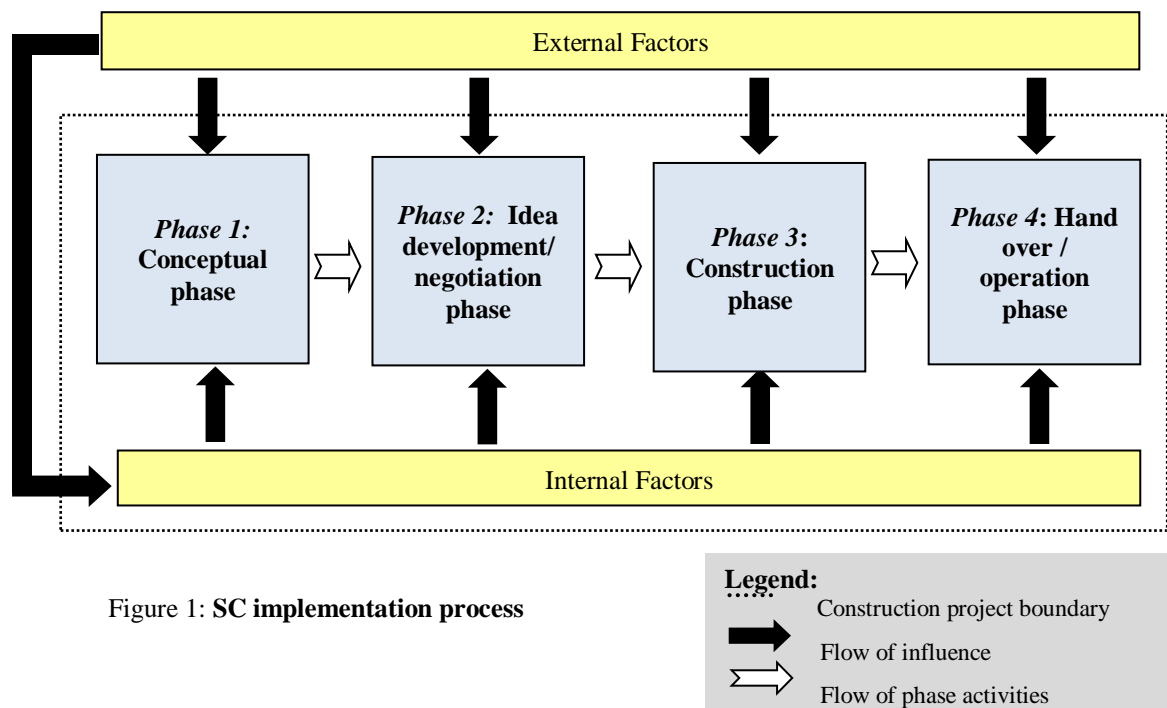


Figure 1: SC implementation process

CONCLUSIONS AND FURTHER RESEARCH

This paper aimed to provide an understanding on the implementation of SC within PFI projects. Four distinct phases could be identified as important in relation to this process. Each phase of the implementation process includes a set of activities and influence factors. There is a need for overall management of the SC implementation process, to ensure the process' smooth flow and transition from one phase to another. There is also a need for overall management to consider the needs of the SC implementation process and to align / integrate those needs within the generic activities of the construction project delivery process itself.

Timely management interventions and control is necessary during each phase of the implementation process to manage the effect of the influence factors and ensure the success of the SC implementation process. Each phase of the SC implementation process is affected by two types of influence factors; internal factors and external factors. In particular, a pro-active approach to cultural, organisational/ managerial and resource facilitation is required to manage the effect of

the internal factors, which are within the control of the construction project stakeholders. National /sector/ industry level interventions should be taken to manage the effect of external factors, which are outside the control of the project parties.

The exact order or structure of the activities within each phase of the SC implementation process, as well as the exact nature of influence factors affecting those activities, differ based upon the realities and complexities of each construction project.

The outcomes of the research can be used by the project level stakeholders, particularly clients and contractors, in adopting pro-active approaches in the uptake and implementation of SC within construction project environments. The developed model is non-technical in nature. This could benefit those stakeholders that come from non-technical backgrounds (e.g. some of the FM and Trust respondents), who found some of the existing technical guidance available on various SC aspects difficult to comprehend.

However, the study was limited to PPP/PFI projects in the healthcare sector. Hence, opportunities for further investigation exist by expanding the number of case studies to widen the scope of the research; for example by including projects in other sectors and using other types of procurement.

REFERENCES

- Augenbroe, G L M, Pearce, A R, Guy, B, and Kibert, C K (1998) Sustainable construction in the USA: perspectives to the year 2010.
- Atkinson, C, Yates, A, and Wyatt, M (2009) Sustainability in the built environment: An introduction to its definition and measurement. Watford: IHS BRE Press.
- Bing, Li, Akintoye, A, Edwards, P J, and Hardcastle, C (2005) The allocation of risk in PPP/PFI construction projects in the UK. *International Journal of Project Management*, 23(1), 25-35.
- DEFRA (2012) *Climate change: what is the government doing?* London: DEFRA. Available from: <http://www.defra.gov.uk/environment/climate/government/> [Accessed 3 February 2012].
- Denscombe, M (2007) The good research guide for small-scale social research projects. 3 ed. Berkshire: Open University Press.
- Eisenhardt, K M (1989) Building theories from case study research. *The Academy of Management Review*, 14(4), 532-550.
- European PPP Expertise Centre - EPEC, 2010. *Market update: Review of the European PPP market in 2010*. Luxembourg: EPEC, European Investment Bank. Available from: <http://www.eib.org/epec/resources/epec-market-update-2010-public.pdf> [Accessed 18 August 2011].
- GVA, (2011) Stimulating sustainable construction in the UK - Do we need a scrappage scheme for buildings? London: GVA.
- Hughes, W (1990). Designing flexible procurement systems. *CIB W92 Symposium on Procurement Systems*, September 1990, Zagreb.
- Innovation and Growth Team - IGT (2010). *Low Carbon Construction Innovation & Growth Team - Final Report*. London: HM Government
- Love, P E D, Skitmore, M, and Earl, G (1998) Selecting a suitable procurement method for a building project. *Construction Management and Economics*, 16 , 221-233.
- Ozorhon, B, Abbott, C, Aouad, G and Powell, J (2010) Innovation in Construction: A Project Life Cycle Approach. *SCRI Research Report*. Salford: University of Salford.

Rohracher, H, (2001) Managing the Technological Transition to Sustainable Construction of Buildings: A Socio-Technical Perspective. *Technology Analysis & Strategic Management*, 13(1), 137-150.

The Chartered Institute of Purchasing and Supply - CIPS (2008) *Does PFI encourage or inhibit sustainable procurement?* CIPS. Available from:
<http://www.cips.org/Documents/Resources/Knowledge%20Now/PFI%20and%20Sustainability.pdf>.

van Bueren, E M and Priemus, H (2002) Institutional barriers to sustainable construction. *Environment and Planning B: Planning and Design*, 29(1), 75-86.

RATIONALE AND CRITICAL SUCCESS FACTORS FOR PUBLIC-PRIVATE PARTNERSHIP WATER SUPPLY PROJECTS IN GHANA

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The Public-private partnership (PPP) concept has attracted the attention of the Ghanaian government and has gathered considerable momentum in the water supply sector of Ghana since 2000. PPPs are viewed as a reform tool for resolving the inefficiencies and absence of dynamism in water supply delivery. However, to date there has been no comprehensive study on the requirements for their successful implementation. This indicates a knowledge gap in this particular area. Drawing on eight case studies carried out in the Ghanaian water supply sector, the paper examines the rationale and critical success factors for water supply projects in Ghana. Both failed and successful projects are investigated so that useful lessons are learned. Four main factors contributing to the growing popularity of PPPs in the water supply sector are inadequate public funding, need for improved management and operational efficiency, growing water demand, and poor asset condition and disrepair. The most important success factors are PPP policy and implementation unit, public support, adequate government support, adequate financing, effective regulatory and legal structures, and quality water infrastructure. As a pioneering study, it serves as a useful guide for central and municipal governments and private water operators planning to participate in PPP water supply projects in Ghana.

Keywords: Critical success factors, Ghana, Public Private Partnerships, Water supply.

INTRODUCTION

The 1990s saw a massive revolution in the delivery of water services as governments across the world resorted to the private sector (through PPPs) for funds and management expertise (Harris et al. 2003; Saltiel and Maywah 2007). Governments were driven by inadequate public funds for and low operational and management efficiencies in state-owned water utilities. The private sector is making significant contributions in this approach that has partly emerged out of a necessity for the provision of water supply services to be undertaken at a rate consistent with growing water demand, economic growth, and poverty alleviation (Prasad 2006; Jefferies et al. 2002). With considerable acceptance of the policy (Abdel Aziz 2007), different models have been utilised in developing, transition, and developed economies in terms of the extent of private and public sector participation in water services. Two general approaches to PPPs are adopted (Jefferies et al. 2002; Augenblick and Custer 1990; Abdel Aziz 2007): 1) financed-based approach that taps private-capital for new developments to meet government's water infrastructure needs; and 2) service-based approach that exploits the private sector's innovations, technical know-how, skills and management expertise to optimise cost and operational efficiencies in service provision, often for existing projects.

In Ghana, PPPs in the water sector began in the early 1990s and follows the above-mentioned approaches. Driven by rapid urbanisation, population growth, economic crisis, political instability, massive inadequate-pricing, under-investment and diminishing operational capacity, the Ghanaian government launched a World Bank-sponsored 10-year Economic Recovery Programme (ERP, 1983–1993) to improve efficiencies in the water sector through institutional strengthening, personnel development, rehabilitation and expansion of existing systems and services (Ainuson 2010; Bohman 2010). In 1987, a 5-year rehabilitation and development plan (as part of the overall

ERP) for the sector was developed which subsequently led to a Water Sector Restructuring Project (WSRP). The WSRP aimed at introducing PPPs into the sector as a response to the grave problems. This prompted the creation of various bodies to facilitate the PPP process and the separation of the urban water from the small-town & rural sub-sector in 1998. Responsibilities for urban water supply services were transferred to a newly-established public semi-autonomous company (Ghana water Company Ltd, GWCL) in 1999. Hitherto, Ghana Water & Sewerage Corporation (GWSC) was responsible for both sub-sectors. On the other hand, water and sanitation responsibilities for small-towns & rural communities were transferred to local governments, under the facilitation of Community Water and Sanitation Agency (CWSA). Milestones in the water sector reforms for PPPs are summarised in Table 1.

Table 1: Milestones in water sector reforms for PPPs in Ghana

Year	Event
Early 1990s	Discussion of PPP options began.
1995	Sir Williams Halcrow & Partners Ltd investigated possible PPP options. First PPP scheme (2 Lease contracts) were proposed and adopted by the stakeholder groups.
1996	An Advisory Committee was formed to supervise and advise the PPP process
1998 (Sept)	Invitation for prequalification of 10- and 30-year lease contracts for the urban water systems was launched.
1998	Separation of the urban sector from the small-town and rural sector.
1999	Azurix expressed interest in a 20-year build-own-operate-transfer (BOOT) contract in the urban water sector. The process was halted following allegations of corruption.
2000 (July)	A 2 nd reformulated invitation for prequalification for a 10-year lease contract was launched. This included private investment and bidding began in 2001.
2001 (May)	National Coalition Against Water Privatisation was created
2002	PPPs introduced in the small-town water sector.
2003	Intensive stakeholder consultation to address opposing groups' concerns.
2005	First urban water management contract between GWCL and Aqua Vitens Rand Ltd (AVRL) signed.
2011(February)	First seawater desalination BOT project between GWCL and Befessa Aqua of Spain signed.
2011(June)	National PPP Policy launched.

The application of PPPs in the water sector between the public and private sector has delivered mixed results. This is attributable to the multiple risks of water supply projects, multiple stakeholders, lack of PPP experience/expertise, public and private sector problems, misallocation of risks; poor procurement systems, public resistance, ill-defined contracts, etc (Zhang 2005b; Chan et al. 2010; Harris 2004). The development of a critical success factor (CSF) framework is timely. Therefore, the paper aims to examine water supply PPP schemes to establish: (a) the main drivers for adopting PPPs in the water sector; and (b) a framework of CSFs, based on case studies. The establishment of CSFs for water projects will ensure efficient allocation of constrained resources (Zhang 2005a) in the Ghanaian water sector.

The paper has six sections. Following on this introduction, the main drivers for adopting PPPs in the water sector are explored in section 2, while the research method and the case studies are presented in section 3. The paper briefly reviews CSFs in section 4, and the CSF framework based on the case studies is presented in section 5. Finally, concluding remarks are made in section 6.

RATIONALE FOR PPPS IN THE WATER SUPPLY SECTOR

PPP reforms in the sector began in the 1990s following pressure from donors and development partners, notably the World Bank and IMF. There are several reasons for PPP application to water supply projects. This section presents these reasons from four key perspectives: inadequate public funding, need for improved management and efficiency, growing water demand, and poor asset condition and lack of maintenance.

Inadequate public funding

Public funding to the water sector is far inadequate (Whitfield 2006). Unfortunately, with an escalating national water needs the government is financially constrained due to overgrown national expenditures. Available estimates suggest huge financial commitments for infrastructure and access expansion in the urban sector. Water Business (2010), for example, estimates US\$100 million annual requirement for infrastructure development alone, against an inflow of US\$35 million: only US\$2 million from the government, US\$3 million from the urban water utility's revenues and US\$30 million from development partners. On the other hand, US\$1.49 billion is required to expand access to meet demand by 2020, but regrettably, an average of 35% financial inflows are realised over the years (GWCL 2009). This issue of underinvestment is largely attributable to failure of the government to enforce cost-recovery tariffs for political reasons. Under GWCL management, rates fell to levels that failed to cover both operation and maintenance and investment requirements of the sector leading to huge infrastructure deficits and inefficiencies. In 2003, for example, the utility incurred annual losses of US\$34 million, nearly its total revenue, due to under-pricing and inefficiencies (Larbi 2005). In the small-town sector, US\$505 million is needed in order to achieve a 76% coverage rate from 2008 to 2015 (CWSA 2008). Evidently, the investment of domestic and international private water operators in the sector has become an unavoidable choice for the government. Investment in new and existing water infrastructure by the private sector avoids the provision of subsidy and also, relieves the national government of financial distress (Meng et al. 2011).

Need for improved management and efficiency

The urban water utility and small-town sector drinking water infrastructure are under public ownership – central and local governments respectively. Sadly, they are fraught with grave operational and management inefficiencies (Nyarko 2007). The sector's main areas of challenges are high non-revenue water levels, poor water quality, low labour productivity due to overstaffing, chronic water theft, operational cost overruns, acute water shortages and service intermittency. The running of the urban utility and the small-town infrastructure rely on government subsidies and bail-outs of international financial institutions and development partners. Public-ownership and the monopoly nature of the water sector limits competition, and hence generates inefficiencies. Therefore, the sector is not responsive to the customer needs, which encourages high non-payment levels. Private sector involvement will therefore inject private-sector expertise and capital to improve operational efficiencies, to enhance customer-oriented management practices and to apply new technologies. This will improve water services to satisfy growing customer needs and payment levels.

Growing water demand (demand-supply imbalance)

Ghana is experiencing a rapid population growth rate of 2.7% per annum, with a greater percentage of the population residing in urban centres (including small-towns). The population has increased significantly over the last decades, from 6.7 million in 1960, 12.29 million in 1984, 18.9 million in 2000 to 24.6 million in 2010 (Ghana Statistical Service 2012), about 367% increment between 1960 and 2010 figures. The urban population has exploded with a rapid rate of 23% in 1960, 29% in 1970, 32% in 1984, 44% in 2000, and 51.5% in 2010 (UN Habitat 2008; Bohman 2010). Moreover, the rapid urbanisation rate of 4.5% per year is the outcome of the rural–urban influx. As of 2005, the proportion of the urban population was 46.3% against 26% in 1965 (Ainuson 2010). Following the definition given earlier, as of 2007, some 6.7 million (32%) of the population lived in small towns (World Bank 2007). Though the current figures do not indicate the exact population living in urban centres and small towns, yet it is evident that the proportions continue to grow faster than the development of water supply infrastructure to keep pace.

At the same time, the total installed capacity of 737,000m³/day (Ainuson 2010) of the existing water systems continues to decline. Currently, one-third is inoperable (Whitfield 2006), putting the urban utility's production capacity at 50% of current demand (Water Business 2010). GII (2011) estimates the average daily production capacity of GWCL at 551,000m³ against average

demand of 939,000m³/day. Over 50% of the amount of water produced is lost to leaks and widespread commercial theft. The diminishing capacity of GWCL, high system losses and the population explosion suggest that a large population face acute water shortages, evidenced by chronic service intermittency. The outright solution is the development of new sources and massive improvement of the existing systems.

Poor asset condition and lack of maintenance/repair

Taking into account the installed capacity and the actual production capacity given above, the current daily idle rate of the production plants is 25.24% (186,000m³). This is partly responsible for the water shortages in the urban sector. This high idle rate results directly from the over-aged and badly deteriorated mains and distribution network infrastructure following decades of neglect and disrepair due to funding constraints. The poor network condition is evidenced by high leakage rates, ranging from 50–60% of total water produced (Kaufmann 2007). Available records show that a large section of the distribution network is over 70 years (Nyarko 2007). On the other hand, it has been argued that public sector lacks the technical expertise to tackle water losses. Therefore, private participation will not only inject capital for pipe renewal, but also technical competence to reduce water losses.

METHOD AND CASE STUDIES

PPP activity in the sector continues to receive government's attention despite the initial resistance to the concept. It occurs at both national and local government levels, but sadly some of which are unsuccessful. In this study, eight real case studies are investigated (see Table 2) and each case is a PPP water supply project in an administrative region. They cover urban and small-town water supply projects: Case 2, for example, is the representation of PPP practice in the urban sector (both cities and big towns), while Case 6 represents PPP practice in small-towns of the northern region. A small-town in this study refers to a settlement of between 2,000 and 50,000 inhabitants that needs improved water supply services (CWSA 2005). As illustrated in Table 2, the cases are a mix of both failed and successful projects. Experience was drawn from successful projects while lessons learnt from failed ones. These cases represent the first wave of private activity in the water supply sector, they provide firm support for exploring the water supply PPP in practice and help to identify and analyse the CSFs for the projects. Information on the projects was collected through review of relevant documentation and reports of respective projects sourced from multiple sources including the urban utility, domestic private water operators, Community Water and Sanitation Agency (CWSA), and general project literature by sponsors (e.g., World Bank) and independent local and international researchers. The case studies are carried out during and after the implementation of the projects so that useful lessons and experiences are captured.

A case study approach is adopted because the paper focuses on a real-life context that has not previously been the focus of thorough investigations (Yin 2003). A case study demonstrates issues underlying the success or failure of efforts (Keremane and McKay 2009). It enables the researcher to study from specific projects in their own right, and also, offers a good understanding of the relevant dimensions of a novel research area (Meng et al. 2011). The approach offers deep insights into CSFs for PPP water supply projects in Ghana, thereby offering a framework for replication in other countries. Given the unique characteristics of the water sector and individual projects across countries the paper does not aim at establishing a framework of CSFs for all water supply PPPs. However, it will serve to test the similarity, practicality and validity of CSFs established from water management case studies and literature. Owing to space limitation, the relevant data of the case studies are summarised in Table 2 and subsequently six main CSFs are discussed.

Defining project success and failure

PPP project success depends on whether the objectives of key participants have been accomplished (Yuan et al. 2010). Project stakeholders have different and sometimes contradicting objectives. This suggests that the success or failure of a project cannot be judged from one or few

stakeholders' perspective. In public projects such as water supply, governments, public water utilities, end-users, private operators, and (sometimes) donors/sponsors are the key stakeholders best placed to judge success or otherwise. The focus of the private sector has been high profit margins and risk avoidance or minimisation; consumers expect improved service levels; government expects effective use of water infrastructure and benefits to the public; and donors pursue successful implementation through completion and value-for-money. The inability to achieve a stakeholder group's expectation(s) represents a failure. The paper considers project success from the government, consumer, and the operator perspectives, with emphasis on factors leading to success or failure.

CRITICAL SUCCESS FACTORS FOR PPPS FROM PREVIOUS STUDIES

Research in CSFs for PPPs continues to receive attention from researchers across sectors and countries. Every project in a given sector and country is unique, hence the proposal of multiple CSFs through case studies, interviews, questionnaire (Abdel Aziz 2007) and literature surveys. CSFs are “those few key areas of activity in which favourable results are absolutely necessary for a manager to reach his/her goals...those few areas where things must go right” (Rockart, 1982: 4). They are the central factors intrinsic in a project which must be upheld so that teamworking can occur in an efficient manner (Rowlinson 1999), and they operate in all phases of a project (Jefferies et al. 2002).

The technique has been applied as a management tool in various fields since the 1970s (Li et al. 2005): manufacturing (Mohr and Spekman 1994); financial services (Boynton and Zmud 1984); and information systems and project management (Jefferies et al. 2002). Other fields include construction management (Chua et al. 1999; Mohsini and Davidson 1992; Sanvido et al. 1992); construction PPPs (Tiong 1996; Li et al. 2005; Qiao et al. 2001; Zhang 2005a; Gupta and Narasimham 1998; Akintoye et al. 2003; Chan et al. 2010); and telecommunication industry (Dima 2004). In recent times, CSFs have been used in water sector PPPs, but these studies are very limited. Meng et al. (2011) introduced a framework of CSFs for transfer-operate-transfer (TOT) water supply projects in China, while Keremane and McKay (2009) discussed CSFs for wastewater management in Australia. Both studies are model-centred, case- and country-specific. In addition, there is no research to date on CSFs for water supply PPPs in Ghana. This paper seeks to contribute to filling this research gap through a case study research approach.

Table 2: Summary of selected water supply PPP projects

Parameters								
ID	Case Study	Contract status	Project scope	PPP model	Private operator mix	Sub-sector	Year	Popn. served
1	Water Supply Project	Developed but failed to be implemented	water supply + investment	Lease contracts (10 & 30 yrs)	International	Urban	1999 - 2002	n/a
2	Water Supply Management	Implemented but failed	water supply + limited investment	Management contract (5 yrs)	International	Urban	2006-2011	7x10 ⁶
3	Yeji Water Supply	Successful	water production + distribution O&M	Management contract (5 yrs)	Small local private company	Small-town	2007-	30,000
4	Atebubu Water Supply	Implemented but failed	water production + distribution O&M	Management contract (5yrs)	Small local private company	Small-town	2003-08	29,595
5	Bekwai Water supply Scheme	Successful	water production + distribution O&M	Management contract (5yrs)	Small local private company	Small-town	2002-07; 2008-'13	30,000
6	Tumu Water Supply	Successful	water production + distribution O&M	Management contract (5yrs)	Small local private company	Small-town	2008-2013	12,000
7	Wassa Akropong Water Supply	Implemented but terminated after a year	water production + distribution O&M	Management contract (5yrs)	Small local private company	Small-town	2003-08	6,170
8	Enchi Water Supply	Implemented	water production + distribution O&M	Management contract (5 yrs)	Small local private company	Small-town	2002-07	9,270

BOOT: Build Own Operate Transfer; O&M: operation and maintenance; n/a: not available; Popn: population

FRAMEWORK FOR CRITICAL SUCCESS FACTORS

PPP policy and implementation unit

The Ghanaian government lacks experience in water supply PPP practice. This applies to other infrastructure and service sectors of the economy. Previous studies (World Bank 2009; Abdel Aziz 2007; Carrillo et al. 2008) paid attention to the availability of diverse expertise in investment and financing, procurement laws, technical, legal, and asset appraisal with knowledge of PPP procurement methods, negotiation, financial, and tax issues. Of particular importance is the accurate valuation/appraisal of existing water infrastructure through the support of valuation experts. Under-estimation of asset limits the chance of attracting potential bidders while over-estimation guarantees future assets losses (Meng et al. 2011) and disputes. Investment experts will guide the procurement process in accordance with best practices whereas legal advisors will ensure effective contract designs to avoid future conflicts that could mar benefits, particularly in Ghana where legal systems are under-developed.

In Ghana's water PPP practice, above areas of skills and expertise could be achieved through the creation and skills enhancement of a PPP policy and implementation unit. The recently launched PPP policy and its unit are generic and apply to all sectors and government levels. However, considering the grave challenges and increasing PPP activity, the establishment of a water sector-specific policy will contribute to addressing the sector's needs in line with the overall policy. It will also prevent confrontations with other government levels regarding the approvals and signing on contracts (Abdel Aziz 2007). The unit could be located within the Ministry of Water Resources, Works and Housing (MWRWH) responsible for the sector to focus on: (a) policy development, e.g., guidelines; (b) procurement and implementation of water supply PPPs, e.g., projects identification and assessment, development of projects documentations, optimum selection of private party and PPP delivery system, proposals evaluation; and (c) approval of projects (Abdel Aziz 2007).

Government (political) commitment

Experience suggests that successful water supply PPPs are beneficiaries of favourable political support. A partnership with a committed government produces noticeable and sustained benefits for the consuming public (Marin et al. 2009; Saltiel and Maywah 2007). This is because politics is closely related to both the development and implementation of public sector reforms (Li et al. 2005). A political decision to make water supply partnerships work drives governments to create conducive environment for partnerships to thrive. The success of the Case 5 was in part due to adequate political support from the local government authority. On the other hand, insufficient political support for cases 5 and 7 presented great risks to both partnerships, evidenced by non-fulfilment of governments' financial obligations, political interferences and ensuing conflicts. As a useful lesson, later projects (particularly Case 6) attracted much support from the district governments.

Adequate financing

In Ghana, most water-related projects are financed by donors or development partners to about 90% of total costs. The government's financial contribution is always minimal and insufficient. Adequate financing has a great impact on the sustainability and success of PPP water supply projects. Substantial initial investment is required for rehabilitating, upgrading, and extending existing and developing new water infrastructure. Therefore, adequate financing efforts must be made to tackle the huge capital outlay of water supply projects to match with innovative financing tools well-suited to their projected cash flows (Zhang, 2005a). The urban water management contract (Case 2), for example, was largely unsuccessful due to insufficient (and untimely) funding from the government and its development partners (World Bank and Nordic Development Fund) to provide the needed funds for rehabilitation and expansion of existing water systems. Hence, no water supply PPP project can deliver its original targets without adequate financing. Moreover, the increasing popularity of management contracts, especially in small-town

projects, puts heavy financial responsibility on the government. Future contracts should therefore incorporate sound financial packages characterised by thorough financial analyses, proper combination of sources of financing and appropriate mitigating mechanisms (measures) for funding delays.

Quality water infrastructure and workforce

Satisfactory water asset (e.g., underground water delivery network) condition is a precondition for successful water supply PPPs (Ringskog et al. 2006). Investors are wary of taking on assets with major rehabilitation needs and will not invest in or will offer a lesser price for highly deteriorated assets. Assets' conditions may be worse than expected (Haarmeyer and Mody 1997) where both parties fail to capture the true state of an existing infrastructure. Good asset condition reduces operational challenges, costs, and renegotiations and subsequent tariff increases. A potential operator can consider the quality and placement of current workforce, and the current state of existing treatment plants and distribution networks through a thorough review of technical reports (Meng et al. 2011), if available. Redundant and low-skilled staff could be laid-off through a well-designed government's voluntary retirement package before signing on an agreement. In Case 2, for example, the problem of overstaffing was tackled through a government-sponsored retrenchment programme. In contrast, nothing was done about the highly-deteriorated distribution network, which defeated the operator's efforts at reducing the already high non-revenue water levels.

Effective regulatory and legal structures

A potent regulatory and legal regime cannot be overlooked in water supply PPPs. An enabling regulatory and legal environment is the foundation of sustainable private sector involvement in urban water infrastructure services (Bennett 1998). Effective regulation reflects the principles of transparency, competition, predictability, independence, accountability, and coherence (ADB 2009) in the delivery of water services. A good legal and regulatory system ensures: (a) appropriate and affordable tariffs, (b) attracts private investors by minimising risks, (c) fair decisions to both the operator and consumers, and (d) minimisation of corrupt practices. The multi-sector utility regulator, Public Utilities Regulatory Commission (PURC), is accused to be weak and lacks political autonomy in executing its functions. On the other hand, the respective regulatory bodies for small-town water projects lack legality and technical capacity to perform their functions satisfactorily. Moreover, there is no national PPP law, and all projects are guided by applicable public procurement laws. As a first step, a new PPP policy was launched in June 2011, but has not been tested on any live project.

Public acceptance/support

Ghana's PPP story cannot be told without mentioning the vocal nature of civil society groups (trade unions, consumers, community organisations/groups, water professionals and activists, environmentalists, political groups, media) ideologically opposed to water sector PPPs. They were successful in stalling the sector's PPP reform for almost 15 years (Fall et al. 2009) and forced the government to abandon Case 1 in 2002. Owing to the attack from the public and other groups, the sector and the whole country paid painful lessons as donors relented on their activities and the urban utility continuously suffered operational and financial losses.

Learning from this an intensive stakeholder consultation was held in 2003 to address the main concerns of opposing groups. In the urban sector, the first project (Case 2) could not have been implemented without stakeholder engagement. Also, the introduction of PPPs in the small-town sector around 2002 integrated full stakeholder consultations to mitigate the risk of community resistance. To a large extent, this approach has softened the ground to allow private participation in the sector, despite some level of initial resistance in some small-town projects (e.g., Case 4). Therefore, in Ghana, public acceptance of the PPP policy is a prerequisite for successful implementation.

CONCLUSION

The appearance of PPPs provides a means to develop and manage water infrastructure and services in Ghana through private-capital, operational competencies, and managerial expertise. Successive governments have made efforts at resolving the chronic failures and inefficiencies in the water sector through PPPs since the early 1990s. Based on the review of relevant policies and documentation on the water sector, this paper first identified the key drivers for adopting PPPs in the sector. These factors include inadequate public funding, management and operational inefficiencies, escalating water demand, and poor asset condition and lack of maintenance/disrepair. The gravity of these challenges warranted private sector participation through PPPs.

However, mixed outcomes have occurred in the undertaken projects, with both failures and successes. After ten years of experimentation with PPPs in the water sector, no study has explored the critical factors for their successful implementation. Thus, to efficiently tap private sector funds and expertise for improved value that is beneficial to both sectors, there is a need to develop a CSF framework for constructive partnerships. Eight real case studies, representing the early PPP projects in both urban and small-town subsectors, have been carried out, leading to the establishment of six main CSFs (relevant to urban and small-town projects) including PPP policy and implementation unit, government commitment, adequate financing, quality water asset and workforce, public acceptance/support, and effective regulatory and legal structures. The paper focused on the interests of the central and local governments, private operators, and consumers in order to identify and analyse these CSFs from a balanced perspective. With application to water supply PPPs, the CSF framework serves to highlight awareness to issues at both the development, implementation, and operation phases. Like similar studies, the CSFs outline a framework for competitive advantages and attainment of multiple objectives. It is therefore advised that both public (central and local governments) and private sectors considering water PPPs view these factors as stout criteria for a successful implementation. Moreover, the key drivers for PPPs and the framework of CSFs discussed in this paper serve to test the similarity, practicality and validity of critical factors for adopting PPPs and CSFs established from water management case studies and literature. Finally, these findings can be adopted as referential experience for implementation of similar projects in Ghana and elsewhere.

REFERENCE

- Asian Development Bank, ADB (2009) *Urban Water Sector Risk Assessment*, Guidance Notes, ADB, Manila.
- Adam, A (2011) *Urban Water Policy Reforms in Ghana: Power, Interest and Performance*, MSc Dissertation, School of Business, University of Greenwich.
- 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, 461-470.
- Ameyaw, E E and Chan, A P C (2012) Assessing the performance of the urban water management contract – a case from Ghana. *Int. J. of Professional Management*, 6(6), ISSN 20422341.
- Ainuson, K (2010) Urban Water Politics and Water Security in Disadvantaged Urban Communities in Ghana. *African Studies Quarterly*, 11(4), 59-82.
- Augenblick, M and Custer, B S (1990) The build-operate-transfer (BOT) approach to infrastructure projects in developing countries, WSP 498, World Bank, Washington D.C.
- Abdel Aziz, M A (2007) Successful Delivery of Public-Private Partnerships for Infrastructure Development. *J. of Engineering and Management*, 133(12), 918-931.

- Bennett, E (1998) *Public-private Co-operation in the Delivery of Urban Infrastructure Services (Water and Waste)*. Background paper: Public Private Partnerships for the Urban Environment Programme (PPPUE), UNDP/Yale Collaborative Programme, New York.
- Bohman, A (2010) Framing the Water and Sanitation Challenge: A history of urban water supply and sanitation in Ghana 2009-2005, PhD thesis, Umea University.
- Boynton, A.C. and Zmud, R.W. (1984) An assessment of critical success factors. *Sloan Management Review*, Summer, 17–27.
- Carrillo, P, Robinson, H, Foale, P, Anumba, C, and Bouchlaghem, D (2008) Participation, barriers, and opportunities in PFI: The United Kingdom experience. *J. Manage. Eng.*, 24(3), 138–145.
- Chan, A P C, Lam, P T I, Chan, D W M, Cheung, E, and Ke, Y J (2010) Critical success factors for Public Private Partnerships (PPP) in infrastructure developments: a Chinese perspective. *ASCE Journal of Construction Engineering and Management*, 136(5), 484–494.
- Chua, D K H, Kog, Y C, and Loh, P K. (1999) Critical success factor for different project objectives. *J. Constr. Eng. Manage.*, 125(3), 142–150.
- Community Water and Sanitation Agency (CWSA) (2005) *Strategic Investment Plan 2005-2015*. Ghana.
- Community Water and Sanitation Agency (CWSA) (2008) *Strategic Investment Plan 2008-2015*. Ghana.
- Dima, J (2004) Success and failure mechanisms of public-private partnerships (PPPs) in Developing countries: Insights from the Lebanese context. *Int. J. of Public Sector Management*, 17(5), 414–430.
- Fall, M, Marin, P, Locussol, A, and Verspyck, R (2009) Reforming Urban Water Utilities in Western and Central Africa: Experiences with Public-Private Partnerships – Volume 2: Case Studies, Discussion Paper SeriesNo.13, World Bank.
- Ghana Statistical Service (2012) 2010 Population and Housing Census: Summary of Final Results. Accra, Ghana.
- GII, Ghana Integrity Initiative (2011) *Ghana's National Water Supply Integrity Study*. GII, Accra, Ghana
- Gupta, M C, and Narasimham, S V (1998) Discussion of CSFs in competitive tendering and negotiation model for BOT projects' by R. L. K. Tiong. *J. Constr. Eng. Manage.*, 124(5), 430.
- GWCL, Ghana Water Company Ltd (2008) *Mid-year review- January to June 2007*, Corporate Planning and ICT Department, Ghana.
- GWCL, Ghana Water Company Ltd (2009) *GWCL Sector Development Program*, Ghana.
- Haarmeyer, D and Mody, A (1997) Private capital in water and sanitation. *Finance and Development*, March, World Bank.
- Harris, S (2004) Public private partnerships: Delivering better infrastructure services, *Proc., Conf.: Investment in Infrastructure in Latin America and the Caribbean: Second Generation Issues and Perspectives*, Inter-American Development Bank.
- Harris, C, Hodges, J, Schur, M and Shukla, P (2003) *Infrastructure Projects: A Review of Cancelled Private Projects*. Public Policy for the Private Sector 252. Washington, DC: World Bank.
- Jefferies, M, Gameson, R, 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.

- Kauffmann C, and Perard, E (2007) *Stocktaking of the water and sanitation sector and private sector involvement in selected African countries*, Background note for the regional roundtable on Strengthening Investment Climate Assessment and Reform in NEPAD Countries, Lusaka–Zambia, 27–28 November, 2007.
- Larbi, E (2005) Public-Private Partnerships and the Poor in Water Supply Projects: the Ghanaian Experience, WELL Fact sheet- Regional Annex, Ghana.
- Li, B, Akintoye, A, Edwards, P J, and Hardcastle, C (2005) Critical success factors for PPP/PFI projects in the UK construction industry. *Constr. Manage. Econ.*, 23(5), 459–471.
- Marin, P, Ouayoro, E, Fall, M, and Verspyck, R (2009) Partnering for water in Côte d'Ivoire Lessons from 50 years of successful private operation, Gridlines, No. 50, Aug. 2009, 1–5.
- Meng, X, Zhao, Q, and Shen, Q (2011) Critical Success Factors for Transfer-Operate-Transfer Urban Water Supply Projects in China. *J. of Management in Engineering*, 27(4), 243–251.
- Mohr, J and Spekman, R (1994) Characteristics of partnership success: partnership attributes, communication behaviour, and conflict resolution techniques. *Strategic Management Journal*, 15, 135–52.
- Mohsini, R A and Davidson, C H (1992) Determinants of performance in the traditional building process. *Constr. Manage. Econom.*, 10(4), 343–359.
- Nyarko, K B (2007) *Drinking Water Sector in Ghana: Drivers for Performance*. Taylor and Francis, The Netherlands.
- Prasad, N (2006) Privatisation Results: Private Sector Participation in Water Services After 15 Years. *Development Policy Review*, 24(6), 669–692.
- Qiao, L, Wang, S Q, Tiong, R L K and Chan, T S (2001) Framework for critical success factors of BOT projects in China. *Journal of Project Finance*, 7(1), 53–61.
- Ringskog, K, Hammond, M E, and Locussol, A (2006) Using management and lease-affermage contracts for water supply: How effective are they in improving service delivery? Gridlines Note No. 3, World Bank.
- Rockart, J F (1982) The changing role of the information systems executive: a critical success factors perspective. *Sloan Management Review* Fall, 3–13.
- Rowlinson, S (1999) Selection criteria. In: *Procurement Systems: A Guide to Best Practice* (eds. S Rowlinson & P. McDermott), pp. 276–299. E and F.N. Spon, London.
- Saltiel, G and Maywah, N (2007) Argentina: The Salta Water Public-Private Partnership. *enbreve*, No. 102, 1–4.
- Tiong, R L K (1996) CSFs in competitive tendering and negotiation model for BOT projects. *J. of Constr. Eng. Manage.*, 122(3), 205–211.
- Today Newspaper (2012) Government to tackle conservation of water bodies. Ghana. 6th July 2012.
- UN Habitat (2008) *The State of African Cities 2008. A framework for Addressing Urban Challenges in Africa*, United Nations Human Settlements Program, Nairobi, Kenya.
- Water Business (2010) *The Water: A Business Imperative - Ghana roundtable*. Accra, Ghana.
- Whitfield, L. (2006) The Politics of Urban Water Reform in Ghana. *Review of African Political Economy*, 33(109), 425–448.
- World Bank (2007) *Ghana Small-town Water Supply and Sanitation Additional Financing*, The World Bank, Washington DC.
- Yin, R K (1994) *Case study research: Design and Methods*, 2nd edition, Sage Publication, Thousand Oaks.

- Yuan, J., Skibniewski, M. J., Li, Q., and Zheng, L. (2010) Performance objectives selection model in public-private partnership projects based on the perspective of stakeholders. *J. Manage. Eng.*, 26(2), 89–104.
- Zhang, X (2005a) Critical success factors for public-private partnerships in infrastructure development. *Journal of Construction Engineering and Management*, 131(1), 3– 14.
- Zhang, X. (2005b) Paving the way for public-private partnerships in infrastructure development. *Journal of Construction Engineering and Management*, 131(1), 71-80.

PPP FOR SCHOOLS IN FLANDERS: COMPLEX STRUCTURE IN A COMPLEX CONTEXT

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PPPs are a commonly used method for creating and delivering public goods or services. Nevertheless, there is a remarkable lack of empirical research into the actual governance of PPPs and the impact on its performance. This article tries to fill up this lacuna. The focus is on the interaction between elements of complexity, the governance structure of PPPs, and its combined effect on performance. First a useful analytical framework is presented; and subsequently it is applied to a critical case in order to gain insights into the 'black box' called PPP performance. The Flemish school infrastructure DBFM program 'Schools of Tomorrow' offers an interesting example to examine how complexity and governance of PPPs affects overall performance.

Keywords: Governance, PPPs, Control, Complexity, Performance, Accountability

INTRODUCTION

While PPPs are popular in the public sector across the world and frequently discussed by politicians, practitioners and academics, there is a remarkable lack of empirical research into the actual governance of PPPs (Hodge, Greve, and Boardman 2010; Bloomfield 2006). PPPs present important management and governance challenges, like governance by public and private actors in a complex multi-level or/and multi-actor context (Flinders 2010; Skelcher 2010; Donahue and Zeckhauser 2012). Increased involvement of different actors and tiers makes public tasks and corresponding responsibilities more ambiguous and confused. This article focuses on the interaction between elements of complexity, the governance structure of PPPs, and its combined effect on performance. After discussing the research strategy, the empirical data of a single case study in Flanders is presented. To conclude, this article ends with the lessons learned from the case study.

RESEARCH STRATEGY

Analytical framework

Before discussing complexity and governance issues of PPPs, the 'PPP' concept has to be delineated as a clear and shared definition of 'PPP' is missing (Hodge, Greve, and Boardman 2010). A broad spectrum of arrangements between traditionally procured government projects and full privatization exists, as many different ways of cooperation/partnership between public and private partners try to fill this space, differing from country to country (OECD 2008; Grimsey and Lewis 2007). Given this lack of definitional clarity, an alternative way to grasp the nature of the

concept PPP is to accept this diversity and attempt to classify different types of PPPs. This article explicitly focuses on so called long-term DBFM (design build finance maintain) programs related to public infrastructure.

Long-term PPP contracts are complex and risky undertakings, and governments hoping to achieve the theoretical benefits of long-term contracting with a private partner are confronted with daunting management and governance challenges (Bloomfield 2006). Since the knowledge about specific factors that contribute to PPP governance and project success or failure is still limited (Bloomfield 2006; Hodge 2004), Van Gestel et al. (2012) introduced an analytical framework to help and fill that gap. This framework tries to capture the entire cycle of the process of a PPP in order to improve the understanding of how governance of PPPs affects their performance.

Using the case of a complex PPP program to develop school infrastructure commissioned by the Flemish government, this article tries to contribute to the understanding of the ‘black box’ called PPP performance. Evaluating PPPs performance or ‘value for money’ is not easy, given the different goals PPPs are supposed to serve. Hodge (2010) states that many evaluation studies are rather weak and the data dirty, resulting in evaluations with mixed and contradictory results. He calls for more evidence-based learning and synthesis, combined with a cross-disciplinary set of perspectives and skills. This article is a modest contribution to this justified ambition. First important elements of complexity are scrutinized, subsequently governance mechanisms to manage those complexities are looked at, and finally some results are presented (See Figure 1).

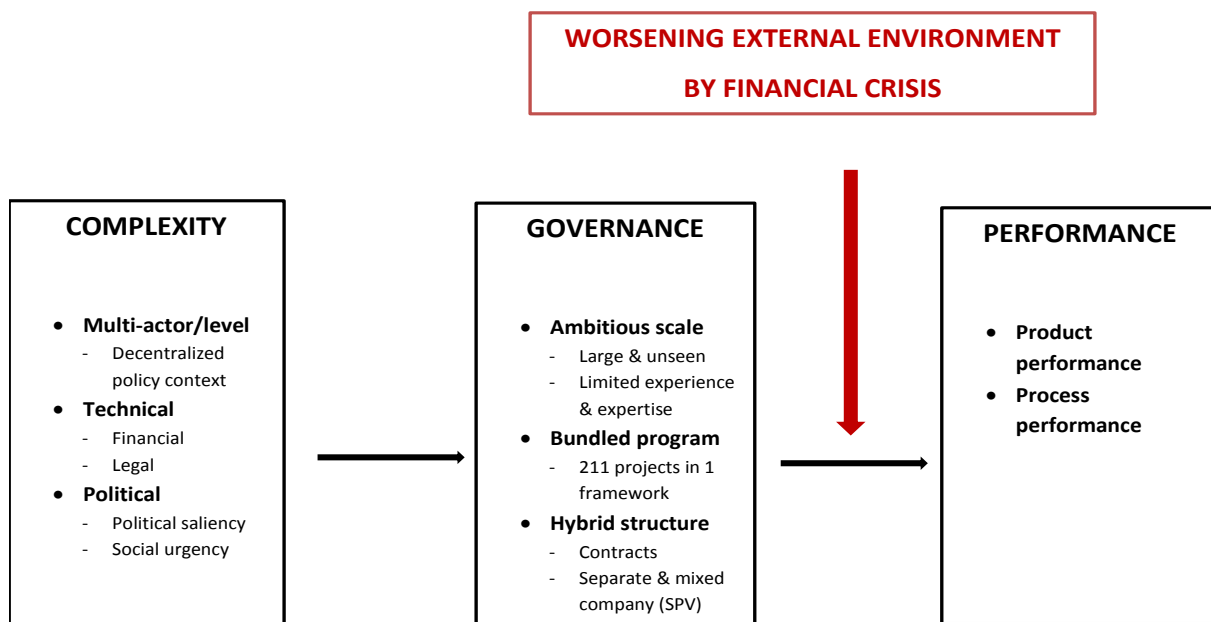


Figure 1: Analytical framework

METHODOLOGY

Since the article aims to uncover social mechanisms behind the interplay between complexity, governance and performance of PPPs, a qualitative approach seems most suitable. Various authors see qualitative research as an important first step in the process of theory construction (Eisenhardt and Graebner 2007; Yin 2009; Geddes 2003). The presented analytical framework will be applied to a particular case (i.e. PPP project) through a detailed description of its attributes and the relationship and dynamics within it. It is an illustration of what Yin (2009) calls a 'case description'.

In this article the focus is on the school infrastructure PPP (DBFM) program of the Flemish government. The case was selected in an information oriented way, namely as an “unique case” containing lots of interesting and relevant material (Flyvbjerg 2006). The PPP program for

Flemish school infrastructure is a single case characterized by different elements of complexity, and therefore a promising example to find out how complexity, control and the applied governance strategy relate to each other, and how that interaction affects overall performance. In short, Flemish PPP school infrastructure offers an example of how a government opts for a complex solution for a complex challenge (with the unfortunate event of a worsening wider environment). It remains to be seen whether this was the most optimal choice in terms of performance. The methods used are twofold: a broad document analysis and various (n=9) semi-structured interviews with key players.

CASE STUDY: THE FLEMISH PPP PROJECT ‘SCHOOLS OF TOMORROW’

The PPP project ‘Schools of Tomorrow’ is one of the largest PPP programs introduced by the Flemish government. Before applying the analytic framework, first the context wherein the PPP project took its actual form will be outlined.

Context

The state of school infrastructure in Flanders (northern region of Belgium) is problematic for several reasons. Decades of structural underinvestment due to public savings since the late seventies resulted in an old and outdated school infrastructure, no longer meeting current standards. Recently, Flanders also faces a school infrastructure shortage in many cities due to demographic evolutions. Almost 2.650 dossiers for subsidy applications are on the waiting list of AGION (public agency for school infrastructure) worth EUR 2,65 billion in September 2012 (AGION 2011) and the investment need of ‘GO!’ (Community Education) is estimated at EUR 1,9 billion, totaling over EUR 4,5 billion. The estimated waiting time for new school infrastructure is more than ten years and many schools take refuge in provisional prefabricated ‘container classes’.

Main educational networks calculated that annual subsidies need multiplication by factor 2.5 à 3 to reduce the waiting list in a reasonable time span. The Flemish government hence looked for new ways to construct and finance school infrastructure, meeting the needs of the target group (different educational networks and school boards) while respecting their autonomy. The Flemish government also wanted ways providing ‘value added’ compared to existing subsidies, like accelerated project implementation, better cost control, compliance with higher (innovative) technical requirements, and improved availability and flexibility of school infrastructure. The Flemish government worked on two different ideas in 2003, namely an investment fund trying to get one billion euros from Flemish individual investors to build new school infrastructure, and the implementation of a ‘DBFM’ PPP-formula.

In 2004, the minister of education (social-democrat) denounced the option of the investment fund, claiming it was too expensive and too complex. The Flemish government (led by a Christian-democrat) choose to put the second idea into practice. In a highly indebted country like Belgium, the Flemish government searched for alternative ways to finance large infrastructure projects without further raising debt and taxes. A two-track policy was therefore developed for school infrastructure. One track was a large catch-up program through PPP totaling EUR 1,5 billion, with new schools designed, build, financed and maintained (DBFM) by a private partner. This DBFM company (SPV) makes school buildings available to school boards and takes care of the maintenance for 30 years. In turn, school boards pay a performance-related availability fee for the contract period, and the building’s ownership is transferred to the school boards free of charge afterwards. The second track was an increase of the regular subsidy system through AGION, a public agency subsidizing purchase, construction and renovation of school buildings, with an annual budget of ca. EUR 190 million.

Complexity

The need for new and additional school infrastructure in the region of Flanders was pressing. The Flemish government had to establish an appropriate solution, and set a number of preconditions:

(1) accelerated elimination of the existing gap in school infrastructure (short term); (2) maximum realization with limited resources; (3) creation of an additional incentive for employment in the construction industry; (4) creation of modern school infrastructure; (5) creation of a flexible and organic school infrastructure; (6) ESA 95 neutral investment, kept off-balance. In a critical report on PPPs in Flanders, the Belgian Court of Audit confirmed that in the start and preparation stage, budget neutrality was empathized more than societal, operational and financial value added (Rekenhof 2009). The Flemish government wanted to invest significantly in infrastructure, without endebting itself from an ESA 95 perspective, thus embracing PPP as an ESA 95 neutral investment method.

Within this more or less 'mandatory' policy framework, some elements of "complexity" were very crucial for further project structuring and the applied instruments for steering and control. In what follows the most important aspects of multi-actor complexity, technical complexity and political complexity are discussed.

Multi-actor complexity

Freedom of education is a fundamental right safeguarded by the Belgian Constitution, shaping a particular educational landscape characterized by three main educational networks with high autonomy to organize education themselves.

Table 1: Educational landscape in Flanders

Community Education (16,5% of the pupils):	public institution "Community Education" (GO!) is organized on behalf of the Flemish Community, fully subsidized by the Flemish government..
Subsidized Public Education (8% of the pupils)	Subsidized public education comprise municipal education organized by local government. School infrastructure is subsidized by the Flemish government via AGION: ratio 60% for secondary schools and 70% for primary schools. The umbrella organizations of this education network are VSGO (municipalities and cities) and POV (provinces).
Subsidized Private Education (75,5% of the pupils)	Subsidized private education is organized by private initiatives (not by a public authority), mostly Catholic schools, ranging from very large to very small organizing bodies and school boards. The umbrella organization of the Catholic schools is VSKO. Their school infrastructure is also subsidized by AGION at a ratio of 60 and 70 %.

The main source of complexity in the school infrastructure project is this multi-actor character, amplified by the decentralized organization of the educational landscape in Flanders.

The Flemish government is the executive branch of the powers of the Flemish Community, and acts as the initiator for the PPP project for school infrastructure. Within this project, the Flemish government is a multiplex 'public partner'.

The DBFM company (SPV) is called 'Schools of Tomorrow' and is responsible for the execution of the program. AG Real Estate and BNP Paribas Fortis make up the private partners who hold a majority share of 75% -1. AG Real Estate is a real estate company with extensive experience in developing and maintaining large construction projects and is fully owned by AG Insurance. BNP Paribas Fortis adds financial expertise and know-how to the program. The DBFM company enters into contracts with the delegated developer AG Real Estate CopID (a subsidiary of AG Real Estate), the school boards and other private parties involved (e.g. architects, contractors, urban planners).

Table 2: Different 'faces' of the Flemish government as 'public partner'

Flemish minister of	The current Flemish minister of education is also competent for school infrastructure. During the entire course of the project, the education competence
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Education	was held by social-democratic ministers. Education is a full competence of the Flemish Community. Other ministers involved: the minister of finance and budget (Flemish nationalists) watches over the budgetary implications and the minister-president (Christian democrat) is responsible for general PPP policy.
PMV	PMV is an independent investment government company, participating in the economic sphere of Flanders and providing financial leverage when the market needs it and when necessary financial support for private initiatives is scarce. PMV is working with partners through private funds and public private partnerships.
AGION	This public agency finances and subsidizes the purchase, construction and renovation of schools for compulsory education and colleges, and ensures the coordination and facilitation of the DBFM program. It is currently an 'internally autonomous agency with public law legal personality', so remains under ministerial hierarchy but with some operational decision making authority delegated to the agency head.
School Invest	Together with AGION (50%), PMV (50%) created 'School Invest' to invest in the DBFM-company. 'School Invest' holds a minority share of 25% +1 in the DBFM company 'Schools of Tomorrow'.

Technical complexity

A major technical challenge for the project was the specific situation of the targeted school infrastructure. The list of individual school projects was so diverse that standardization was very difficult: projects were large or small, more technical or art schools with specific demands, new school buildings or renovation of existing schools, some schools were protected as cultural heritage, etc. Many individual projects were too small scale for stand-alone PPPs, due to high transaction costs associated with such a type of partnership. As a result, the Flemish government opted for a bundled or aggregated program of more than 200 projects with high diversity. By placing one huge program in the market for a public tender procedure, the technical complexity increased significantly.

Moreover, the specific situation of and legislation on education (including absolute autonomy of education organizing bodies) and the diversity of educational landscape with each network having their particular procedures and characteristics also complicated things. The specific financial situation was also different: community education was fully funded while the subsidized networks had to secure their own funding up to 20-30% of the investment value of the new infrastructures (which was not obvious especially for the subsidized private schools).

Another major technical issue is the legal and financial structure of the project. Main challenge was finding a way to get the project off the government's balance sheet, while retaining some government control and steering in the process and providing an extended government guarantee on the long-term loans (lowering overall cost price). Yet, financing a DBFM program with a total value of more than EUR 1.5 billion proved very difficult, especially in financial turbulent times. Complexity was increased because of the huge and unseen scale of the project. PPP contracting automatically brings along some legal and financial complexities, but these are amplified because the ambitious nature of the project and the lack of a proven track record. Without much first-hand experience and expertise regarding DBFM projects, the Flemish government opted for a 'big bang' option: implementing one large catch-up program at once; with much emphasis on public expertise development along the way.

Political complexity

Political complexity of the project is closely related to multi-actor complexity (e.g. existence of different schools networks). These various school networks are rooted in the ideological struggle of Liberals and Socialists on the one hand and Catholics on the other hand about the role of the state in education and the position of private education during the nineteenth and twentieth century. Today, this struggle is no longer prominent, but there remains a delicate balance between the different networks, and consequently between the different political parties. Education is a political salient issue and constitutes almost 40% of the total expenditures of the Flemish government. It also has a strong tradition of elaborated deliberation with the ‘field’ (umbrella organizations, unions, etc.). Moreover, given the value of EUR 1.5 billion of the DBFM program, all relevant political actors watch it closely. Political complexity is also increased by the societal urgency of the project.

PPP governance

When looking at the actual governance of the PPP project ‘Schools of Tomorrow’, it will become clear how the complexities are handled with in order to pursuit the initial objectives of the program (See figure 2).

Initiating the project structure (n° 3 in figure 2)

In the literature, two main types of PPPs are distinguished (e.g. Edelenbos and Klijn 2009). In the contractual model (inspired by PFI in the UK) PPP is a turnkey project in which a private actor contracts to design, finance and construct a public sector project. Private maintenance and exploitation may also be part of the contract. In the participative model, public and private actors establish a joint company to develop, maintain and operate projects. Different projects are combined to reinforce each other and to create an value added through real co-production. Because the intertwinement of public and private partners is higher in the second model, it can be viewed as an advanced PPP-type. The Flemish ‘hybrid’ model however combines both models (Van Gestel, Voets, and Verhoest 2011). It has a double control and steering structure: (1) a separate and mixed company (SPV) to execute the program and (2) a strict DBFM framework agreement between the SPV and the Flemish government(n° 2 in figure 2), and separate DBM and F-contracts between the SPV and other private partners. This *sui generis* hybrid model is internationally unseen and untested, and hence an interesting test case for an international audience.

To manage all complexities, the Flemish government opted for a SPV responsible for the PPP (DBFM) program of all individual schools. Several advantages of this structure were expected. Firstly, the projects would be performed faster compared to school boards providing full realization of construction or renovation by themselves. Secondly, the SPV could specialize in its core-task: performing integrated contracts for school construction, while school boards focus on the provision of education. Thirdly, the long-term commitment of the SPV would produce sustainable buildings (because the company also guaranteed the long-term maintenance). Fourthly, the SPV would enable the coordination of various parties involved in the construction, which might limit realization time. Fifthly, it enables pooling certain purchasing procedures (called bargaining power: e.g. if the SPV negotiates the insurance-package for the full program, this might be less expensive than if each individual building project had to run through the same procedure) and reduces transaction costs. Finally, the specialized construction coordination could be conducted by specialized personnel in the SPV. Especially the fifth and sixth potential benefit seems to derive directly from the choice for a single project company for the entire program.

Besides bundling several small projects (n° 1 in figure 2), the Flemish government also opted for a public participation in the project company for several reasons (n° 3 in figure 2). Because the private partner would mainly act from a profit-maximizing perspective, it was important that a public counterweight watched closely over the educational and societal perspectives. Second, given the large LT (financial) commitment, the public partner wanted a structural direct control over the DBFM program. To ensure ESA-neutrality of the project, the Flemish government opted

for a minority stake of 25%+1. This stake provided some minority protection according to company law (de facto veto power in decision making). So, next to elaborate contract surveillance and steering, the Flemish government can partly control and steer the process through the Board of Directors of the SPV. A specific supervisor of the Flemish government was also appointed as a non-voting member to watch carefully over the execution of the DBFM program. The direct participation also allowed the Flemish government to learn directly from the process; important given the lack of first-hand experience and expertise. Finally, its financial participation lowered the threshold for private partners and a possible financial return in case of a profit.

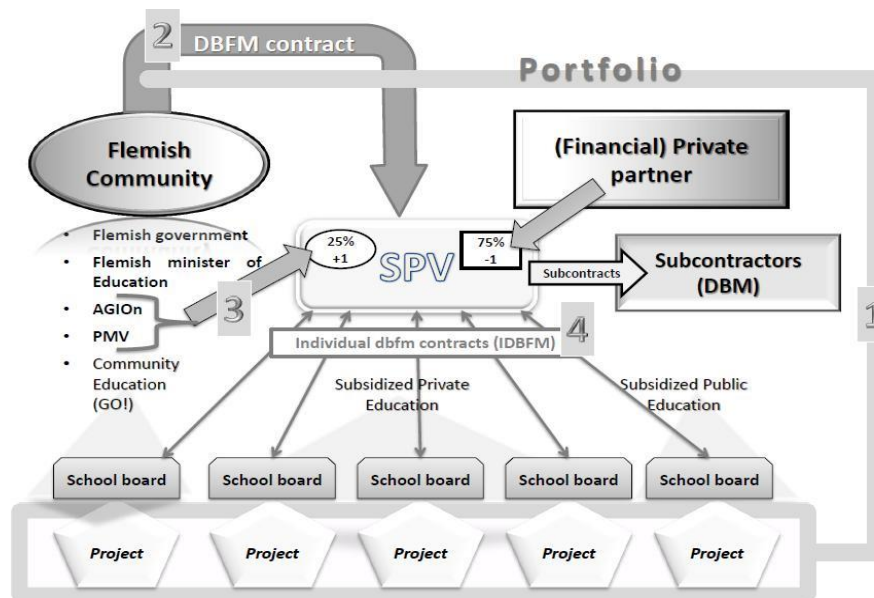


Figure 2: Project structure

AGION got additional money to set up a subsidiary called 'School Invest', sharing it 50/50 with PMV. School Invest then participates in the DBFM company (SPV) for 25% + 1 share, worth EUR 40.25 million (*n° 3 in figure 2*). The Flemish government wanted private *financial* partners with experience in real estate activities and companies. Such an exclusive choice for consortiums with a financial partner (and not for instance large project developers) is rather atypical and inconsistent with international PPP standards and practice, but several elements explain this. The first idea was that a financial partner would lead to a more 'classical' approach, namely easier and cheaper financing and more opportunities for smaller contractors and developers. The second idea was to let the financial partners do the project management, although this is not their core business.

The project company then makes school infrastructure available on the basis of individual DBFM contracts with the school boards (*n° 4 in figure 2*). AGION would pay part of the availability fees, following existing subsidized rates in the different educational networks and levels, while school boards pay the remaining part. The advantage for school boards is a standardized contract, instead of every board making additional costs for legal advice.

The structure seemed to meet some elements of complexity. Yet, some other actors, including the Flemish PPP Knowledge Centre, pointed to potential challenges of this structure. The project structure, for instance, deviated strongly from international standards on PPP. Critical questions included: Are smaller clusters not preferable above such a large program? Are consortiums based on financial institutions the most appropriate private partners for realizing a school infrastructure program? Are deviations from international standards wisely when first-hand experience and expertise is missing?

Public-public stage: Process (n°1 in figure 2)

Following the publication of the project in 2004, the school networks were asked to respond to the plans. As expected, their main concerns related to the ownership structure (different for different networks), distribution of resources across the networks, additional costs of alternative financing (especially for the subsidized school networks), critical mass of projects, and difficulties in ex ante specification of the existing needs. After this initial consultation, feedback to education networks was limited. Despite the decentralized educational landscape, 'the largest PPP project in Flanders' was set up in a fairly centralized manner. Moreover, the key players feared that a broad interactive process with many stakeholders would lead to slow and 'sticky' decision-making. As PPP promised faster implementation, such an interactive approach was no option.

Because of the enormous complexity of the project (no previous experience with such projects, limited expertise, huge scale, bundled large program, 'hybrid' PPP governance structure, multi-actor complexity, financial and legal complexity), the project structure was in practice elaborated by a small group of experts. Flemish minister of education and his cabinet worked on the project structure with the support of specialized law and financial firms, more or less decoupled from other actors like the Flemish PPP Knowledge Centre or other ministers in the Flemish government. Although most Flemish PPP projects follow the participative model (with PMV included as one of the shareholders), it is remarkable how much the project structuring differs each time. Probably the specificity of the educational policy domain explains this 'unique' project structuring.

The educational field – most notably subsidized private education - considered transparency and communication towards the education networks insufficient. The subsidized private education feared that the uniqueness and specificity of its network – most notably the fact that they were not entirely subsidized – was neglected, and that this structure was not the cheapest solution for their school boards. To build trust, the final selection of the projects was done by a selection committee with extensive representation from the representative umbrella organizations of school boards. This committee helped to limit concerns on distribution of resources between the different networks.

Selection stage (n°2 in figure 2)

The Flemish government decided in 2006 that AGION would conduct the negotiation and award procedure for the selection of the SPV-partner. Candidates were expected to take the role of equity provider, to formulate a proposal with respect to the overall financing, and to have the necessary experience and expertise relating to real estate development. This negotiation process was guided by an advisory committee (with PMV, Department of Finance, Inspection of Finances, AGION and the cabinet of the minister of education).

The public tender procedure (a negotiated procedure with prior publication of a notice) was open for consortiums with a financial partner. The competitive process lasted for two years and four candidates entered the BAFO phase: DEXIA/KBC, Fortis Bank/Fortis Real Estate (in 2008 BNP Paribas bought 75% of the shares of Fortis), Cofinimmo / Gemeentelijke Holding, Barclays Capital / Meridiam Infrastructure / NIB Capital. In December 2008, the Flemish government approved the proposal by the contracting authority to select Fortis as the preferred candidate. Due to the financial crisis in September 2008 which had a tremendous impact on Fortis (Fortis was first nationalized and then sold to BNP Paribas), the final negotiations were delayed. Fortis had to rely on other banks like Dexia and KBC to secure the financing of the program. To keep the project on track, in addition to an already extended sub sovereign guarantee scheme, the Flemish government provided a refunding guarantee in respect of the private lender. In August 2009, the contract was closed, except for the financial part. The financial close finally took place on June 10, 2010, three and a half years after publication of the tender.

During the tendering procedure, the school networks received little information and mostly through informal channels. Under these conditions, the school networks tried to form the blueprint of the final project structure and procedure.

In 2010, nearly four years after the selection of projects, the SPV was founded. Its goals are:

- Exert all possible means to maximize individual DBFM contracts with school boards to finish the school building projects as soon as possible;
- Ensuring the financing of school buildings;
- The implementation of the design, construction and maintenance of the institutions that are the subject of the construction program and described in the individual DBFM contracts in accordance with the competition rules set in public procurement rules;
- Ensuring the project management and coordination of the construction as well as supervising the construction and maintenance;
- Exert all possible means to build and maintain each institution as cost-efficiently as possible without lowering quality;
- Transfer the infrastructure after 30 years without charge;
- Set up a system of risk management.

The DBFM framework agreement between the SPV and the Flemish government, detailing these goals, is secret because of confidentiality issues (despite heavy pressure from the main education networks). The issue of commercial confidentiality hampering transparency and eroding public legitimacy of PPPs is something various authors warn for (e.g. Coghill and Woodward 2005; Flinders 2005; Shaoul 2005). Nevertheless, a number of provisions relating to risk sharing that have a (potentially) strong impact on future development of the project could be deducted. One issue is the allocation of the volume risk on the side of the Flemish government. Despite the ambition of the Flemish government to shift the volume risk towards the private partner (next to including maintenance in the program of school infrastructure), the volume risk eventually shifted back towards the Flemish government. As a result, an important incentive for the SPV to keep as many schools as possible on board, was eliminated. In that way it became a fortiori important for the Flemish government to convince as many school boards as possible. Two calls were organized to the subsidized private education network.

Operational stage (n°4 in figure 2)

In March 2009 the establishment of 'School Invest' was speeded up. In anticipation of the start of the SPV, School Invest got the task to prepare the first twenty projects in the DBFM portfolio. The relevant school boards were extensively briefed on their role and that of School Invest in a plenary information session and individual consultation sessions on the spot.

In the subsequent discussions between the schools and School Invest, especially for the subsidized networks, a number of problems came up: the possibility to amend the proposed project, the assessment of the financial feasibility, listed buildings (cultural heritage) and the problem of the already appointed architects. Although no immediate solution was available, School Invest engaged itself to quickly create clarity not to jeopardize the successful development of the DBFM program. Meanwhile, the preparation of the project proceeded. At the end of 2009 AGION asked school boards to update their building programs.

In 2010, the SPV was finally operational. Due to the constitutional right of freedom of education, school boards could not be forced to take part in the DBFM program. Their initial commitment however was high because the PPP 'promised' improvement of their infrastructures more rapidly. The schools were also allowed to stay in the second policy track by obtaining their spot on the regular waiting list, ensuring that the choice for PPP had no ex ante negative consequences. However, the ranking of many schools improved during the years that the PPP was being set up, weakening the promise of earlier realization through PPP.

After the SPV was established, further information and communication actions started towards the school boards, inviting them to participate in the DBFM program. Although school boards were

visited individually and the contract and the program was explained, many questions concerning the actual implementation of the project remained unanswered.

The fact that the original ambition in 2006 of 702,000 m² gross and 211 school projects worth EUR 1 billion was downsized in 2010 to a considerably smaller volume of investments (625,000 m²) and 167 school projects for a total of 1.5 billion, reinforced the fear of the subsidized networks. Concerns about the cost of DBFM, already voiced in 2005, were re-enforced as well. For the community schools, enjoying 100% subsidies, the DBFM program was no risk and even a welcome addition to the regular funding.

Meanwhile, the pressure on school boards increased from September 15th 2010 onwards, as the official invitation to join the DBFM project was sent, giving them 75 days to approve it. However, due to uncertainties about the program, many school boards were not inclined to participate. Firstly, in some cases, the contribution (the "availability fee") of school boards (subsidized networks) would take 80 percent, with peaks up to 120 percent of their operating budget, for a thirty year period. Completely 'unfeasible' and 'unaffordable' was the reaction of the subsidized networks. Secondly, because of the delay in the kick-off of DBFM, a number of the selected projects could be realized in the regular system in the period 2007-2010.

The Flemish government then decided to provide the subsidized education within the DBFM program with an increase of 11.5% in subsidies; and AGION asked the networks themselves to actively try to promote the program. The school boards however remained wary, lacking prior knowledge and specific expertise and trying to interact with a highly specialized SPV supported by a battery lawyers and experts that had full understanding of all the clauses of the DBFM agreement. Neither the network organizations nor the school boards had access to the actual DBFM framework between the Flemish government and the SPV and its contents, making them dependent on secondary sources (e.g. the individual DBFM contracts) to understand the regulatory context of these transactions. The networks claimed some critical issues were not yet solved (e.g. the needed input of own resources, accelerated repayment, references to the framework agreement, third party use of future school infrastructure).

These uncertainties forced AGION and the SPV to ensure that none of the school board would be deleted from the portfolio just because of exceeding the deadline of 75 calendar days to decide on their participation. By the end of 2010, it became clear that the quota for the subsidized private education for the portfolio was not going to be met. In accordance with the framework agreement between the government and the private partner, a new call was launched. If this call failed, the remaining quota would be passed on to the other networks (Community Education). As a result, in July 2011 the quota was reached. The delays so far increased the pressure to accelerate the closing of the individual DBFM contracts.

Mid 2012, the DBFM Company signed 167 pre-contracts corresponding to at least 200 schools: 108 for subsidized private education, 28 for subsidized official education and 31 for state education. The project was finally on track, at least for what the number of participating schools was concerning (although the number represented less m²). The ambition for realizing all projects was shifted towards 2017, and the start of the construction stage of the first project is expected late 2012.

Performance

Six years after the ratification of the decree concerning the catch-up in school infrastructure in 2006, not a single school has been built or renovated within the PPP-framework. Although evaluating PPPs is a difficult task because they harbor so many different promises ((Hodge (2010) lists fifteen of them), table 3 presents the various objectives and a prudent estimation of the current situation.

Table 3: Performance

<i>"[...] school boards could focus on the provision of education."</i>	The detailed and formalistic character of the DBFM approach, with a financial focus, requires diligent action from the school boards, and a structured, professional and above all well-timed monitoring system. All this in order to avoid compromising their liability and safeguarding their rights regarding the DBFM company. If the school boards want to fully exploit the potential benefits regarding qualitative school infrastructure embedded in the current DBFM-scheme, they still have an important task during the availability stage.
<i>"The long-term commitment of the SPV would produce buildings that are sustainable"</i>	Out of the scope of this article, but the first results are promising. There are a lot of innovative designs with great attention to sustainability. In addition, the SLAs are of a higher level of severance than is usually the case, making it difficult to compare the maintenance component. Especially in Subsidized Private Education, the maintenance aspect is strongly linked to the available (and limited) budgets.
<i>"[...] a favorable effect on the realization time."</i>	Not yet verifiable.
<i>"The possibility of pooling certain purchasing procedures and reduce transaction costs."</i>	Ex post evaluation of this item must be awaited. A tender procedure for subcontractors has been carried out. The selected consortia will be able to compete for individual projects.
<i>"The specialized construction coordination could be conducted by specialized personnel in the SPV."</i>	The delegated developer AG Real Estate CopID has a team of ca. 50 specialized people to execute the program.
<i>"The projects would be performed faster than if the school boards had to provide the full realization of the construction or renovation by themselves."</i>	During initial forecasts in 2006 it was expected that in 2011 all schools within the project would be realized. Early 2012, this forecast shifted to 2017. 11 years (2006-2017) after the ratification of the decree concerning the catch-up in school infrastructure, this aspect of value added will have lost its authority entirely.
<i>"The program makes a contribution to maximum realization with limited resources."</i>	Not in the scope of this article, although it is clear that this investment could not be made within the conventional budget.
<i>"The creation of an additional incentive for employment and the construction industry"</i>	Not in the scope of this article.
<i>"The creation of modern and appropriate school infrastructure"</i>	Not in the scope of this article, although it looks that this objective will be achieved, but it might also have been achieved in a standard public procurement procedure.
<i>"The creation of a flexible and organic school infrastructure"</i>	No information available.
<i>"ESA-95 neutral"</i>	Uncertain. The ESA95-neutrality of the project may be compromised because of the government guarantees deemed necessary in relation to the bankability of the project.

CONCLUSIONS

Nowadays PPP is a widely used method for creating and delivering public goods or services. Nevertheless, there is still need for further research in order to gain insight into the actual governance of PPPs and the impact on its performance. Therefore, this article tries to make a contribution to the PPP research and literature in two ways: by presenting a useful analytical framework to investigate PPP performance; and by applying it to a complex Flemish PPP project through detailed description. The Flemish school infrastructure DBFM program offers a good example to examine how complexity and governance of PPPs affects overall performance.

The Flemish government faced a difficult policy challenge, namely to rapidly create new school infrastructure in the complex decentralized educational landscape with a long tradition of consultation. Budget constraints forced the Flemish government to explore new ways (ESA neutral) to finance this operation. A DBFM formula was chosen with the promise of budget neutrality as the main driver, but other advantages were anticipated (short term results, maximum realization with limited resources, modern school infrastructure, low energy buildings, professionalization). While most DBFM projects are rather complex by nature, the Flemish government added complexity by choosing a very large, bundled program, and multifaceted 'hybrid' governance structure which was internationally unseen and untested. The main reason for the latter was the strong desire to retain some direct control.

Not only is this DBFM program an ongoing learning process for the Flemish government, it also developed rather isolated from other relevant actors. The minister of education and his cabinet, supported by specialized law and financial firms, structured and shaped the PPP project, without much cross-departmental expertise exchange or learning. This centralized decision-making structure based on a small group of experts clashed with the rather decentralized educational landscape and was negative for building trust between the clients (educational networks and school boards) and the providers (SPV) in the program.

Despite reasonable and well-intended arguments for choosing this large 'bundled' DBFM program and this particular 'hybrid' governance structure, this paper explained that the Flemish government chose a very difficult and complex option which deviated from the international PPP standards and practices. This may seem odd because Flanders was rather late with developing a PPP policy, and one could expect the Flemish government to really more heavily on international best practices, and tested and competitive models (instead of introducing new ones). The complexities of the PPP-setting were also influenced negatively by unforeseeable external events, most notably the financial crisis in 2008. In short, the PPP school infrastructure in Flanders illustrates what can happen when a complex solution is chosen for a complex problem in a worsening environment. In this case it led to many delays, incremental costs and various difficult implementation obstacles.

Although evaluating PPP performance is never easy and many goals need to be reckoned with, it is interesting to run through the results so far. According to the original plans, most schools had to build by the end of 2012, but no new school infrastructure has been built yet following the PPP-scheme. The current estimated completion date of all school projects is 2017. Moreover, the program started with 211 school projects estimated EUR 1 billion, and changed to 167 school projects (with a total of 211 school buildings) estimated EUR 1.5 billion. Furthermore, not all intended advantages were achieved (see table above). The overall picture is somewhat disappointing, to understate the obvious conclusion. It is definitely an achievement that in such financial turbulent times the DBFM program did not fail, but the high expectations are not (yet) realized.

As conclusion some lessons can be derived from the case 'Schools of Tomorrow'. Firstly, there is a real danger in choosing for a 'big bang' and 'one shot' catch-up program. PPP projects are intrinsically complex projects and difficult to manage, especially in a case where no previous experience or exemplary project is available. The bundled structure adds even more challenges regarding coordination and management. Moreover, the close interrelation of numerous projects includes a real contamination risk between projects. If only one or some projects default, the entire PPP scheme can come at risk.

Secondly, innovative and creative PPP structures can look very interesting from a theoretical perspective, but in reality can lead to a long and difficult implementation process. Especially in a market that has become more risk averse and where market players look for projects and structures they know.

Last but not least the most important lesson from this case in terms of PPP performance is probably that when a government is confronted with a very complex policy challenge and context, it is probably less risky to opt for a more cautious incremental approach, which attempts to

simplify the governance structure as much as possible and which is supported by international tested standards and ‘best practices’.

REFERENCES

- AGION. 2011. Annual Report. Brussels.
- Bloomfield, Pamela. 2006. The Challenging Business of Long-Term Public-Private Partnerships: Reflections on Local Experience. *Public Administration Review* 66 (3):400-411.
- Coghill, and Woodward. 2005. Political Issues of Public–Private Partnerships. In *The Challenge Of Public–Private Partnerships: Learning from International Experience* edited by G. Hodge and C. Greve. Cheltenham: Edward Elgar.
- Donahue, John D., and Richard J. Zeckhauser. 2012. *Collaborative Governance: Private Roles for Public Goals in Turbulent Times*. Princeton, N.J.: Princeton University Press.
- Edelenbos, Jurian, and Erik-Hans Klijn. 2009. Project Versus Process Management in Public-Private Partnership: Relation Between Management Style and Outcomes. *International Public Management Journal* 12 (3):310-331.
- Eisenhardt, K., and M. Graebner. 2007. Theory Building From Cases: Opportunities and Challenges. *Academy of Management Journal* 50 (1):25-32.
- Flinders, Matthew. 2005. The Politics of Public-Private Partnerships. *The British Journal of Politics & International Relations* 7 (2):215-239.
- Flinders, Matthew. 2010. Splintered logic and political debate. In *International Handbook on Public-Private Partnerships*, edited by G. A. Hodge, C. Greve and A. E. Boardman. Cheltenham, UK: Edward Elgar.
- Geddes, B. 2003. Paradigms and sand castles: Theory building and research design in comparative politics. Ann Arbor, Michigan: University of Michigan Press.
- Grimsey, Darrin, and Mervyn K. Lewis. 2007. Public Private Partnerships: The Worldwide Revolution in Infrastructure Provision and Project Finance. Cheltenham: Edward Elgar.
- Hodge, Graeme. 2004. The Risky Business of Public-Private Partnerships. *Australian Journal of Public Administration* 63 (4):37-49.
- Hodge, Graeme A. 2010. Reviewing public-private partnerships: some thoughts on evaluation. In *International Handbook on Public-Private Partnerships*, edited by G. A. Hodge, C. Greve and A. E. Boardman. Cheltenham, UK: Edward Elgar.
- Hodge, Graeme A., Carsten Greve, and Anthony E. Boardman. 2010. Introduction: the PPP phenomenon and its evaluation. In *International Handbook on Public-Private Partnerships*, edited by G. A. Hodge, C. Greve and A. E. Boardman. Cheltenham, UK: Edward Elgar.
- Hodge, Graeme A., Carsten Greve, and Anthony E. Boardman, eds. 2010. *International Handbook on Public-Private Partnerships*. Cheltenham, UK: Edward Elgar.
- OECD. 2008. Public-Private Partnerships: In Pursuit of Risk Sharing and Value For Money. Paris.
- Rekenhof. 2009. Publiek-private samenwerking bij de Vlaamse overheid.
- Shaoul, Jean. 2005. The Private Finance Initiative or the public funding of private profit. In *The Challenge Of Public–Private Partnerships: Learning from International Experience* edited by G. Hodge and C. Greve. Cheltenham: Edward Elgar.
- Skelcher, Chris. 2010. Governing partnerships. In *International Handbook on Public-Private Partnerships*, edited by G. A. Hodge, C. Greve and A. E. Boardman. Cheltenham, UK: Edward Elgar.

Van Gestel et al.

Van Gestel, Kit, Joris Voets, and Koen Verhoest. 2011. Pijlers voor een performante samenwerking. Handreiking voor de PPS-praktijk op basis van vijf Vlaamse PPS projecten. Leuven: SBOV.

Van Gestel, Kit, Joris Voets, and Koen Verhoest. 2012. How Governance of Complex PPPs affects Performance. *Public Administration Quarterly* 36 (2).

Yin, Robert K. 2009. *Case study research: design and methods*. Thousand Oaks: Sage.

LEGAL LIMITATIONS ON THE COMMUNICATION BETWEEN THE PARTIES IN PUBLIC PROCUREMENT OF PPP

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The European public procurement regulation has been described as a restrictive force on PPP projects, especially in countries which employ a strict interpretation of the directives. One major limitation brought forward has been the restrictions on negotiations during the procurement procedure. In the literature it has been suggested that the negotiation would improve PPP performance because it allows for a clarification of the contract and enables alignment of the parties' goals. Two propositions are used to examine if the regulations are a hindrance to PPP performance by comparing the current doctrine and European case law on public procurement to those two propositions. The perspectives are the regulation of the different procedures available in the directives: competitive dialogue, the negotiated procedure, and the open and restricted procedures and the possibility of early involvement before the formal procedure has begun. The conclusion is that, while the directives limit the procuring authorities' abilities to exchange information and negotiate provisions, the information which need to be transferred, and negotiations which needs to be conducted, can in most cases be carried out within the current procurement framework. Thus, the public procurement legislation does not present any substantial limitations on PPP performance.

Keywords: Public Procurement, Public Private Partnerships, Performance, Regulation, Communication

INTRODUCTION

A public authority has to comply with the E.U. law in all its actions. With regard to public-private partnerships this may involve consideration of, for example, state aid rules. Those rules would concern occasions where the public authority within a partnership guarantees the private entity's bank loans (Hancher *et al.*, 2006). Another example is the case of special project vehicles in PPP, where state aid is regulating capital injections into those vehicles (Hancher *et al.*, 2006). Another legal area which could come into play regarding PPP is the regulation of service concessions (Calleja, 2010). Concessions can be described as the right of a private party to exercise an economic activity (European Commission, 2000), e.g. the right to collect parking fees on property belonging to a public authority, or the right to collect road tolls. If the private party assumes the economic risk, and is not reimbursed by the public authority (e.g. consumers pay the parking fee) those service concessions are covered by primary law only (Sundstrand, 2012), though it should be noted that service concessions are proposed to become regulated in secondary law also (European Commission, 2011). However, if the prerequisites are not met for the contract to be characterised as a service concession, then the PPP contract is often covered by the public procurement directives. This would typically involve PPP contracts where the public authority reimburses, in some form, the private party for the latter's supply of goods, buildings or services: many PFI projects ought to fall into this category.

For PPP contracts covered by the directives it has been suggested that the restrictions put on the use of the negotiated procedures (art. 28 2004/18/EC) and the restrictions on the public authorities' behaviour drawn from the fundamental principles of transparency, equal treatment, proportionality, mutual recognition would decrease the likelihood of an efficient PPP contract (Tvarnø, 2006). However, this suggestion may be precipitous. If the need for negotiation during contract award can be interpreted as a need to communicate information in order to reduce

information asymmetry between the contracting parties, the outcome of the legal analysis may change.

NEED FOR COMMUNICATION

Communication between parties during the conception of a PPP project is probably of vital importance in order to meet the parties' expectations. Akerlof's seminal work on *lemons* (1970) describes market situations where a buyer cannot reliably evaluate the quality of the item purchased, but the seller can. The proposition is that if a buyer is not able to distinguish between bad and good quality, bad quality items will drive out good quality items because the seller of good quality cannot obtain the real or expected value for the item (Akerlof, 1970). Applied to PPP this would suggest that if a public body cannot determine whether they are buying good quality or bad quality, PPP projects would consistently degrade in performance. Nevertheless, different institutions can come into play in order to remedy this effect. For example, a trademark can be built on the reputation of delivering good quality, or long term relationships can be used to establish trust (e.g. Macneil, 1973). Thus, a customer can predict the probability of buying a good quality product, even though the customer cannot determine this from the product specifically. However, in public procurement the use of trademarks are severely limited, Classical directive 2004/18, art. 23.8 which lies down:

"Unless justified by the subject-matter of the contract, technical specifications shall not refer to a specific make or source, or a particular process, or to trade marks, patents, types or a specific origin or production with the effect of favouring or eliminating certain undertakings or certain products [...]"

The use of trust may also be severely limited since art 2 states:

"Contracting authorities shall treat economic operators equally and non-discriminatorily and shall act in a transparent way."

In other words, a public authority may not chose a partner in PPP on the basis that it *trusts* that partner, at least not based on previous experience. Consequently there is a need to exchange information, during the tendering process, on the quality of the project to be delivered by other means in order to ensure project success. The notion that there is a need to exchange information early is not new. However, surprisingly few researchers have dealt with the issue explicitly regarding to PPP.

Leiringer (2006) has concluded that early involvement between contractors and clients is a cornerstone for technical innovation in PPP. Furthermore, it is concluded in the same paper that risk allocation in itself is not as important as clarity of the risk allocation being made. A similar approach has been taken by Wilson *et al.* (2010) who suggests that division of tasks has to be clear from the outset of a PPP project. It has also been proposed that negotiation before contract award is a success factor in PPP because the negotiation process would imply precision in the contract arrangements (Stanley, 2006). Moreover, it has been construed that too complex contracting (i.e. when the private party cannot understand the effects of the contract given its bounded rationality) may be a cause of failure in PPPs (Van Gestel *et al.*, 2012). Further, pre-contractual negotiations can be a useful tool to align the parties' goals (Noble, 2006; see Stadtler and Probst, 2012 for a similar suggestion). Furthermore, transaction costs decrease when the parties are able to communicate during the early phases in the tender process (i.e. when the private party can have influence on the formulation of the contract notice or an impact on requirements placed upon tenderers) due to decreased scope of the negotiation.

There appear to be two elements in the works cited above: a need to establish a contractual certainty or clarity, and a mechanism to reduce information asymmetry between the parties which is in the with Akerlof's suggestions discussed above. Thus, these two elements are brought forward in the following legal analysis.

PUBLIC PROCUREMENT LAW

In Union law the European Court of Justice has laid down some fundamental principles with regard to public procurement. Those are the principles of transparency, equal treatment, non-discrimination, proportionality and mutual recognition. The *principle of transparency* means that a public authority has to an obligation of transparency so that a supplier can satisfy itself that the rules in the directives are followed (C-275/98 Unitron Scandinavia). This principle, together with the *principle of equal treatment*, also implies that, for example, award criteria are mentioned in the tender notices, so that every reasonably well-informed supplier is given the opportunity to interpret the conditions of the procurement in the same way (C-19/00 Siac Construction). The court has formulated the *principle of equal treatment* as:

“[C]omparable situations must not be treated differently and that different situations must not be treated in the same way unless such treatment is objectively justified (C-434/02 Arnold André, para. 68, C-21/03 and C-34/03 Fabricom, para. 27)

Another principle is the *principle of non-discrimination* stemming from article 18 in the treaty on the functioning of the European Union (TFEU) which states that discrimination on the grounds on nationality is forbidden (cf, C-243/89 Storebælt). The fourth fundamental principle is the *principle of proportionality*, which means that requirements are not allowed to be set higher than necessary for a specific goal (e.g. environmental concerns) to be reached (C-448/01 EVN & Wienstrom). The last of the fundamental principles is the *principle of mutual recognition* which says that a member state must respect a decision in another member state, for example if a member state body certifies a product or a supplier, this certification has to be respected in the other member states, except where there is an overriding reason in the public interest (cf. 120/78 Cassis de Dijon). Concerning the possibilities of communication during the procurement process, the principles of transparency and equal treatment are of immediate concern. The principle of transparency includes a notion of predictability, that is, a supplier needs to be, when reading a contract notice, at a state where he is able to predict what he would have to do in order to submit a successful tender (cf. The effect of price competitiveness, Bovis, 2012). Combine this principle with the notion of equal treatment, where the procuring body needs to ensure that every potential supplier (Bovis, 2006a) at the tender notice stage is given the same conditions, and it will have immediate effects on the scope of communication between parties when procuring a PPP.

The procedural rules have been laid down in the directives in order to ensure that the principles mentioned above are complied with, and directly affect the possibility for communication. The *open* and *restricted* procedures are the default procedures available in all procurement processes (art. 28 2004/18/EC). Those procedures do not allow for any negotiations of contract terms from the time of the publication of a tender notice, and can be seen as first-price sealed bid auctions. The principles in those procedures are secured by restricting almost all communication between the time of the tender notice and the publication of the award decision. This stems from the restrictions of changing the scope of the procurement or the conditions of the contract. If conditions need to be changed, a new tender notice has to be published (though exceptions exist on rare occasions, not relevant to the issue at hand). This has been recognised as too restrictive in particularly complex projects. Therefore some so-called restrictive procedures have been put in place for complex projects.

Competitive dialogue may be used in complex projects (art. 29 2004/18/EC). The procedure allows for sequential post-tender negotiations and allows for explicit changes of contract provisions and the scope of the procurement process, providing changes in the contract are laid upon every participant in the dialogue (Bovis, 2006b). In contrast the *negotiated procedure* (art. 30 2004/18/EC) allows for post-tender negotiations of costs, delivery schedule and similar provisions, but not for change in the scope of the procurement. The negotiated procedure is only available for projects where the project itself does not permit overall pricing prior to the tender (Bovis, 2006a). There is unfortunately a lack of case law with regard to choice of procedure, and with regard to amount of discretion the procuring authority has negotiations in competitive dialogue and the negotiated procedure; however, the directives clearly state that during competitive dialogue there is room for negotiation during the procurement procedures, but less so

after a preferred supplier has been selected. The negotiated procedure does not allow for negotiation during the procurement process, but does allow for negotiation with a preferred supplier. Nonetheless, it should be noted that a public authority has to comply with the fundamental principles also while conducting a restrictive procedure.

Early involvement

The public procurement directives demand that communication between potential suppliers and the procuring authority need to be transparent and non-discriminatory. This effectively implies that every supplier needs to get the same information, or have opportunity to give information on the same subject. However, not all activities related to the process of procuring a PPP are necessarily covered by the directives.

In the case C-26/03 Stadt Halle, the court considered which decisions were reviewable in courts. The city council in Halle had decided to award a waste disposal contract to a company which was partly owned by the city. When a potential supplier learned about the contract, the firm applied for a review of the decision. Halle argued that the application was inadmissible since the city never formally started a public procurement procedure, i.e. since no public procurement procedure had taken place, there was nothing for the board to review. Nevertheless, the court concluded that:

“Where a contracting authority decides not to initiate an award procedure on the ground that the contract in question does not, in its opinion, fall within the scope of the relevant Community rules, such a decision constitutes the very first decision amenable to judicial review.” (C-26/03 Stadt Halle, para 33)

And the court further stated:

“Not amenable to review are acts which constitute a mere preliminary study of the market or which are purely preparatory and form part of the internal reflections of the contracting authority with a view to a public award procedure.” (C-26/03 Stadt Halle, para 35)

Thus, it is possible to conclude that some market research is exempted from the scope of the public procurement directives. It is only when a procuring authority decides to (or decides not to) initiate a public procurement procedure, decisions has to comply with the rules laid down in the directives. One can argue that a decision to conduct market research, or preliminary studies, is an indication that there already is a decision to conduct a public procurement process, at least when the aim of the procurement is a need which has to be met in order for the authority to fulfil its duties. However, the decision to initiate a process has to have the capability to legally affect the outcome of a contract award, in order for the decision to be reviewable (C-26/03 Stadt Halle, para 39). In other words, a decision must be capable of affecting the award itself or the contract. Furthermore, it can be argued that the act of market research, or preliminary study, depending on how these are carried out, can skew the procurement process to the benefit of a specific supplier. For example, it is possible for a supplier, if consulted during a preliminary stage, to affect specifications and other properties in the tender notice in a manner which would put the supplier in a better position than other suppliers. In the joined cases C-21/03 and C-34/03 Fabricom, a provision in a Belgian decree which prevented suppliers involved in research, experiments and development from submitting a tender for contracts related to those activities. It was argued that the principle of equal treatment requires that a person who has been engaged in preparatory work would be in a more advantageous position than a person who has not been involved in an early stage (cf. C-434/02 Arnold André, para 68), and thus has to be excluded from the tender award. While the court recognised that a supplier which has been involved in early stages may have information which gives them an advantageous position (C-21/03 and C-34/03 Fabricom, para 29-30), it declared that this cannot be assumed to be generally the case. Instead an investigation has to be made on a case-by-case basis if the nature of the involvement has in fact put the supplier in a better position (C-21/03 and C-34/03 Fabricom, para 31). What has to be determined is whether all potential suppliers have been given equal opportunities while formulating their bids (C-87/94 Walloon Buses, para 54) and thus the participation in early stages is distorting the competition

between the tenderers (C-538/07 Assitur, para 30). One example of such distortion is if a supplier is able to affect the requirements on the supply or service in a way which would exclude suppliers who cannot meet those requirements. However, the circumstance that only some suppliers may be able to fulfil a requirement is not *eo ipso* a distortion of competition. In Concordia (C-513/99 Concordia Bus Finland, para 85), the court considered a situation where the city of Helsinki had set award criteria which in the tender could be met by a small number of undertakings. In the contract notice, the municipality had stated that bids could receive extra points in the evaluation if they met criteria relating to low nitrogen oxide emissions and low noise levels. In order to be able to get those extra points the tenderers would be required to use gas-powered buses. At the time there was only one service station in the country providing the gas needed, and this service station had limited capacity. Furthermore, just before the invitation for tender was published another municipality-owned undertaking placed an order for 11 gas-powered buses. When those buses were delivered the service station's capacity would be reached. Thus, the only candidate which could reasonably provide gas-powered buses was the undertaking owned by the municipality. The court observe that the fact that only a small number of undertakings can meet a criterion does not lead to it being a violation of the principle of equal treatment *per se* (C-513/99 Concordia, para 85). The view thus seems to be that it is not a question of if a supplier explicitly can provide a specific service, but rather if all suppliers could provide that service given that it had set up its resources differently. In comparison, if a specific trademark is required, only the manufacturer of this trademark would be able to fulfil the requirements. No other undertaking would be able to fulfil the requirement no matter it employed strategies in the market (cf. C-359/93 Unix).

With regard the public procurement of PPPs, some conclusions can be made from the case law. A procuring authority can conduct preliminary studies in cooperation with market actors. This ought to be true for any kind of information, including scope, financial and contractual terms. It is first when a decision to initiate a public procurement process has been made that explicit restrictions are applied on the process. However, if an actor is allowed to influence the design of the contract notice or procurement procedure, it can be assumed that behaviour, which is not compliant with the principle of equal treatment even before the decision to initiate a procurement process, may be inherited and is thus reviewable. This is because decisions to accept a specific design of a contract notice is a decision which would be within the reach of public procurement regulations even if the requirements in the contract notice were developed during preliminary studies. Limitations on communication between the parties depending on two requisites: the level of involvement of the supplier in the process, and the impact the involvement has on the contract award (i.e. if the involvement distorts competition between the tenderers). A supplier intending to participate in the bidding cannot be allowed to actively shape or define tender documentation on behalf of the procuring authority if this will affect competition between tenderers. It should not be inferred from this that a decision by a procuring authority, based on information gathering, to set up requirements which only some suppliers may fulfil is violating the rules laid down in the directives. One can for example imagine that a procuring authority may choose between five alternative characteristics for a PPP project suggested by five different suppliers. Preferring one characteristic over another is not in itself distorting the competition if it is theoretically possible for all suppliers to deliver the chosen characteristic.

Negotiations

As concluded above, when a procuring authority needs, or wants, to include suppliers in the formulation of a contract notice, it results in distortion of the competition between the tenderers. This is typically discussions on what should be delivered, where, when and how and at what price, i.e. contract negotiation. The ability of the parties to communicate this type of information to each other depends on the chosen award procedure. Nonetheless, there are some general conclusions related to public procurement of PPPs. First of all, if a project does not qualify for the use of competitive dialogue or the negotiated procedure, communications with suppliers are restricted to events prior of publication of the tender notice. This implies that the needs of the procuring authorities have to be finally specified before the publication. Thus, the communication has to be conducted during the information search process in the early stages. If it is not possible to collect required knowledge during the early stages competitive dialogue and the negotiated procedure can

be used. Competitive dialogue will provide a procedure where contract scope and financial terms are sequentially negotiated until a satisfactory contract can be written. The nature of the negotiation during the dialogue can be conducted on different levels.

Arrowsmith and Treumer (2012) suggests a division into three models of behaviour for the negotiations: model 1 is based on negotiations on functional or performance requirements, e.g. how many cars per year should the highway allow for, should it be one railway bridge and one road bridge, or a bridge which combines the two modes of transport. Model 2 covers negotiations on prescriptive requirements, e.g. what kind of asphalt should be used for the highway, what kind of middle barrier should be installed. The third model mentioned by Arrowsmith and Treumer is a hybrid model where model 1 and 2 are combined with different performance and prescriptive requirements which are then negotiated. However, it is still important to remember that the negotiations allowed during the competitive dialogue may still have some restrictions compared to a rule-free negotiation conducted between private parties. The principle of equal treatment and transparency confers upon the public authority the obligation to give the same information and apply the same conditions to every participant in the dialogue. This prevents negotiations from running completely parallel to each other. The participants are involved in the same negotiation; it is not separate negotiations between each participant and the public authority. Nevertheless, it would seem that the competitive dialogue has ample room for negotiation during the procurement stages.

If the procuring authority is able to specify its needs, but not the financial conditions, it is possible to use the negotiated procedure with a prior publication of a contract notice, in order to establish viable payment mechanisms for the PPP. Article 30, para 2 states this conclusion as:

“[...] Contracting authorities shall negotiate with tenderers the tenders submitted by them in order to adapt them to the requirements which they have set in the contract notice, the specifications and additional documents, if any, and to seek out the best tender [...]”

From the directives' wording it is clear that negotiations can take place *ex post* only; already set requirements may not be changed during the negotiations. However, it is uncertain whether this implies a prerequisite that all requirements are set in the tender notice, or if it is possible to negotiate on requirements which not are mentioned in the tender notice. One example is during the publication of a tender notice of the procurement of a public swimming facility using PPP, where opening hours should be between A and B, all days of week. The capacity should be 1000 visitors during weekdays, 1500 during weekends. The facility should have an “adventure theme” for kids. It has not been defined if the adventure part should include a water chute, or a wave machine. Is it then possible to negotiate terms of introducing a water chute in the adventure part of the facility? One argument would be: yes it is, because it does not specifically extend the scope of the project, it only specifies the scope. On the other hand, the wording of article 30 states that the negotiations should be on the tenders, not on the requirements, and to introduce a water chute is to introduce a new feature in the project. The solution is, arguably, in the nature of the change of scope. If the change of scope implies a change of the economic considerations a tenderer would make during submission of a bid, then it would probably not be an allowed topic for negotiation. But if the question concerns changes in the qualitative scope of the project only, negotiations would probably be allowed. A somewhat easier topic for negotiation would be discussions on payment mechanisms. Returning to the swimming facility, one can imagine three mechanisms being negotiated: monthly fee put upon the public authority, price rates for visitors and reimbursement per visitor from the public authority. If three bidders submit different bids in these three categories, one can imagine a negotiation on the ratio between these three categories, 20% higher monthly fee against a 20% lower entrance fee. It is important to relate this, again, to the principle of transparency, which would require every negotiation has to be on issues clearly identified in the tender notice. Thus, it is not permissible for discussions on topics not previously publicised.

DISCUSSION

There is a potential limitation in the communication through the principle of equality, which to some extent can prevent a supplier from actively shaping the contract or the contract notice. This limitation can restrict the possibility of early involvement by the contractor, a recommendation put forward by Leiringer (2006). While early involvement can be achieved during preliminary stages, and through competitive dialogue, this involvement has to be carried out without contractual obligations which may weaken incentives for suppliers to commit to the project. However, there may be other solutions, not discussed in this paper, to achieve early involvement by using incomplete contracting (eg. Ågren and Landin, 2012). Leiringer (2006) also suggested that clarity of risk allocation is of importance in PPPs. This can be achieved in the early stages through a market dialogue. Once again taking the principle of equality into consideration, it is possible to publicly investigate how potential suppliers view suggestions on risk allocations made by the public authority. This would enable the public authority to ensure that the market actors find the proposed allocation of risks clear and suitable. Furthermore, both competitive dialogue and the negotiated procedure would enable formal negotiations on risk allocation. Further, there is no regulation which would prevent that conclusion to be extended also with regard to division of tasks as suggested by Wilson et al. (2010) or for contract precision (Stanley, 2006). However, since the negotiated procedure requires scope of work to be defined in the contract notice, this would rule out the negotiated procedure. The proposition to align the contracting parties' goals through pre-contractual negotiations can be achieved through a competitive dialogue. To some extent it should be possible to align at least explicitly economical goals through the negotiated procedure also. As concluded by Siemonsma et al. (2012), competitive dialogue would also decrease transaction costs by providing a tool for early involvement of suppliers. However, simpler projects which have to be procured with the open and restricted procedures ought to restrict the possibility for negotiation.

CONCLUSIONS

If the assumption that success factors for PPP converge into the questions of contract clarity and the reduction of asymmetric information between the parties is correct, then the public procurement regulations would not put up impenetrable barriers.

The regulation allow for ample room for communication between the parties, both in straightforward projects and in complex projects. However, in order to make it possible for a supplier to reveal some asymmetric information, the authority needs to design the procurement process with this purpose, from day zero. First, the choice of procedure is of vital importance; if the project is procured by open or restricted procedure, the revelation of asymmetric information has to be directed through market research, and market discussion before the formal procedure is begun. This is also the case when the negotiated procedure is employed. However, if competitive dialogue is used, then the revelation may take place during the formal procedure.

If the goal is to increase contractual clarity, this has to be done in market discussions prior to the formal procedure commencing, if the open procedures are used. Competitive dialogue contains a possibility to increase the contractual clarity during the formal procedures, while the negotiated procedure allow for discussions on clarity *ex post* if those discussions do not change the economic prerequisites in the tender notice's scope. Thus, thus the conclusion is that the public procurement regulations may hinder when a certain type of communication is carried out during a procurement process. However the regulations do not obstruct communication aimed at decreasing asymmetric information or contractual clarity provided this communication is carried out at a proper time.

REFERENCES

120/78 Rewe-Zentral Ag V Bundesmonopolverwaltung Für Branntwein. 1979 ECR 00649.

- Akerlof, G A (1970) The Market for "Lemons": Quality Uncertainty and the Market Mechanism. *The Quarterly Journal of Economics*, **84**(3), 488-500.
- Arrowsmith, S and Treumer, S (2012) Competitive Dialogue in EU Law: A Critical Review. In: Arrowsmith, S and Treumer, S (Eds.), *Competitive Dialogue in EU Procurement*, pp. 3-143. Cambridge: Cambridge University Press.
- Bovis, C (2006a) *EC Public Procurement : Case Law and Regulation*. Oxford: Oxford University Press.
- Bovis, C (2006b) The Competitive Dialogue as a Procurement Process of Public Private Partnerships. *European Public Private Partnership Law Review*, **1**, 14-8.
- Bovis, C (2012) *EU Public Procurement Law*. Cheltenham: Edward Elgar.
- C-243/89 Commission of the European Communities V Kingdom of Denmark. 1993 ECR I-03353.
- C-359/93 European Commission V. The Kingdom of the Netherlands. 1995 ECR I-00157.
- C-87/94 Commission of the European Communities V. Kingdom of Belgium. 1996 ECR I-2043.
- C-275/98 Unitron Scandinavia A/S and 3-S A/S, Danske Svineproducenters Serviceselskab V Ministeriet for Fødevarer, Landbrug Og Fiskeri. 1999 ECR I-08291.
- C-513/99 Concordia Bus Finland Oy Ab, Formerly Stagecoach Finland Oy Ab V. Helsingin Kaupunki, Hkl-Bussiliikenne. 2002 ECR I-7213.
- C-19/00 Siac Construction Ltd V County Council of the County of Mayo. 2001 ECR I-07725.
- C-448/01 Evn Ag and Wienstrom Gmbh V Republic of Austria. 2003
- C-434/02 Arnold André Gmbh & Co. Kg V. Landrat Des Kreises Herford. 2004 ECR I-0000.
- Joined Cases C-21/03 and C-34/03 Fabricom Sa V. État Belge. 2005 ECR I-1559.
- C-26/03 Stadt Halle, Rpl Recyclingpark Lochau Gmbh V. Arbeitsgemeinschaft Thermische Restabfall- Und Energieverwertungsanlage Trea Leuna. 2005 ECR I-1.
- C-538/07 Assitur Srl V. Camera Di Commercio, Industria, Artigianato E Agricoltura Di Milano. 2009 ECR I-04219.
- Calleja, A (2010) The Legal and Policy Considerations in the Award of Public-Private Partnerships. *European Public Private Partnership Law Review*, **5**(2), 97-105.
- European Commission (2000) Commission Interpretative Communication on Concessions under Community Law. OJ C 121, 29.4.2000.
- European Commission (2011) Proposal for a Directive of the European Parliament and of the Council on the Award of Concession Contracts. COM(2011) 897 final.
- Hancher, L, Ottervanger, T and Slot, P J (2006) *EC State Aids*. London: Sweet & Maxwell.
- Leiringer, R (2006) Technological Innovation in PPPs: Incentives, Opportunities and Actions. *Construction Management and Economics*, **24**(3), 301-8.
- Macneil, I R (1973) The Many Futures of Contracts. *Southern California Law Review*, **47**(3), 691-816.
- Noble, G (2006) The Role of Contracts in Public Private Partnerships. *University of New South Wales Law Journal*, **29**(3), 276-81.
- Siemonsma, H, Van Nus, W and Uyttendaele, P (2012) Awarding of Port Ppp Contracts: The Added Value of a Competitive Dialogue Procedure. *Maritime Policy & Management*, **39**(1), 63-78.
- Stadtler, L and Probst, G (2012) How Broker Organizations Can Facilitate Public-Private Partnerships for Development. *European Management Journal*, **30**(1), 32-46.

- Stanley, J (2006) Developing Trusting Partnerships' between Purchasers and Providers. *University of New South Wales Law Journal*, **29**(3), 270-5.
- Sundstrand, A (2012) Offentlig Upphandling – Primärrättens Reglering Av Offentliga Kontrakt [Public procurement - regulation in primary law of public contracts]. Stockholm: Jure.
- Tvarnø, C D (2006) Public-Private Partnerships from a Danish Perspective. *Public Procurement Law Review*(3), NA98-108.
- Van Gestel, K, Voets, J and Verhoest, K (2012) How Governance of Complex Ppps Affects Performance. *Public Administration Quarterly*, **36**(2), 140-88.
- Wilson, D I, Pelham, N and Duffield, C F (2010) A Review of Australian PPP Governance Structures. *Journal of Financial Management of Property and Construction*, **15**(3), 198-215.
- Ågren, R and Landin, A (2012) Contract Design for Procuring Complex Projects. In: Piga, G and Treumer, S (Eds.), *The Applied Law and Economics of Public Procurement*, pp. 40-57. UK: Routledge.

OPTIMAL BIDDING AND INVESTMENT STRATEGY IN THE PPP COMPETITIVE DIALOGUE

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Public private partnerships (PPPs) are cutting edge contractual agreements nowadays. The long-term prospect entails considerable risks and practitioners underline the inefficiencies in the contracting phase. This research focuses on the competitive bidding procedure in the tendering stage. A private contractor will decide upon its pre-tendering research strategy and the involved investment in order to determine the costs implied in the project. Secondly, it will consider a bidding strategy while taking into account the number of other competitors and their respective characteristics. A game theoretical analysis of the influence of the strategies of competitors, a company's experience and the government's compensation schemes is performed in an initial, analytical way and by using simulations. This shows that pre-tender research incentives can be created but the dynamics of the game require careful consideration. Consequently, a rational approach for investigating the pre-bidding research strategy and the final offer is proposed. The difficulties to enter this niche market are underlined and possible policies to deal with this issue can be studied in more detail in future research.

Keywords: Bidding, Decision analysis, Game theory, Tendering.

INTRODUCTION

Since they have seen the daylight, public private partnerships have gained importance and its number has proliferated. The synergies and value for money that can be created by engaging in a long-term commitment can be appealing, but as in every marriage, planning is a necessity. That is where the shoe often pinches. The literature acknowledges that the tendering phase is the critical one. The government makes an important decision and selecting the wrong contractor can incur disastrous consequences and lock-in issues. The typical textbook cases of the Eurotunnel project or the New Southern Rail project in Sydney are globally known examples of negative PPP encounters.

Selecting a good contractor will increase the probability of attaining a higher value for money, the main driver of PPP contracting. Through an appropriate allocation of risk and the integration of the design, building and operation of the infrastructure project, a public entity hopes to attain a higher efficiency. Nevertheless, one should beware before leaping into this marriage because every bidder for the project is in some way driven by opportunistic behaviour.

This research models the particular bidding environment of a PPP contract. The longer time frames and the flexibility induce more uncertainty at the public as well as the private side. A contractor will usually have to perform research before proposing the bid. In this way, the quality of the proposal is increased and a better cost estimation can be made. How can a contractor determine an optimal investment and bidding strategy for a particular project? But also of major importance is the question how the government can ensure competition in this rather narrow market in order to avoid monopolistic or oligopolistic mechanisms? This paper presents a simulation model that already can offer some guidance in the dynamics of the parameters. After a brief literature review on bidding in infrastructure projects, the game theoretical approach and the simulation model are presented. Afterwards, some results and sensitivity tendencies are provided.

LITERATURE REVIEW

As the PPP literature is often sector or country specific, also the bidding methodologies that are applied in general infrastructure projects need to be evaluated in order to guarantee their applicability in the PPP context.

First of all, it needs to be taken for granted that bidders in a PPP context are usually heterogeneous. Oo et al. (2010) have experimentally proven that bidders have different bidding behaviour. Nevertheless, in some bidding frameworks, researchers (e.g., Ho 2005, Shen et al. 2007) claim that bidders can be considered as homogeneous. A second dimension is the once-only versus repetitive dimension. Regressions or system dynamic models use information from the past to characterize a bidder's behaviour (e.g., Skitmore & Runeson 2006, Tan et al. 2010). Nevertheless, PPP projects are often only repetitive to a limited extent or even once-in-a-lifetime decisions (Flyvbjerg et al. 2009). In recent studies, a multi-criteria-based selection with the inclusion of qualitative information has gained importance (e.g., Vassallo 2007, Lo & Yan 2009). Abudayyeh et al. (2007) empirically stated that qualitative aspects are important for prequalification and proposed an analytic hierarchy process method, while a price-based decision is common for the final preferred bidder selection. The other stretch is of course formed by the models that are solely based on price: the lowest bid, but also the selection of the bid below the average (Ioannou & Awwad, 2010). Lastly, the bidding procedure is the fourth dimension. The competitive dialogue is the prevalent procedure. The government will have a one-to-one communication with every contractor for reasons of clarification, but in the end, all bidders will hand in their proposals at the same time, so simultaneous bidding is assumed, while sequential bidding would lean more towards an auction.

This research relies on game theory to model the interactions among different players in this bidding environment, which is often overlooked in the PPP literature. The hot topics of determining the optimal contract duration or the minimum revenue guarantee often only consider a one-to-one relationship between a particular contractor and the government. Game theoretical models are not very common in current PPP tendering literature. Medda (2007) has set up a risk allocation model by relying on bargaining theory. Moreover, Shen et al. (2007) utilize bargaining theory for representing the negotiation of an appropriate concession period. Ho (2008) uses game theory to investigate the impact of government compensation policies on the incentive to perform better pre-tender research. Moreover, he dynamically models the renegotiation problem when contractors get into trouble and return to the government as the lender of last resort. Last but not least, Tserng et al. (2012) rely on game theory to identify the role of a national PPP unit in promoting PPP projects.

BIDDING MODEL

Figure 1 gives an overview of the applied bidding framework. It is assumed that there are several bidders and that they are heterogeneous. Every bidder has developed some characteristics: an experience level, a particular risk attitude and a set of objectives that it aims to realize. For a particular project, the bidder determines the investment level. Investment in pre-tender research can compensate for a lack of experience. With this information, the bidder sets a price that is assembled from the cost, the risk premium and the mark-up. The determination of the mark-up also depends on the other bidders and their respective experience level. Last but not least, the government can influence this picture with a compensation policy. After the bidding has been performed, the government will decide upon who has won the bid. Several decision criteria exist, partly or entirely based on price or on qualitative measures or a combination of both.

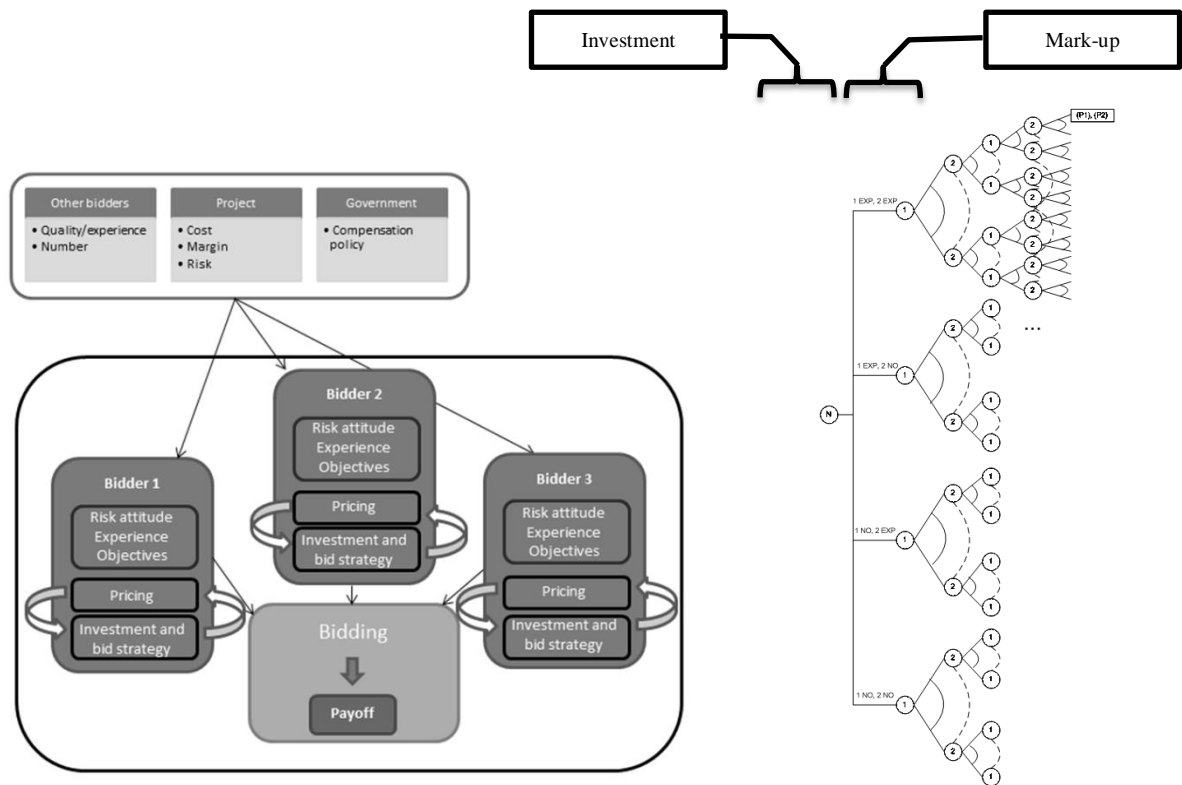


Figure 1: The bidding framework

Figure 2: The game tree

GAME THEORETICAL METHODOLOGY

Game theory is the favoured methodology to tackle the problem. A basic and simplified game tree is represented in figure 2 for only two players. First of all, the government, indicated as “nature” (N), launches the project. Consequently, every bidder can determine the respective experience level of the different players. An appropriate prequalification has been applied, so that this decision tree represents the final bidding stage. The different players will simultaneously decide upon their investment strategy. This can be a continuous amount of money, which is indicated by the full line between the two branches from each decision point. The simultaneity involves imperfect information (i.e., no player knows the experience level of its competitors), that is indicated by the dotted line between all the decision nodes of player two in the figure. Each player will be able to estimate the project cost, given what he has learned through research. Afterwards, every bidder sets a mark-up. The government will choose the preferred bidder, usually based on a multi-criteria approach, so that a pay-off can be calculated.

A strategy can be defined in theoretical terms as a behavioural pattern for different situations. The contractor will have to make several decisions. A decision point is called an information set. At each decision point, a number of choices are determined. Some variables are helpful for further analysis:

P = number of players;

E = number of experience levels;

I = number of investment levels;

B = number of bidding levels.

As the situation (i.e., whether the decision maker and its respective competitors have experience or not) is assumed to be known upfront, it is possible to consider every situation separately in

finding an optimal strategy. In this way, it is guaranteed that the resulting strategy is also sub-game perfect. The number of proper sub-games (G) is given by a combination with repetition:

$$G = \binom{P + E - 1}{P} = \frac{(P + E - 1)!}{P! * (E - 1)!}$$

It is said that there are G information sets with I choices and $G * I$ information sets with B choices. The total number of strategies (S) is given by:

$$S = I^G * B^{G*I}$$

A strategy profile is defined as every combination of strategies for the different players and inherently determines the size of the pay-off matrix. The number of strategy profiles is written as S^P . Nevertheless, bearing in mind the sub-game perfectness consideration and the simultaneity assumption, a lot of equivalent strategies do not need to be studied further in the proposed model, so that in every sub-game the bid and investment decision for each player can be combined and only $I * B$ interesting combinations appear, leaving only $S' = (I * B)^G$ strategies for research.

Simulation model

The purpose of the simulation model is to identify possible stable strategies, which means that this particular strategy is optimal given the other players' strategies. The simulation model that has been set up, starts off with the creation of projects. For the results presented here, multiple databases of 1000 projects have been composed with an initial expected mean value of € 1 million and with differing standard deviations (σ_r for every project r) that range from zero to twenty per cent of the expected mean value and that are drawn from a uniform distribution.

The number of experience levels is supposed to be fixed and within a range from zero to ten. In fact, generalization towards a continuous experience level could be possible. The results that will be shown are determined on three experience levels ($N=3$): no experience with a value zero, average experience with a level of five and high experience to which a value of ten is attributed. Consequently, ten sub-games need to be studied. It is believed that an increase in experience incurs a non-linear cost reduction, as is modelled here with a negative exponential relationship between the experience level and the cost impact (example in figure 3):

$$\text{cost impact} = h * e^{-\gamma e_p} \text{ with } e_p \in [0,10]$$

with h the cost disadvantage for an inexperienced contractor with respect to the most experienced level and e_p the respective experience level for player p . γ is a parameter that is equal to 0.4 in figure 3.

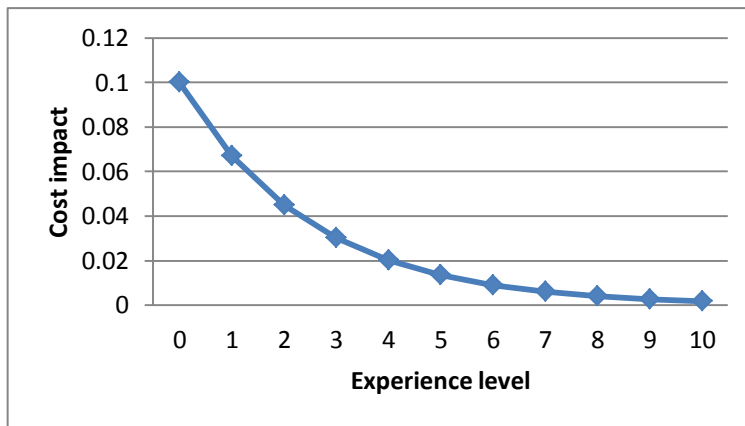


Figure 3: The relationship between the cost (dis)advantage and the experience level

A strategy for a particular sub-game refers to an investment level and a bidding level. The combination of choices for all the different information sets defines the strategy for a player (i.e.,

s_{pij} with p the player, i the investment level and j the bidding level). The simulation model has I investment choices and B mark-up choices. A minimum and maximum mark-up and investment level are predetermined and the number of choices will fix the investment level as a percentage of the initial estimated project cost and the mark-up level as a percentage of the estimated cost after performing research.

Once the setting is settled, the simulation can start. First of all, a random expected actual project cost is selected from the normal distribution with a variance of σ_r^2 . The obtained value is supposed to be the best estimate that can be made by a contractor with full experience (i.e., experience level 10). The mean expected actual cost (X_p) for another contractor can be obtained by multiplying with one plus the factor that can be derived from figure 3. It is assumed that the normal distribution for the expected actual cost has a variance that is also dependent on both the experience level and the investment level. This assumption is stated as follows:

$$\sigma_{s_{pij}}^2 = \sigma_r^2 + \text{Variance}(\text{lack of experience}) + \text{Variance}(\text{lack of investment})$$

$$\sigma_{s_{pij}}^2 = \sigma_r^2 + \alpha(ae^{-\lambda_1 e_p})^2 + \beta(be^{-\lambda_2 i_{s_{pij}}})^2$$

All covariances are supposed to be zero and the negative exponential function was favoured to capture the decreasing scale effects of an experience increase and an investment increase. An example is shown in figure 4.

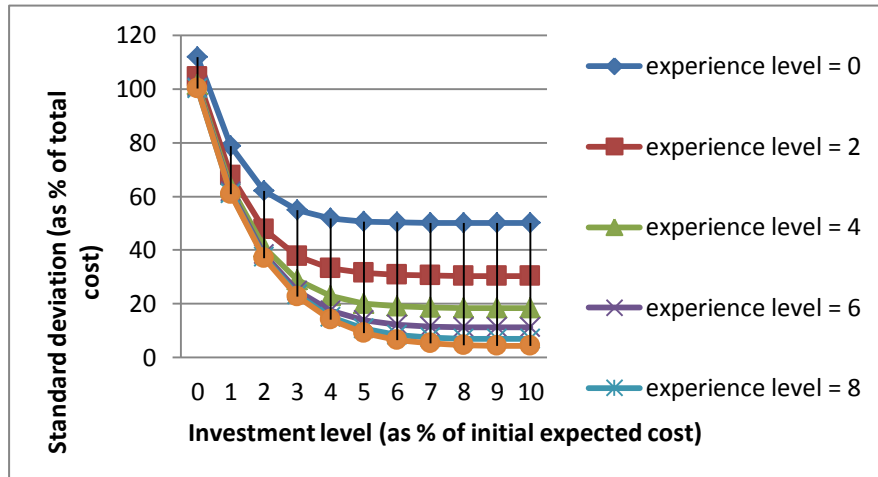


Figure 4: The standard deviation in function of the experience level and the investment level

The simulation model will select an expected contractor cost for every player p from the distribution $N(X_p, \sigma_{s_{pij}}^2)$ and the multiplication of this expected cost with one plus the mark-up gives the proposed bid. As it is assumed that prequalification has been performed in an earlier stage, the decision variable for the public entity is based on the price level only. When the selection is based on the lowest bid, the winner's ex post pay-off can be determined as the proposed bid minus the investment cost that was incurred and minus the actual cost, that is simulated from the distribution $N(X_p, \frac{\sigma_r^2}{10})$. This last distribution has a mean value that is the mean expected actual cost for a player with the winner's particular experience level and a variance that is a fraction of the initial project variance that represents some final uncertainty of the actual project outcome. The losers of the bidding game will have a pay-off of minus the investment level, or a fraction of it when the government would compensate the contractors for their research.

When all the pay-offs for the different strategy profiles are calculated, a Nash equilibrium search can be performed. A unique Nash equilibrium is preferred, but if there is no unique equilibrium, a mixed strategy can give solace. The applied method is the average pay-off method. For every strategy profile, the average pay-off and its respective confidence interval is calculated after simulating for the 1000 projects. This matrix is used for further identification of the candidate

Nash equilibria. One should bear in mind that there might be other Nash equilibria besides the reported ones that are near optimal. A careful consideration of the neighbourhood of the equilibria is essential. To define the neighbourhood, the two-sample t-statistic is calculated to compare the pay-offs between two strategies for a particular player. Consequently, the reported results in the subsequent sections are often stated in terms of tendencies as the significance of the conclusions should always be taken into account when analysing the pay-off matrices.

RESULTS

The results that are presented in the following paragraphs are derived from a simulation with three players, which is often the case in typical PPP tendering in Belgium, three different experience levels (0, 5 and 10) and a predetermined number of investment and bidding levels (4 to 6). The investment percentages and mark-up percentages that are derived for a particular strategy are set at equal intervals between a minimum and maximum investment level and bidding level respectively. The simulation assumes a minimum investment and bidding level of 0% and a maximum investment level of 10% and a maximum bidding level of 20%. In other words, in the case of four bidding levels, the possibilities are 0%, 3.33%, 6.67% and 10%. This leads to a number of strategies that ranges from 16 to 36, and the following parameters for the variance function of figure 4: $\alpha = \beta = 1$; $\gamma = 0.5$; $\lambda_1 = 0.25$; $\lambda_2 = 0.5$; $a = 15$. For the parameter b several values are tested.

A strategy for a particular player is defined as a behavioural pattern for every information set, but as stated above, the different situations can be considered separately as the experience levels of the respective players are known in advance.

Investment and bidding choices

The government should favour investment in pre-tender research. One strategy could namely be to invest almost nothing while asking a higher mark-up. Of course, a closer look at the pay-offs indicate that these are very negative. In fact, every bidder just plays for good luck and sometimes wins because he has put the lowest bid by coincidence without having any information about the project. The government is assumed to select the lowest bidder as the winner, but for the contractor this strategy is not bearable in the long term. Also for the government, this might be harmful as the social welfare impact could be high and the government might have the expensive necessity to renegotiate the contract and save the contractor. As the experience advantage gets larger, it is harder for an inexperienced contractor to get into the market, because the incumbent contractor has a cost and a knowledge advantage. A lower margin or saving on investment cost while doing a wild guess can help to gain experience for the future. This requires further analysis in a future dynamic environment with multiple projects. In the situations where one bidder has a competitive disadvantage on the experience level, a mixed strategy on the mark-up level seems appropriate. The simulation reveals that a randomization between an average bidding level and a high bidding level is suitable, while there is no significant increase of the investment level in the simulation. In general, the inexperienced bidder will ask a higher mark-up with reference to the one of a more experienced bidder. If the experience advantage is large enough (i.e., the maximum cost disadvantage h is large ($h=20\%$)), there is a clear tendency at the experienced contractor's side to move towards a higher investment level. In a next paragraph, it is shown that this tendency is more clear when the necessity for research (i.e., parameter b) is larger.

Experience advantage

The simulation results show that, in general, a more experienced bidder tends to ask a higher margin. Nevertheless, when the experience advantage is small (e.g., when the absolute cost disadvantage h is only 5%), the more experienced player tends to ask a lower mark-up than in the case that he has a higher advantage (e.g., when $h=20\%$). In the case where all players are homogeneous (e.g., all bidders have an average experience level), usually no unique Nash equilibrium is attained and one moves towards a mixed strategy. For the 36 strategies case, an

investment level of 1.67% (with $20 \leq b \leq 50$) seems appropriate, but bidders will randomize among different mark-up levels.

Impact of uncertainty through lack of investment

The maximum level of uncertainty through a lack of investment (i.e., triggered by the parameter b in the variance function) has to be sufficiently high before an investment will take place, which means in the performed simulation for instance a move from a zero investment strategy towards a 3.33% investment strategy in the 16 strategies case. The variability parameter b should be at least approximately 15 when $h=5\%$ and 20 when $h=20\%$ in the simulation before a significant investment will take place. In the case where the parameter b is rather low and consequently investment is not involved in the equilibrium solution, the government might need to create incentives through government compensation. If the parameter increases (e.g., towards $b=50$), there is a tendency to move towards a higher investment level in the simulation. Nonetheless, this tendency is not linear, which means that the parameter should increase significantly before a move towards the following investment level is instigated. This tendency is especially apparent for the more experienced bidder. For instance, in the situation with two average experienced bidders and one with a high experience (i.e., situation 5/5/10), the most experienced bidder will move to a higher investment level. Last but not least, the simulation shows that uncertainty has an important impact on the pay-offs for all players and that might be an argument in favour of government compensation.

Government intervention

The government could intervene in the tendering phase. In the end, they are still the final decision maker. An appropriate level of competition should be installed in order to avoid opportunistic behaviour through monopolistic and oligopolistic mechanisms. On the other hand, too much competition might be harmful as a number of qualitatively good bidders might become reluctant because of the low probability of winning (McAfee & McMillan 1986). A government compensation policy that reimburses the losing bidders for their research cost is released on the bidding model. In some countries there is no straightforward agreement on the usefulness of this intervention.

For the cases where the parameter b is high (e.g., 50), the less experienced bidder, that was investing less than the experienced one, will now be stimulated to increase the investment level to the same level of the more experienced bidders. The performed simulation did not give an indication that the less experienced bidder is spending more on investment to compensate for the experience disadvantage. Anyway, the compensation should be sufficient. A 20% compensation does not trigger higher investment, while a compensation level of 80% leads to a significant strategy change in all bidding environment situations. A compensation level near 100% will make the inexperienced bidder invest more than the experienced one, but this can be due to opportunistic behaviour. In nearly all situations, the compensation will first incur a mark-up decrease for the experienced players and afterwards an investment increase.

If the uncertainty through a lack of investment is low (e.g., $b=10$), the government might be willing to create appropriate incentives towards investing. According to the simulation, by setting up an appropriate compensation level, the right incentives can be created and this can even incur a cost decrease for the government. If the experience advantage is small (e.g., $h=5\%$), a 50% compensation of the investment cost leads to a change of strategy: a lower margin and a higher investment level. Especially the experienced firms start to invest. The government will have to compensate for the investment, but nevertheless, they still realize a total cost decrease of for instance 3% in the case where the experience levels are 0/5/10. If the government also wants to incentivize the inexperienced bidders, 90% or even 100% of compensation is needed. In the case where there is one bidder with a large experience disadvantage, the extra cost might be considerable, but especially in the homogeneous situations, the little cost increase (e.g., 0.3%) can avoid renegotiation later on. If the experience advantage is large (e.g., $h=20\%$), a compensation level of 30% makes the experienced companies invest, while the inexperienced ones remain at their high mark-up levels without investment. If the differences between the experience levels are

small, a higher compensation might be interesting so that inexperienced players try to get into the market, while the extra cost is usually small or even negative. If there is a large difference in the players' experience (e.g., in the situation of 0/0/10) or if the contractors have already a lot of experience (e.g., 5/5/10), the extra cost can be high.

In the literature, Ho (2008) concluded that the compensation policy almost never incurs extra effort by the bidders or that also with a zero-compensation enough effort will be performed. Nevertheless, the assumptions could be arguable. A homogeneous bidding environment is assumed and bid compensation is only awarded to the second best bidder. A policy that reimburses also the other bidders with a decreasing fraction of the investment might be a better solution for the creation of a win-win situation.

Is compensation not appropriate? Ho (2008) is not really convinced of the governmental intervention, but when certain assumptions are changed, a new situation could occur. To introduce this approach, an analytical example is given as a first step in the argument. Assume a deterministic game with two players: an inexperienced player 1 and an experienced player 2. The inexperienced player can attain the experience level of player 2 by investment I . Besides, both players have the possibility to invest more in order to arrive at a qualitatively better bid and assume that $I > E$. Last but not least, the players have the option to invest nothing. P is the profit that one attains if he wins the bid. Similar to Ho's model (2008), the player that has the highest stage of knowledge will win. If two players are at the same level, the probability of winning is 0.5. The question is to determine a compensation level α as a fraction of the investment that has been done. The resulting pay-off matrix is given in figure 5.

		Player 2	
		0	E
Player 1	0	$(0, P)$	$(0, P - E)$
	I	$(\frac{P}{2} + \frac{\alpha I}{2} - I, \frac{P}{2})$	$(\alpha I - I, P - E)$
	I + E	$(P - I - E, 0)$	$(\frac{P}{2} + \frac{\alpha(I + E)}{2} - I - E, \frac{P}{2} + \frac{\alpha E}{2} - E)$

Figure 5: Pay-off matrix for 2-bidder game with experience heterogeneity

In order to guarantee that $(I+E, E)$ is a Nash equilibrium, α should be determined so that both players have no incentive to change their strategy. The analytical enumeration concludes that: $\alpha > 2 - \frac{P}{I+E}$. It is assumed that $P > I + E$. If $I + E$ is small, so that α could become negative, this actually means that no compensation is necessary. On the other hand, α should be smaller than 1, or (I, E) could become an equilibrium where player 2 always wins and player 1 just earns money. If the assumption of $I > E$ is removed, also the strategy profile $(I, 0)$ could become an equilibrium. This example is just to show that also analytically, the impact of government compensation can be interesting. An extension towards three bidders gives similar conclusions but due to space limitations, this is omitted in this paper. In conclusion, both the simulation and the analytical approach guide towards a compensation policy dependent on the effort that has been performed.

CONCLUSIONS

This study tries to represent the bidding context of a public private partnership in a game theoretical fashion. Pre-tender research is an important cost factor in PPP tendering and this simulation model hoped to give some insights in the dynamics of this bidding environment. Different factors have an influence on the optimal strategy. An optimal strategy should be looked

at from a stability point of view. The candidate Nash equilibria of the average pay-off matrix give a clear indication of suitable strategies. A high mark-up is often the case in these highly uncertain projects and is often hard to handle. For the government, it could be worth the higher spending as long as the quality is guaranteed. In the simulation, it is often only in projects with very high variability that sufficient research is performed. The experience advantage is proven to be often significant in the simulation and appropriate incentives can be created. A compensation can even lower the total cost for the government. Both analytically as well as from the simulation, it is clear that government compensation can have a positive impact as long as the right incentives are created.

Of course, there are some limitations accompanying these conclusions. The simulation is relying on a discrete number of investment and bidding choices and on a limited number of players. Moreover, the focus has been on a lowest bid approach and the implementation of a combined quality-cost measure will be for future research. Also a repetitive game will be developed so that a player can gain experience with the knowledge that there are future projects. Last but not least, an analytical approximation will be performed.

REFERENCES

- Abudayyeh, O, Zidan, S J, Yehia, S and Randolph, D (2007) Hybrid Prequalification-Based, Innovative Contracting Model Using AHP. *Journal of Management in Engineering*, **23**, 88-96.
- Flyvbjerg, B, Garbuio, M and Løvallo, D (2009) Delusion and Deception in Large Infrastructure Projects: Two models for Explaining and Preventing Executive disaster. *California Management Review*, **51**, 170-93.
- Ho, S P (2008) Government policy on PPP financial issues: bid compensation and financial renegotiation. In A. Akintoye and M. Beck (Eds.), *Policy, Finance & Management for Public-Private Partnerships*. Oxford: Willey-Blackwell.
- Ioannou, P G and Awwad R E (2010) Below-Average Bidding Method. *Journal of Construction Engineering and Management*, **136**, 936-46.
- Lo, W and Yan, M R (2009) Evaluating Qualification-Based Selection System: A simulation approach. *Journal of Construction Engineering and Management*, **135**, 458-65.
- McAfee, R P and McMillan, J (1986) Bidding for contracts: a principal-agent analysis. *Rand Journal of Economics*, **17**, 326-38.
- Medda, F (2007) A game theory approach for the allocation of risks in transport public private partnerships. *International Journal of Project Management*, **25**, 213-8.
- Oo, B L, Drew, D S and Lo, H P (2010) Modeling the Heterogeneity in Contractors' Mark-Up Behavior. *Journal of Construction Engineering and Management*, **136**, 720-9.
- Shen, L Y, Bao, H J, Wu, Y Z and Lu, W S (2007) Using Bargaining-Game Theory for Negotiating Concession Period for BOT-Type Contract. *Journal of Construction Engineering and Management*, **133**, 385-92.
- Skitmore, M and Runeson, G (2006) Bidding models: testing the stationarity assumption. *Construction Management and Economics*, **24**, 791-803.
- Tan, Y, Shen, L and Langston, C (2010) Contractors' Competition Strategies in Bidding: Hong Kong study. *Journal of Construction Engineering and Management*, **136**, 1069-77.
- Tserng, H P, Russell, J S, Hsu, C W and Lin, C (2012) Analyzing the Role of National PPP Unit in Promoting PPP - Using New Institutional Economics and Case Study. *Journal of Construction Engineering and Management*, **138**, 242-9.
- Vassallo, J M (2007) Implementation of Quality Criteria in Tendering and Regulating Infrastructure Management Contracts. *Journal of Construction Engineering and Management*, **133**, 553-61.

SUITABILITY OF BIM FOR ENHANCING VALUE ON PPP PROJECTS FOR THE BENEFIT OF THE PUBLIC SECTOR

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Collaborative integrated working and stakeholder's interest have been among key drivers that underpin and encourage the use of Building Information Modelling (BIM) within the AEC industry. BIM is becoming a major means to deliver projects with better improved product, and reduced risk within the construction industry. Furthermore, using BIM in areas like buildability, quality assurance, cost and scheduling can be justified through BIM-*n*D modelling application. What is not so obvious is how the utilisation of BIM visualisation and knowledge embedment will enhance these areas to refine and achieve better value for PPP procurement projects for the long term benefit especially during post-construction phase for the public sector. As of now there is no well-defined guidance with respect to BIM usage incorporating all of the above. Do we really need to revisit the way we specify projects within the contractual framework under PPP? This paper examines the possibility of how BIM can be utilised in the realisation of augmented formal database information management system under the PPP procurement routes with respect to operation and maintenance support. The paper concludes with additional measures that BIM can offer at the post-construction phase for the public sector at learning organisations.

Keywords: Building Information Modelling, Public Private Partnership, PFI, E-procurement, *n*D Modelling.

INTRODUCTION

Integrated project delivery has been suggested as an alternative to the traditional process which will help in reducing waste streams and improve productivity of construction processes through the integration of people, systems, business structures, practices into a process that collaboratively harness the talents and insights of all the participants (AIA 2007). In the publication of numerous research papers, it has been suggested that Building Information Modelling (BIM) plays a key role in the integrated project delivery approach by facilitating full collaboration and information sharing amongst the participants of a construction project throughout its lifecycle (Laishram 2011). Furthermore, Public Private Partnership (PPP) is seen as a way of integrating the various practitioners as well as working collaboratively on projects.

Public Private Partnership (PPP) in construction concerns "a long-term contractual arrangement between a public sector agency and a private sector concern, whereby resources and risk are shared for the purpose of developing or refurbishing a public facility" (Li *et al.* 2001:16). At the moment, PPP is prominently used in public projects procurement in many countries. In the UK, for example, the number of PFI projects has increased steadily since 1997 when the Labour Government came into power (HM 2000; Li *et al.* 2000).

Typical PPP project risks have been highlighted in PFI guidelines (HM 1995). The various risks in PPP projects vary with the development process, i.e. from the planning stage through the design, construction and operation stages. The objective of risk analysis is to capture all feasible options and to analyse the various outcomes of any decision concerning their treatment (Flanagan and Norman 1993). The UK Government guideline on PPP/PFI procurement recommended the assignment of risks to the party best able to manage them (HM 2000). To facilitate this process contractual change in the building industry requires a more integrated approach (Hannele 2012).

Thus, a model which will help PPP parties to allocate risks between themselves more quickly is worthwhile. BIM is envisaged as a good candidate in this area.

With the increase in the utilisation of BIM in the construction industry, it has become clear that there is some legal uncertainty in dealing with this technology (Douglas *et al.* 2012). In order to achieve a Level 2 BIM standard in the UK, which is a BIM file based collaboration and library management, there is little change required to the fundamental building blocks of copyright law, contracts or insurance (McAuley 2012).

BIM effectively requires significant changes in the way construction businesses work at almost every level within the building process and requires not only learning new software applications, but also how to reinvent the workflow, but also how to train staff and assign responsibilities (Arayici *et al.* 2011). The subject of this paper is the value BIM will create in its utilisation on PPP contract during the post construction phase.

The rest of the paper is divided into the following sections: the nature of the construction industry, the nature of the public organisations, the organisational changes encountered in a dynamic environment, the nature and role of BIM in public sector projects; towards a better integration of BIM and PPP and finally discussion and conclusion.

THE NATURE OF THE CONSTRUCTION ORGANISATIONS

Construction embraces buildings, civil engineering and plant erection. Any individual product of the construction industry could be as small as a few hundred pounds in value in the case of small domestic structures, or as large as the multi-million-pound installations for the power generation or oil-production. In addition to covering a broad range of size of product unit, it is a feature of the construction industry that it also covers a wide range of skills – architect, engineer, surveyor and much different type of contractor and materials supplier. Most of these skills are organised in separate companies or units, which means that in any one project there may be a large number of organisations involved. This fragmentation is a feature of the construction industry influencing the way in which it operates. Another specific feature which is typical of the construction industry is the uniqueness of its product and most projects are of the one-off type. These characteristics of variability and uniqueness of product together with fragmentation is not a good prerequisite for collaborative working without the aid of visualisation and information technology.

Since projects are becoming ever more expensive, complex and interactive, the rational approach offered by the methods of Building Information Management through modelling can provide benefits to all. Those who are prepared to make the effort to find solutions to their problems in the digital age that will be reliable, persistent and retrievable will be the benefactor of the utilisation of the power of BIM for such life cycle solutions. One such organisation that may benefit from this approach will be the public sector utilising PPP as a delivery vehicle of projects.

THE NATURE OF PUBLIC SECTOR ORGANISATIONS

According to the OECD Glossary of Statistical Terms (OECD 2006) the public sector comprises the general government sector plus all public corporations including the Central Bank. Similarly put, a public sector organisation is one who's ownership funding and cooperation is by the government or one of its agencies (Broadbent and Guthrie 2008; OECD 2006). Broadbent and Guthrie (2008) identify four key domains of the public sector (Grant *et al.* 2010):

- Central government;
- Local government
- Public institutional systems, which although funded through taxation may be separate from local government and central government (e.g. the national Health Service – NHS)

Hagen and Liddle (2007) argue that the public sector comprises a network infrastructure that comprises of, and relates to, a number of layers, which interact with each other as well as the wider context of, for example, the private and voluntary sectors.

Drawing on the work of Boyne (2002) and Guy (2000, cited in Dufner *et al.* 2002: 415) it is argued that what distinguishes public sector organisations from the private sector relates to the nature and interactions of:

- Their goals particularly in the absence of the '*profit motive*' and competitive pressures;
- The greater variety of stakeholders and their goals;
- The role of the public scrutiny;
- The political dimension.

In public sector organisation the absence of '*profit motive*' and the imperative to be successful in the market place, is a key difference from the private sector. The profit motive gives the private sector organisations a simple and unfailing compass with which to navigate towards, and judge their success. In contrast, the public sector organisations face a variety of stakeholders, each with what may be differing, or even conflicting goals. As individuals, we require efficient and effective provision from our public services – but at the same time as we would like to have our tax burden (which pays for the services) minimised. For public sector organisations, value (i.e. best value) rather than 'profit' is the guiding concept. The Scottish Government describes the '*duty of best value in public services*' as having two principles (Scottish Government 2006):

- Securing continuous improvement in performance whilst maintaining an appropriate balance between quality and cost; and
- Having regard to economy, efficiency, effectiveness, the equal opportunities requirements, and to contribute to the achievements of sustainable development.

As such these organisations engaging in PPP contracts with private consortium need some amount of persistent data that are retrievable and reliable, even with all the negativity shown by their status in the partnership. Most of these public sector organisations have realised that they do not have certain capabilities to be competitive in such a changing environment. As such a platform can be offered through the BIM capabilities, for them to realise such a change.

ORGANISATIONAL CHANGE

Each organisation is built on a particular business model and differentiates itself through its strategy; it has both a state and a direction (Miles and Snow 1978; Mintzerg and Westley 1992). An organisational state is determined by its culture, structure, management systems and people. The organisation's direction is determined by its strategic vision, market position, business processes and assets (i.e. buildings, equipment, facilities and information). Organisations can change their state and direction but it is not always necessary for change in one dimension to be accompanied by one in the other (Mintzberg and Westley 1992; Magretta 2002). For example, it is possible to change individuals in a particular job without requiring any changes elsewhere. A change asset, however, can require a change in people. For example, if an organisation replaces its legacy IT system (i.e. CAD to BIM) with similar but newer system, it may require fewer personnel with more advanced skills. Such changes, however, will typically have little or no effect on the organisation culture or strategic vision.

Change begins with perception. Neither an individual nor an organisation can begin to change unless something of interest is seen in the operating environment that deviates from an important and relevant expectation (De Geus 1999; Day and Schoemaker 2005; Roberto *et al.* 2006; Grant *et al.* 2010). That is why succeeding in complex and rapidly evolving operating environments requires managers to be sensitive to signals of change, to observe trends and make sense of emerging patterns. What managers can see depends on their knowledge and what is important in

their view of the future (De Geus 1999; Grant *et al.* 2010). The reason is that when something of interest has been observed, it creates a curiosity gap. That is, when our curiosity is pricked, we will feel a gap in our knowledge and the need to fill it (Loewenstein 1994). To guard against this, it is important that different people from different disciplines collaborate effectively, because what one may miss, another may pick up, allowing the organisation to respond sooner and with a greater sense of urgency (Kotter 1995).

Managing strategic change is about effecting fundamental change in how the organisation creates value for its customers and how it differentiates itself from competitors. Regardless whether the need to do so originates inside or outside the organisation, change begins with perception. To bridge this gap the government recognises the importance of PPP and BIM procurement routes such driving the adoption of this method.

THE NATURE OF PPP-PFI PROJECTS

The UK Private Finance Initiative (PFI) is a holistic and integrative conceptual model that integrates a hierarchy of four levels of concepts: government ideology, principles, practices, and tools. The PFI life cycle process, value chain, and value-delivery network are discussed here. PFI is as a novel way to do business, and requires the establishment of a long-term relationship. PFI is an innovative concession as it relates the revenues for the private partner solely to the provision of a service, which in turn is performance related. It is too early to assess PFI success or failure because of the long life cycle of PFI projects, 20 to 30 years, and most projects have not yet been in operation for 10 years. In addition, based on the empirical data from the research and recurring to business information sources and academic studies on PFI (still very limited), the article addresses two important issues that emerged from the introduction of PFI: first the change in organisational culture brought about by a move into the services sector, coupled with the need to deal with long-term issues, followed by the financing structure, that is, the balancing of debt and equity and the hypothesis of considering bond issues to finance senior debt (de Lamos *et al.* 2003).

During recent years, a wide spectrum of research has questioned whether public services/infrastructure procurement through private finance, as exemplified by the UK Private Finance Initiative (PFI), meets minimum standards of democratic accountability. While broadly agreeing with some of these arguments, the debate or discourse is flawed on two grounds. Firstly, PFI is not about effective procurement, or even about a pragmatic choice of procurement mechanisms which can potentially compromise public involvement and input; rather it is about a process where the state creates new profit opportunities at a time when the international financial system is increasingly lacking in safe investment opportunities. Secondly, because of its primary function as investment opportunity, PFI, by its very nature, priorities the risk-return criteria of private finance over the needs of the public sector client and its stakeholders (Asenova and Beck 2010). This requires a good understanding of decision-making under uncertainty in the post construction period in which the information and support is required.

Decision making is a process that involves a variety of activities, most of which deal with handling information. From an IT-supported decision perspective, the issue here is to figure out what and how IT can be used to help the decision maker get the information he needs, better formulate the problem, clarify his preferences, process complex reasoning, and better appreciate the impacts of the decision before it is made.

THE ROLE OF BUILDING INFORMATION MODELLING

Modelling is the process of constructing a model of reality based on a situation that we know the answer, and try to apply to another situation that we have yet to find the solution. The model component stores a family of analytical models in a model base that a user can choose, and possibly integrate them together, to solve his decision. For example, the user can request a simulation to a forecasting model from the model base to weigh different market forces, and transfer that result of the simulation to a forecasting model that calls regression

algorithms/appraisal algorithms to predict costs. Models need to fit with the data, they need to be kept up to date; users need to understand and trust them; and if several models are used, they need to work together (i.e. interoperability) (McNurlin *et al.* 2009).

'Building Information Modelling' and 'Building Information Model' are terms that are often used interchangeably, reflecting the term's growth to manage the expanding needs of the constituency. There are several definitions of BIM and no universally accepted one. However, many researchers seem to accept the definition advanced jointly by the RIBA, Construction Project Information Committee and Building Smart Alliance. That definition states that BIM is "a digital representation of physical and functional characteristics of a facility creating a shared knowledge resource for information about it forming a reliable basis for decisions during its life cycle, from earliest conception to demolition" (RIBA 2012:3; BSA 2012; CPIC 2011). Thus, BIM is a digital model of a building in which information about a project is structured in such a way that the data can be shared. This information can be in 3D (visualisation and coordination of project), 4D (integrating time) 5D, (including cost estimating), 6D (procurement and thermal properties analysis), 7D (operational applications lifecycle), 8D (integrated project delivery)- right up to 'nD' (a term that covers any other information needed for construction and running of a facility). BIM is a new technology that brings with it a new method of working which is aiming to revolutionise and make the construction process more responsive to of the end-user's needs (Edwards and Maguire 2013).

The accurate cost of the lack of interoperability in the UK has not – and probably could not – be precisely calculated but estimates suggest that the scale of waste due to a lack of shared structured information for owner operators in the UK amounts to £100 million a year (AIA 2010). Two-thirds is incurred directly by owners and one-third through the facilities management industry. There is, in any event, wide agreement that process and technology change could be harnessed to deliver improvements in cost and quality. Collaborative working, using a central BIM, offers a practical way forward.

Construction industry has established the basis of object-oriented building product modelling in 1990s. Initially, certain market sectors such as structural steel utilised the parametric 3D modelling. Building Information Modelling (BIM), therefore, as a technology is not new to the construction industry. This technology under different names such as product model, virtual building, and intelligent object model has been in use for over twenty years. The term building information modelling came into popular use after Jerry the publication of Laiserin's article in LaiserinLetter in December 2002 (Smith and Tardiff 2009).

BIM MATURITY LEVELS

A maturity framework has been developed to ensure clear delivery of the levels of competence expected and the supporting standards and guidelines their relationship to each other and how they can be applied to projects and contracts in the construction industry.

In the UK, the government requires fully collaborative level BIM Level 2 (with all project information, documentation and data in an electronic format) as minimum by 2016 on all public projects (Cabinet Office 2011). Level 2 comes third in a four-tiered system as listed below (BIMTG 2011):

Level 0: Unmanaged fragmented (none standardised/ none exchangeable data format) CAD.

Level 1: Managed CAD in 2D and/or 3D format using BS1192:2007 (fragmented production/analysis programmes, file based collaboration).

Level 2: Managed 3D environment with data attached but fragmented (discipline based collaboration and library management).

Level 3: Single, online (integrated/interoperable data), project nD model including but not limited to visualisation and coordination, construction sequencing, cost estimating, procurement, thermal

properties analysis, operational applications lifecycle, integrated project delivery, and lifecycle management information.

As discussed above, BIM has not reach full maturity level yet and continues to develop. It is obvious that the adoption of systems and technologies by businesses will not be at the same rate. However, just like organisations in the retail sector before them, BIM adopters will need to go through a managed process of change which encompasses not only their internal organisation but also the way they interface with their external supply-base and clients. The majority of the UK market is still working with Level 1 processes, and the best in class are experiencing significant benefits by moving to Level 2. It is clear that organisations adopting BIM now will be those most likely to capitalise on this advantage as the market improves.

As discussed above, BIM continues to develop. Clearly, not all businesses will adopt systems and technologies at the same rate. However, just like organisations in the retail sector before them, BIM adopters will need to go through a managed process of change which encompasses not only their internal organisation but also the way they interface with their external supply-base and clients. The majority of the UK market is still working with Level 1 processes, and the best in class are experiencing significant benefits by moving to Level 2. It is clear that organisations adopting BIM now will be those most likely to capitalise on this advantage as the market improves.

NEW WAY OF DELIVERY: PPP AND BIM

BIM offers the opportunity to achieve accuracy and inevitability in delivering products and services. It improves efficiency and allows design processes to be smoothly repeated. But how and why does BIM deliver this outcome? To understand what BIM does and the benefits it brings, we need to look at traditional procurement approaches in the construction industry and their drawbacks.

The concept of procurement aims generally to supports a delivery-relationship between sellers and buyers. Other than “purchasing” scope, procurement includes strategic activities such as, negotiating with suppliers, sourcing, and coordination with R&D (Grilo and Jardim-Goncalves 2011).

The principal barrier to reduced cost and increased growth is the lack of integration in the industry, combined with a lack of standardisation and repetition in the product; and by relative protection from international competition. In parallel, a procurement process has been shaped that has reinforced those barriers. These issues necessitate both reform of the procurement process and greater efficiency in the operation of that process (Cabinet Office 2011:6).

E-procurement (electronic procurement) began from the early use of the Internet in business. Early e-procurement was linked to the surge of inter-organisational systems, communities, electronic platforms, meeting places, virtual locations, and infrastructures, often designated as electronic marketplaces (Grilo and Jardim-Goncalves 2011).

Structures including buildings are not just 2 Dimensional, nor built, or used an element at a time. In fact, they are multi-dimensional, integrated endeavours that require collaboration from inception to demolition and recycling. Consequently, it is vital that the tools used to facilitate the design, construction, operation and demolishing of a structure should reflect this.

BIM is not just a single 3D modelling software package such as Revit or ArchiCAD but it is a suite of technologies and processes that integrate to form the system at the heart of which is a component-based 3D representation of each building element. This replaces traditional design tools currently in use in the architecture, engineering and construction industry. Each component is generated from a product library with all information about that element. As the design progresses, more information can be added and the integrated information becomes more valuable. BIM is not a simple design tool but it is the way the system generates interfaces to and uses information from other systems which is fundamental to the delivery success of a facility and its management after completion. These benefits can be gained by the whole stakeholders through

the collaborative and integrated use of BIM. There are parallels between BIM and the EPOS (electronic point of sale) and ERP (enterprise resource planning) systems ubiquitously found in the retail sector (BIMTG 2012). There is a clear interface between BIM and organisational corporate systems – including those dealing with procurement, finance and supply chain performance.

DISCUSSION AND CONCLUSIONS

Decision making is a process that involves a variety of activities, most of which deal with handling information. From an IT-supported decision perspective, the issue here is to figure out what and how IT can be used to help the decision maker get the information he needs, better formulate the problem, clarify his preferences, process complex reasoning, and better appreciate the impacts of the decision before it is made. The public sector is the decision maker and the client in this case.

The client which is the public sector in this paper is not the one that controls the BIM utilisation capabilities for the long term. Although there may be clause or some contractual arrangement, however, this area is still a grey area and requires some more investigation. This is due to the fact that the public sector will be involved in this contract for the next 25/30 years after the completing the construction of a facility. If the public sector can state having ownership (i.e. knowledge and understanding of the facility) of the BIM during the operations and maintenance period by the practitioners (i.e. private sector), the public sector body will be able to be knowledgeable about what are the key areas that requires support after the facility has been handed over by the private investor to the public sector, till the design-life of the building is reached. As BIM is also repository for knowledge and information that is retrievable and persistent, the public sector as a learning organisation (Soliman 2011) during the operation and maintenance phase of the PPP project will enable them to better their understanding for future PPP projects.

REFERENCES

- AIA (2007) *Integrated Project delivery – A guide*, The American Institute of Architects, Washington, D.C.
- AIA (2010) *Constructing the business case Building information modelling*, http://www.milestoneuk.com/resources/case-studies/oracle-primavera/p6-eppm-case-studies/cat_view/49-white-papers/134-bim-whitepapers
- Arayici, Y, Coates, P, Koskela, L, Kagioglou, M, Usher, C, and O'Reilly, K (2011) Technology adoption in the BIM implementation for lean architectural practice. *Automation in Construction*, 20 (2), 189-195.
- Argyris, C (1991) Teaching smart people how to learn, *Harvard Business Review*, 69 (3), 99 – 109.
- Asenova, D, and Beck, M (2010) Crucial silences: when accountability met PFI and finance capital, *Critical Perspectives on Accounting*, 21(1), 1-13.
- BIMTG (BIM Task Group) (2011) *BiM: Management for value, cost and carbon improvement Strategy*, Paper for the Government Construction Client Group From the BIM Industry Working Group – March 2011, <http://www.bimtaskgroup.org> accessed 17th Feb 2013.
- BIMTG (BIM Task Group) (2012) Investors Report Building Information Modelling (BIM), , <http://www.bimtaskgroup.org> accessed 17th Feb 2013
- Boyne, G A, (2002) Public and private management: What is the difference?, *Journal of Management studies*, 39(1), 97 – 122.
- Broadbent, J, and Guthrie, J (2008) Public sector to public services: 20 years of ‘contextual’ accounting research, *Accounting, Auditing and Accountability Journal*, Vol. 21(2), pp. 129 – 169.

- BSA (buildingSMARTalliance) (2012) *What is a BIM*, <http://www.buildingsmartalliance.org> accessed 16th Feb 2013.
- Cabinet Office (2011), Government Construction Strategy May 2011, <http://www.cic.org.uk/gcs/GovernmentConstructionStrategy.pdf> accessed 14/11/2012.
- CPIC (Construction Project Information Committee) (2011), Building Information Modelling: Drawing is Dead – Long Live Modelling, <http://www.cpic.org.uk/en/> access 16th Feb 2013.
- Day, G S, and Schoemaker, P J (2005) Scanning the periphery, *Harvard Business Review*, 83(11), 135.
- de Geus, A (1999) *The living company: growth, learning and longevity in business*, London: Nicholas Brealey Publishing.
- Douglas *et al.* 2012 Douglas, B., Arensman, M. S. and Mehmet, E. Ozbek (2012). Building Information Modelling and Potential Legal Issues, *International Journal of Construction Education and Research*, (8), 146–56.
- Dufner, D, Holley, L M, & Reed, B J (2002) Can private sector strategic information systems planning techniques work for the public sector?. *Communications of the Association for Information Systems*, 8(1), 28.
- East, W.E. “BIM for Construction Handover.” *Journal of Building Information Modeling*. Fall 2007. 28-35.
- Edwards, M, and Maguire, G (2013) *The BIM Timeline, Modern Builder: Building for Sustainable Future Today*, Issue 12 Feb 2013, pp. 14-17 www.modernbuilder.co.uk access 10 Feb 2013.
- Farrah, T (2007) Brumby wins the battle to keep Eastlink costs secret. *The Age*, February 14, 2007.
- Flanagan, R, and Norman, G (1993) *Risk management and construction*, Oxford: Blackwell Scientific.
- Foster, B (2010) BIM for Facility Management: "Design for Maintenance". Sandia National Labs.
- Grant, K, Hackney, R, & Edgar, D (2010) *Strategic information systems management*. Cengage Learning Business Press.
- Grilo, A, and Jardim-Goncalves, R (2011), Challenging electronic procurement in the AEC sector: A BIM-based integrated perspective, *Automation in Construction*, 20 (2), 107-114.
- Hagen and Liddle (2007) Chnging strategic direction for executive development in the public sector: Opportunities for top business schools? *International Journal of Public Sector management*, 20(4), 325 – 340.
- Hannele, K, Reijo, M, Tarja, M, Sami, P, Jenni, K and Teija, R (2012) Expanding uses of building information modelling in life-cycle construction projects, *Work* 41, 114–119.
- HM Treasury (1995) *Private opportunity, public benefit: progressing the private finance initiative*, London: The Stationery Office; 1995
- HM Treasury (2000) *Public private partnerships – the government’s approach*. London: The Stationery Office.
- Kamara, J M (2012) *Integration in the project development process of a Private Finance Initiative (PFI) project*, *Journal of Architectural engineering and design*, vol.8(12), pp. 228 – 245.
- Kotter, J P (1995) Leading change: Why transformation efforts fail. *Harvard Business Review*, 73(2), 59-67.
- Laishram, B (2011) Building Information Modelling in Public Private Partnership Projects- Perspectives and Hurdles, ICSECM 2011, Kandy - Sri Lanka - 15th to 17th December 2011. http://www.civil.mrt.ac.lk/ICSECM_2011/SEC-11-105.pdf accessed 21/02/13

- Li, B, Akintoye, A, and Hardcastle, C (2001) VFM and Risk Allocation Models in Construction PPP Projects. *School of Built and Natural Environment, Glasgow Caledonian University, Glasgow G4 0BA, Working Paper for Ph. D. Study.*
<http://www.reading.ac.uk/AcaDepts/kc/ARCOM/workshops/04-Edinburgh/06-Li.pdf>
 accessed 20/02/2013
- Loewenstein, G, (1994) The psychology of curiosity: a review and reinterpretation, *Psychological Bulletin*, 116, pp. 75 – 109.
- Magretta, J, (2002) why business models matter, *Harvard Business Review*, vol. 80, pp. 86 – 92.
- McAuley, B, Hore, A V, West, R P and Kehily, D (2012) Addressing the Need to Reform Construction Public Procurement in Ireland through the Implementation of Building Information Modelling, *Proceedings of the 1st ASEA-SEC International Conference on Research, Development and Practice in Structural Engineering and Construction*, Perth Western Australia, 28th Nov – 2nd Dec 2012
- McNurlin B C, Sprague R H, Bui, T (2009) *Information system management in practice*, Pearson international Edition, ISBN139780131579514.
- Miles, R E, and Snow, C C (1978) *Organisational strategy: structure and process*, New York; McGraw-Hill
- Mintzberg, H and Westley, F (1992) Cycles of organisational change, *Strategic Management Journal*, 13, pp. 39 – 59.
- OECD (Organisation for Economic co-operation and Development) (2006) Glossary of statistical terms: public sector. [Online] URL:<http://stats.oecd.org/glossary/detail.asp>
- Prime Minister, John Prescott, on the scope of improving the quality and efficiency of UK construction. London, Department of Environment Transport and the Regions.
- Roberto, M A, and Levesques, L C (2005) The art of making change initiatives stick, *Sloan management Review*, 46(4), 53 – 60.
- Scottish Government (2006) Best value, Scottish Government Edinburgh. [Online] URL: <http://www.scotland.gov.uk/Topics/Government/Finances/spfm/BestValue> [accessed 21/2/2013]
- Smith, D K and Tardif M (2009), *Building Information Modeling: A Strategic Implementation Guide for Architects, Engineers, Constructors, and Real Estate Asset Managers*, Hoboken, NJ, John Wiley & Sons, Inc.
- Soliman, F (2011) Could one transformational leaders convert the organisation from knowledge based into learning organisation, then into innovation? *Journal of Modern Accounting and Auditing*, 7(12), 1352-1361.
- Watson, J R (2009) Post Construction BIM Implementation and Facility Asset Management, *Journal of Building Information Modelling*. Spring 2009, 34-35
- West, D M, (2008) Improving technology utilization in Electronic Government around the world, Government studies at Brookings.

STANDARDIZATION OF PPP: THEORETICAL EXPLORATION AND RESEARCH AGENDA

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Managing PPP policies and projects requests a lot of effort from governments. Complexity and risk are omnipresent and need to be coped with in one way or another. An obvious call for PPP standards exists in practice, since standards are assumed to have a simplifying effect on PPP procurement. However, it remains to be seen whether standards positively affect PPP performance. A theoretical exploration yields propositions on the relationship between standards and PPP performance. These propositions are then prudently, but empirically discussed. The offered insights lead to some slight refinements of the theoretical assumptions and simultaneously express the relevance and merits of a research agenda for PPP standards.

Keywords: Government, Performance, Standardisation.

INTRODUCTION

Albeit their financial and operational performance are disputed, a more or less worldwide tendency of increased creation and implementation of PPP policies and projects can be noticed. It is plausible to no longer consider PPP a novel phenomenon on the continuum of the public-private divide. That being said, new issues for investigation arise as to further develop our understanding of PPPs, and in doing so, to contribute to a successful implementation of partnerships in practice. *Standardization* of PPPs can be a particularly interesting issue in this respect, since standards can remarkably influence PPP performance. Yet standardization is only marginally dealt with in academic literature on PPPs (for exceptions, see Jooste et al., 2011, Dewulf et al., 2011, Börzel and Risse, 2002). Central to this paper is the following meta-question: to what extent are standards likely to affect PPP performance? More specifically, the main objective of this paper is to theoretically explore the relevance of the relationship between (1) creating and using standards for partnerships and (2) PPP performance.

Our argument takes off with a brief conceptual account on PPPs and standards, which results in a conceptual framework that illustrates the assumed relationship between standards and performance. Consequently, based on inspiration that was found in academic literature on standardization, several theoretical perspectives are used to shed light on the potential impact of standards on PPP performance. Propositions are deduced from this theoretical discussion, and then put to a first, prudent empirical discussion through exploratory interviews. Finally, an agenda for future research will be formulated.

PPP: DEFINITION AND PURPOSES

It is generally assumed that PPP, in its current shape, came into being somewhere in the eighties of the twentieth century. Due to the ruling Thatcherist approach in British Government, the longing for more and better involvement of private parties in the development of public services and works rose and was put into practice (Pollitt, 2005, Yescombe, 2011, Dewulf et al., 2012, Grimsey and Lewis, 2007). This public-private discourse spread to other Anglo-Saxon countries and, eventually, to Continental Europe. As of today, PPPs are increasingly becoming mainstream policy, as well as a usual management tool. Yet the conceptualization of PPP remains somewhat intangible. Donahue and Zeckhauser (2011) criticize the PPP concept for being a “conceptual

swamp”, and Grossman refers to the complexity and ubiquitous character of PPPs that add to the confusion (2012b).

Indeed, PPP certainly fails to allow for an unambiguous definition—hence it is frequently referred to as an umbrella term (Osborne, 2000, Skelcher, 2005). An exemplary definition of PPP is that of Grimsey and Lewis: PPP is a “risk-sharing relationship based on a shared aspiration between the public sector and one or more partners from the private and/or voluntary sectors to deliver a publicly agreed outcome and/or public service” (2007). Other, slightly deviant definitions have been proposed by Van Ham and Koppenjan (2001), Hodge and Greve (2005), and Edelenbos and Teisman (2008). If we would collect several different approaches and throw them into a melting pot, at least the following three features of PPP would still be evident: (1) cooperation has to be relatively enduring, (2) sharing of risks is a crucial part of the deal and (3) actors produce something together and both contribute (financially) to it (Hodge and Greve, 2007). It is this definition that we will temporarily stick with, mainly for its comprehensiveness. This definition also indicates that PPP is different from privatization and contracting out.

The number of perspectives on both PPP performance determinants and PPP performance *per se* seems to correspond with the myriad as it occurs in the aforementioned definitional debate. One’s opinion on PPP performance largely depends on how he or she classifies a PPP—and obviously, classifications are abundant. In order to get an overview of this, we utilize a dichotomy based on the work of Hodge and Greve (2007) and Teisman and Klijn (2002). On the one hand, PPP can be seen as a sheer governance tool, whereas on the other hand, PPP may well be considered a political phenomenon *par excellence*. The latter classification implies that PPPs are realized for political purposes, i.e., PPPs are used by government and politicians as a means to exercise power or to appeal to the electorate (Flinders, 2005). The former classification addresses rather less-political performance issues, such as on-time and on-budget delivery, process management, value for money, risk management, and innovation (Hodge and Greve, 2009). We exclusively classify PPP as a governance tool, since the initial goal affiliated to this paper is to create better partnerships, not to find out how electoral gain can be achieved through the enforcement and utilization of standards.

A literature review has brought to the fore that hitherto, PPP around the world has been considerably inconstant in fulfilling its promises. As a matter of fact, none of the potential non-political justifications of PPP as mentioned above has retained an undisputed reputation over the course of years (Akintoye et al., 2003, Grimsey and Lewis, 2005, Grimsey and Lewis, 2007, Pollitt, 2005). PPP clearly provides food for thought and discussion on the performance of public-private cooperation. A potential means to improve this performance is explored in this paper: standardization.

STANDARDS IN GENERAL AND IN PPP

Very little investigative work has been published on the standardization of PPPs, which is remarkable, since standardization may well be regarded as a technique to improve the performance of partnerships—we come back to that later in the theoretical section. A sharp contrast with other fields of interest and their subjection to standards research can be recognized. For instance, quite some scholarly work has emerged on the standardization of information and communication technology (David and Greenstein, 1990), product and service quality (Beck and Walgenbach, 2005), accounting systems (Botzem and Quack, 2006), and societal and environmental performance of firms (Gilbert et al., 2011).

The definition of standards is subject to debate (a brief overview is provided by Slager et al., 2012). Academic and corporate literature seem to comprehend dozens of terms and definitions (Spivak and Brenner, 2001). In Brunsson and Jacobsson’s seminal work, *A World of Standards* (2000), a standard is defined as a form of regulation, though it should not directly be considered a mandatory directive. This illuminates two of the essential characteristics of a standard: it is a (1) specific type of rule which is (2) voluntary for potential adopters, i.e., one is entirely free in either acting upon a standard or not. As Brunsson et al. further elaborate on this argument, “[s]tandards

reflect explicitly formulated and explicitly decided rules and thus differ from more implicit social norms” (2012). This implies that for a standard to be formed, (3) a degree of common understanding among standard-setting actors is required—it “denotes a uniform set of measures, agreements, conditions, or specifications between parties” (Spivak and Brenner, 2001). Furthermore, standards are (4) meant for common use (Brunsson et al., 2012).

More recently, Brunsson et al. (2012) provided a threefold perspective on standards and standardization. First of all, the standardization *of* organizations focuses upon adopting, diffusing, implementing, avoiding, and altering standards in the course of their implementation. “Second, standardization *by* organizations concerns the fact that most standards are the product of formal organizations” (2012). Finally, standardization can be viewed as a form *of* organization. In the latter context, standards can be perceived as an important governance mechanism, which is the perspective that is going to be used in this paper.

Different types of standards can be noticed in the PPP universe. First of all, we can think of PPP standards concerning the task of policymakers to decide between either public procurement or public-private procurement of, say, an infrastructure project. This type often appears in the form of ex ante evaluation instruments and calculation methods, such as the public-private comparator [PPC] or the public sector comparator [PSC] (Grimsey and Lewis, 2005). Second, the entire PPP decision-making procedure—ranging from the very first project proposal to service delivery—can be standardized. To mention a third act of standardization, we refer to the harmonization of many different tendering procedures into one, or just a few, templates for tendering. Two additional types include the standardization of PPP project structures (cf. Van Gestel et al., 2009) and PPP project content. A sixth and final type can be recognized in the field of contracting: contract duration, warranties, price mechanism, availability requirements, maintenance, early termination, insurance, and dispute resolution are only a few examples of contract-related standards (see also HM Treasury, 2007).

The United Kingdom [UK] has been the first country to develop a handbook dedicated to the standardization of PPP contracts—and, obviously, also the first country to put standards into practice (HM Treasury, 2007). In similar vein, other countries are coming up with PPP standards nowadays, such as Belgium (Van Garsse et al., 2009), the Netherlands (Rijkswaterstaat, 2012), Portugal, Canada, and Australia (Farrugia et al., 2008). The practical relevance of PPP standards increases; nonetheless, academic literature seems to neglect standards as a relevant theme to PPPs. An exceptional example is provided by Jooste et al. (2011). They point to institutional and political contexts as explicit determinants of either success or failure of PPP standards. Their findings strongly indicate that a ‘one size fits all’ approach to PPPs—i.e., a fully standardized approach—is deemed to collide with the persistent, non-ideal real world. Börzel and Risse (2002) provide a second exceptional example we would like to address here. They overtly put into question some presumed benefits of large-scale establishment of PPP standards, since their empirical findings indicate that the impact of standards on PPP performance is likely to vary.

Thus, although there have not been many academic publications on PPP standards, the few that do account for their impact on PPP performance evidently place their effectiveness in dispute. This relationship, which is also shown in table 1 below, will be explored further in the remainder of the paper. The next section provides an account on PPP performance, which is the dependent variable in this case. The subsequent section will address theoretical approaches to standards and their impact on PPP performance.

Table 1: Independent variable ‘standards’ (X) and dependent variable ‘PPP performance’ (Y)

X	relationship	Y
standards	impact on	PPP performance

PPP PERFORMANCE

Even though we have already decided to classify PPP as a governance tool, the challenge to determine a sound basis for evaluating PPP performance remains. According to Hodge (2010), a

certain opaqueness is inherent to PPP performance evaluation, due to the multiple objectives, multiple discourses, and multiple disciplines that are usually involved in PPP. Indeed, there generally is no doubt that unilaterally determined substantive criteria for multi-actor partnerships do not exist (Skelcher and Sullivan, 2008, Klijn and Teisman, 2003, Akintoye et al., 2003). Although there is a clear call for an integrative approach of PPP performance (Grossman, 2012a), the creation of such a ‘standardized’ integrative framework seems hardly feasible. Therefore, some scholars advocate to evaluate PPP merely on a case-by-case basis (Ladow and Ebdon, 2012), or on the basis of separate evaluation of different performance domains (Skelcher and Sullivan, 2008).

In our attempt to operationalize PPP performance, we make a distinction between product performance and process performance. “Product performance refers to the production process where inputs are converted into outputs and results” (Van Gestel et al., 2012). The main indicator of product performance consists of the goal effectiveness of a PPP: to what extent do expectations seem to be met once the project has been completed? Another indicator is value for money: to what extent has the PPP created added value compared to a conventionally procured project (Bult-Spiering and Dewulf, 2006)? A third and final indicator is found in the extent to which a PPP can be considered innovative.

Process performance refers to the multi-actor setting of a PPP and how one dealt with this setting over time: how have certain outputs and outcomes been realized, which roles were fulfilled by the actors involved, to what extent could cooperation be noticed, and last but not least: were environment-specific dynamics taken into account during the procurement phase and/or afterwards? These are only a few questions that come to the fore when operationalizing the process performance of a PPP. Other indicators for this type of performance are the progress made during the decision-making process (Klijn and Koppenjan, 2000), trust building (Macdonald, 2012), and stability in interpersonal and inter-organizational relationships (Alexander, 2012).

Table 2 below provides an overview of performance dimensions that are to be thoroughly scrutinized during a future empirical research phase. As was announced in the introduction, this paper will merely serve an exploratory purpose, meaning that it attempts to generate discussion on several theoretical assumptions on the nexus between PPP standards and PPP performance. For the sake of discussion, some of the performance dimensions have not been fully operationalized yet.

Table 2: List of PPP performance dimensions

Product performance	Process performance
Goal effectiveness ¹	Inclusion of context ²
Value for money	Trust, cooperation
Innovation	Procurement process

IMPACT OF STANDARDS: THEORETICAL ASSUMPTIONS

Throughout the years, several theoretical considerations have been published regarding the impact of standards on the performance of any subjective variable. This section explores some of these theoretical venues as a means to find out why (or why not) standards are formulated, adopted, and used. Consequently, some assumptions will be drafted that refer to the impact of standards on the performance of PPP projects—with that, a relationship is created between the performance dimensions and the theoretical propositions.

¹ Goal effectiveness will not be discussed further in this paper, since this still is an opaque area which could better be addressed on a case-by-case basis in the case studies to come.

² You could say that the inclusion of a policy or project context is a *condition* for process performance, rather than a *measurement*. A similar comment can be made with regard to procurement process. However, as was explained earlier in this section, inclusion of context and procurement process will be operationalized in the near future, which would make it a proper means to measure process performance. Commitment, openness, transparency, and legitimacy are likely to become elements of these two operationalizations (Scharpf, 1997).

A first interesting perspective on standardization addresses the commercial and financial attractiveness of standards in that they enhance network externalities: “the utility that a user derives from consumption of the good increases with the number of other agents consuming the good” (Katz and Shapiro, 1985). One can imagine that in an ever globalizing world, potential network externalities are abundant. However, in order to effectively utilize this compatibility potential, a number of standards needs to be created. Illustrations of these are a universal railway track gauge, harmonized telecommunication services, and compatible computer technologies. Eventually, standards should provide for a more simplified, interchangeable, communicative, and open market (Spivak and Brenner, 2001). Seen from this functionalist point of view (Feng, 2003), standards can be perceived as instruments that provide a clear framework for market actors. If we are to translate this into PPP terms, this leads to the assumed ability of standards to reduce transaction costs, which in turn causes an increase in value for money, which is one of the product performance dimensions that were put forward in the previous section. Another assumed ability of standards is that they speed up a procurement process (Kindleberger, 1983, Botzem and Dobusch, 2012), which is one of the aforementioned process performance dimensions. Accordingly, the following propositions are posed:

Proposition 1 Standardization of PPP is positively related to the reduction of transaction costs of PPP.

Proposition 2 Standardization of PPP is positively related to the shortened duration of the procurement process.

Second, standards can be viewed through a network theory lens. By and large, standards are understood as agreed-upon measures; they initially are social phenomena (Timmermans and Epstein, 2010), since they can only be created through consensus among different actors. Nonetheless, as soon as a standard is used in PPP practice, it is likely to contribute to a certain ignorance of project-specific contexts and dynamics. Dunn elaborates further on this message, stating that “[w]hen standards are used to dictate practice [...], they often replace *metis*—the unwritten practical know-how that local producers gain over the years as they work to adapt to the ever-changing conditions of their lands, their markets, and their communities” (2009, see also Scott, 1998). This relates to one of the process performance dimensions that were presented in table 2: inclusion of context. We propose:

Proposition 3 Standardization of PPP is negatively related to the inclusion of project contexts and dynamics.

Grosso modo, two tensions rise if one digs deeper into Dunn’s argument: standards versus innovation, and standards versus flexibility—two different tensions which clearly are interlinked. First, standards may have adverse effects on innovation. For instance, due to coordination or information problems, a collective switch from a common standard or technology to a possibly superior counterpart may well be impeded by existing standards—*excess inertia* occurs (Farrell and Saloner, 1985, Farrell and Saloner, 1986). A typical example in this case is the worldwide standardization of ‘Qwerty’ keyboards mainly due to path dependency, whereas many alternative keyboard types would probably have done a far better job if they only could have afforded to seriously compete with their predecessor (David, 1985).

Next to this argument on inertia issues, a common-known comment on standards is that they are “an unwelcome, unnecessary, and harmful intrusion into a world of free, distinct individuals and organizations who are wise enough to decide for themselves, or into the world of civil society or free markets” (Brunsson and Jacobsson, 2000). In their attempt to try and stabilize the world they might limit room for innovation (Choi, 1996). It is exactly here that flexibility comes into play as well: Van den Ende et al. (2012) launch the paradoxical concept of *standard flexibility* as a cure to the often alleged rigidity of standards. Provided that a standard—be it a standard PPP contract, a competitive dialogue procedure, or any other PPP-related standard—allows for change every now and then, one can prevent that it stifles innovation. However, innovation remains to be an Achilles’ heel for standards. Sussman tries to make this clear by arguing the other way around: “[I]n the world of social phenomena, without standardization innovation can be taken for granted”

(1999). Consequently, the following proposition, which relates to the product performance dimension of innovation, is posed:

Proposition 4 Standardization of PPP has a negative relationship with innovation.³

Next to its critical stand regarding standards and their impact on innovation and flexibility, network theory provides for a critical account with respect to standards and trust building and cooperation. The cooperative spirit and acting of actors in a PPP, also known as *partnering*, may be victimized as standards start to institutionalize. Once the public sector and the private sector act and interact according to certain procurement standards or contracting standards, the interpersonal trust of the actors involved is likely to decrease. Since standards are the norm, one might not be able or willing to look for creative, joint solutions anymore. As a result, the cooperative spirit diminishes or even disappears, and this provides for a debate on the link between PPP standards and the extent to which they affect trust and cooperation, the latter being a process performance dimension that was listed in table 2.

Proposition 5 Standardization of PPP has a negative relationship with trust building and cooperation (*partnering*)

IMPACT OF STANDARDS: EXPLORATORY INTERVIEWS

Whereas the former paragraph provided an account on some theoretical approaches to standardization and presented assumptions on the relationship between standards and PPP performance, this paragraph is of a rather empirical nature. The propositions have been discussed in a series of exploratory interviews, so as to gather some first remarks and useful insights on PPP standards in practice—and, in a broader sense, on the relevance of future research in this area.

Nine semi-structured interviews on the UK's PPP standards were conducted and subjected to content analysis. The UK was selected as a pilot case due to its advanced PPP policy, in which contracts and decision-making procedures have been standardized to a remarkable extent. More specifically, the interviews took place in the counties of Lancashire and Greater Manchester. This was due to the fact that one of the authors stayed in that area for the duration of a visiting scholarship of three weeks. Respondents were selected on the basis of their involvement with and/or their assumed knowledge on the nexus between PPP and standards. Furthermore, the group of respondents was to reflect diverse views on reality, so both political, financial, legal, and operational specialists were selected. Finally, respondents have also been selected on availability and accessibility. The interviews took place in November and December 2012 and had an average length of 60 minutes. Confidentiality requirements preclude the publication of the names of informants, but information on the informants' professions is included in table 3. The findings are categorized in accordance with the propositions.

³ As the empirical data gathering proceeded, it appeared that the flexibility of a standard was considered to have a strong influence on PPP performance, and that it deserves to be the basis of its own theoretical proposition. Unfortunately, due to a lack of time and means, standard flexibility could not be fully included in this paper anymore. It will be thoroughly addressed in a future paper.

Table 3: List of interview respondents

Respondent	Date/place of interview	Profession/job position
A	6 November, Preston	Professor of Construction Economics and Management, University of Central Lancashire
B	7 November, Preston	Research assistant at University of Central Lancashire, former construction site manager
C	12 November, Manchester	Professor of Accounting, University of Manchester
D	13 November, Manchester	Professor of Construction Economics and Finance, University of Salford
E	15 November, Manchester	Professor of New Infrastructure and Development, University of Manchester
F/G (double interview)	16 November, Preston	Assistant professors Construction Procurement and EU Procurement Law, University of Central Lancashire
H	21 November, Preston	Director of Navigant Europe, Public Services practice
J	22 November, Manchester	Partner and National Head of Infrastructure, Projects and Energy at Addleshaw Goddard
K	4 December, Skype	Transport consultant, Research Fellow, Imperial College

Proposition 1 We take off with some of the respondents' comments on the proposition concerning transaction costs. Across-the-board, the respondents tended to agree in saying that standardization has fulfilled a significant role in decreasing the transaction costs of, for example, PPP procurement. Respondent B stated that transaction costs have "probably been one of the most contentious areas for PPPs in this country. That is probably where most of the cost elevations is coming to in all of the projects." A considerable part of these costs is made during the procurement phase of a PPP—i.e., as negotiations take place in order to eventually draw a contract. Both respondent A and J emphasized that standards have allowed to reduce the amount of costs required in this specific phase. Respondent J: "Before there was a standardized series of contracts, people had to make it up. Forms of contract were made up. And so, depending on the experience and expertise of the lawyers concerned, [...] the contractual documentation would lean towards the expertise of the individual lawyer." This created a situation in which specialized lawyers drafted contracts that actually exceeded their specialism: "So if the lawyer involved was a construction lawyer, the documentation would look like a construction contract." Quite often, this caused friction: people used to argue about every single clause of a contract. Ever since the launch of standard contracts in the UK in the late 1990s, areas for negotiation have become less extensive. A significant part of "the territory that was being argued over for the sake of argument" is settled (respondent J). And clearly, if certain things are simply swept of the table, that will reduce the time taken in negotiations, respondent C admitted.

A critical comment on the transaction costs proposition was given by respondent D, who would completely refute the linear relationship between standards and transaction costs as it is suggested in the proposition: "There is a link, there is some co-dependency between the degree of standardization and transaction costs. But I would not say it is a linear relationship." Rather, this respondent would speak of a U-shape where there is an optimal point where standardization and transaction costs meet. But at either side of that, transaction costs would start to increase. This comment will be referred to in the conclusion of this paper.

Proposition 2 The second proposition, stating that standardization contributes to speeding-up a procurement process, was rather unanimously agreed upon by the interviewees. As standards become institutionalized in PPP practice, they contribute to a certain normalization of PPP activities. Habituation becomes evident, and routines rise. As a consequence, PPP procurement of PPP decision-making procedures may indeed require less time. Again, however, respondent D openly questioned the generalizability of the proposition: "I think too much standardization could actually slow a project down because you are then requiring the Special Purpose Vehicle to do far more due diligence because of the degree of standardization." Indeed, respondent D argued that an optimal balance should be found somewhere, but that this balance largely depends on context-specific assets.

Proposition 3 Mixed response was received with regard to the proposition that negatively relates standardization to the inclusion of project contexts and dynamics. According to respondent A, this

proposition addresses an interesting issue, since it touches upon one of the main concerns of PPP standards, namely flexibility. Respondent A acknowledged that the concept of a standard might cause people to interpret standards as rigid instruments that do not allow for amendments, thereby neglecting and precluding the consequences of ongoing developments in political, social, or any other environments. Although one speaks of a standard contract or a standard process, “it doesn’t mean that it cannot be adjusted to specific situations. It is just a starting point.” With that, we come back to the paradoxical term of Van den Ende et al. (2012): *standard flexibility*. Like basically every other interviewee, respondents H and J pointed to the government’s Building Schools for the Future investment program as a typical example of how an incorrect usage of nationally determined standards led to some bad experiences at local level.

Nonetheless, a more critical view came to the fore as well. Respondent C, for instance, seriously casted doubt on the actual desirability and feasibility of creating and enhancing standard contracts with an open and flexible feature attached to them. “You will make particularly the financiers very nervous. [...] Some flexibility is a good thing, but it is very expensive and it may not be possible.” Likewise, respondent D touched upon the need of flexibility: “Try to tie somebody into the finances for thirty years without giving provision for renegotiation and adjustment at sensible periods. The construction industry would accept it, but they would charge a huge risk premium for taking that risk,” and with that there would hardly be any value for the public sector.

Obviously, standard flexibility could be a useful tool to keep up with and take account of the ever-changing environment of a PPP project—every respondent clearly admitted the relevance of flexibility. But it seems even more obvious that a major challenge lies ahead to find a balance; whereas a few respondents basically considered standards to be easily amenable at present, others set the stage for a debate on the chances of successfully including flexibility aspects.

Proposition 4 A particular sense of disagreement came up as soon as the proposition on the negative relationship between standardization and innovation was addressed. In general, two types of response could be distinguished on this matter. On the one hand, some interviewees felt quite convenient with the assumption, as they initially asserted that the prescriptive character of standards may well be detrimental to opportunities for innovation. Respondent B commented that “if you create an overburdened standard regime, you could stifle innovation,” thereby directly referring to the different cultural ethos in the public sector and the private sector, and actually stating that innovation is a rather perceptual issue. The desire of the government to control PPP projects through strict, prescriptive requirements collides with the desire of the private sector to develop groundbreaking concepts. Several other respondents supported respondent B in his statement. Respondent C argued that “if you have this [prescriptive] manual, and everybody in the industry knows that if you do not comply with the manual, you will not get the contract, then that is obviously going to hamper innovation.” Respondent D noted that “we have got contracts that actually provide punishment if you fail, but not an incentive for if you are good,” a message which was supported by respondent C: “We do not incentivize for over-performing.” Respondent D, who once did an analysis of the stimulants and obstacles to innovation in PPP, confidently added that innovation roots at the bottom of the hierarchy, and certainly not at the top, which is where political decision-makers are active. Risk-averse decision-makers will not allow PPP consortia to put untried or untested proposals into practice.

On the other hand, a slightly more critical response to the assumed relationship between standards and innovation was found during the analysis. Respondent A did not see any reason to allege PPP standards of being detrimental to innovation and exemplified this by referring to standards contracts: “What is standardized is the contract itself. The process, in terms of the solution you provide towards the output specifications, that is where the innovation comes in.” As respondent A continued his argument, he even stated it would be naive to think that because of standards, innovation cannot flourish. Support for this statement was given by respondent J: “I do not think innovation comes from the contract. Innovation comes from the public sector creating an environment, whereby the private sector is encouraged to invest its time in coming up with a different solution.” Indeed, prescriptive documents or less prescriptive output specifications are likely to reduce the degrees of freedom for bidders, designers, and contractors to come up with new ideas. But to cite respondent J, “having space does not mean you invent great things.”

Respondents F and G elaborated further on this subject and were convinced that, “innovation, in all its forms, has got to break the rules. It has got to be risk-taking, it has to challenge existing rules, existing standards.” Following this line of thought, you could even say that the limiting impact of standards on the freedom of the private sector actually lies at the heart of innovation in its purest form.

In the conclusion of this paper, a brief, short-term research agenda is presented with regard to dealing with the phenomenon of innovation.

Proposition 5 Finally, the assumed negative relationship between standardization and partnering was thrown into the interview arena. Interviewee C’s response was that the proposition more or less assumes that standards are in some way an unpleasant phenomenon, making people do anything but feeling like cooperating. The respondent certainly did not agree with that: “if your standards have come from past experience, then they should be capturing good experience, and therefore, they should not drive a lack of cooperation.” Moreover, the voluntary character of standards leaves public and private actors with a free choice to cooperate or not.

However, some respondents were less sure about the ability of standardization to thrive cooperation. Respondent D referred to the tension that is implicitly included in a PPP contract, and probably to an even greater extent in a standardized PPP contract: “Every time you refer to a formal contract, you are actually admitting that the project is failing. Because they are the rules of war.” Whereas mutual cooperation is required all the way through for a project to render success, contracts, in a way, are based on concerns of risk allocation. The latter has nothing to do with cooperation, but with confrontation: the actors’ personal interests, i.e., their risk aversion. It was respondent H who stated that the prescriptiveness of a (standardized) contract basically undermines opportunities for *partnering*, unless a sound common interest of all involved parties is present, such as a shared problem—as was put forward by respondents F and G.

Finally, respondent J emphasized that one should put the role of contracts into perspective: “A contract does not make people cooperate.” Instead, it is the people themselves, influenced by their position and the environment, that create a climate for cooperation. “We have seen examples of PFI contracts where people always argued.” However, in other projects, which comprised the same (standardized) contract, the people worked together. In other words: it is not only because of a contract that people become involved in arguments.

CONCLUSION

The main objective of this paper was to explore the relationship between standards and PPP performance and to explore the relevance of future research on this relationship. This endeavour was guided by a number of propositions that emanated from a study of several theories that were likely to be relevant to PPP. Interviews were conducted so as to discuss the proposition for the very first time. The results, then, were to be used as a means to define further a research agenda on the impact of standards on PPP performance.

Analysis of the interviews has clearly indicated that standards matter, be it in a positive or negative fashion. Even though the UK has a track record of more than ten years when it comes to the standardization of PPP procurement and contracting, it seems that it can and should be utilized more effectively and more efficiently. All in all, the main challenge remains: what would be the optimum range of PPP-related standards. Through the conduction of scientific research, one should continue the quest for a range that is wide enough to put standardization advantages into practice, and just too narrow to prevent PPPs from falling into a shortage of interaction, diminished innovation, and losing sight of contingency. How to find a balance—that is obviously the question.

The data retrieved from the interviews has certainly provided food for thought for further research. Three action points will be addressed here. The first—and most important—action point builds a bridge between the previous theoretical exploration and the future empirical phase of this research on PPP standards. Some of the interviewees justly expressed their doubts on the direct

relationship between standards and PPP performance as it was indicated in the propositions. Indeed, although it is likely that some sort of correlation between these variables exists, the likelihood of a direct causal relationship is close to zero. PPP performance is a matter of contingencies: apart from standards, variables such as political complexity, government capacity, leadership, expertise, and trust inevitably play a role. Given these contingencies, and given the fact that this specific research project aims to analyze only a small number of cases, causal inferences are hard to achieve. An opportunity to alleviate this small N problem may well be found in the technique of *qualitative comparative analysis* [QCA] (Rihoux, 2006). For that reason, time and effort will be put in the orientation and learning of this method of analysis.

Second, some propositions provided for more discussion during the interviews than others. Particularly the assumption on the inclusion of project contexts and dynamics, as well as the assumption on innovation triggered debate. But this debate was probably not solely instigated by the content of the propositions. Part of the explanation may well be found in the fact that some concepts were not sufficiently defined on forehand, which has allowed for different interpretations of the concepts by the different respondents. This issue needs to be overcome before any other interviews are conducted. Additional literature will be studied and interpreted, so as to provide for proper definitions and operationalizations of concepts that have not been sufficiently defined yet. One of them is the concept of standard flexibility, which was briefly touched upon in one of the previous sections.

The third and final action point is to continue elaborating on the retrieved data as an official starting point for the empirical stage of this research project. The lessons learned from the UK interviews might be premature and incomplete. Nevertheless, these early lessons related to theoretical and methodological aspects, or lessons with regard to rather substantive issues, such as PPP performance and governance, are to be taken into account as they will be helpful in moving forward with the optimization of standardization. The contemporary findings provide a basis for further research on PPP standards, both in the UK and in other countries. The next step in this specific research project will be to subject the Flanders Region in Belgium to a thorough analysis of its policies on and practices of PPP standards. Several case studies will be conducted in the near future.

REFERENCES

- Akintoye, A., Hardcastle, C., Beck, M., Chinyio, E. & Asenova, D. 2003. Achieving best value in private finance initiative project procurement. *Construction Management and Economics*, 21, 461-470.
- Alexander, R. 2012. Network structures and the performance of brownfield redevelopment PPPs. *Public Performance & Management Review*, 35, 753-768.
- Beck, N. & Walgenbach, P. 2005. Technical efficiency or adaptation to institutionalized expectations? The adoption of ISO 9000 standards in the German mechanical engineering industry. *Organization Studies*, 26, 841-866.
- Börzel, T. A. & Risse, T. 2002. Public-private partnerships: effective and legitimate tools of international governance? In: Grande, E. & Pauly, L. (eds.) *Complex Sovereignty: Reconstituting Political Authority in the Twenty-First Century*. Toronto: University of Toronto Press.
- Botzem, S. & Dobusch, L. 2012. Standardization cycles: a process perspective on the formation and diffusion of international standards. *Organization Studies*, 33, 737-762.
- Botzem, S. & Quack, S. 2006. Contested rules and shifting boundaries: International standard-setting in accounting. In: Djelic, M.-L. & Sahlin-Andersson, K. (eds.) *Transnational Governance: Institutional Dynamics of Regulation*. Cambridge: Cambridge University Press.
- Brunsson, N. & Jacobsson, B. (eds.) 2000. *A World of Standards*, Oxford: Oxford University Press.

- Brunsson, N., Rasche, A. & Seidl, D. 2012. The dynamics of standardization: three perspectives on standards in organization studies. *Organization Studies*, 33, 613-632.
- Bult-Spiering, M. & Dewulf, G. (eds.) 2006. *Strategic Issues in Public-private Partnerships: An International Perspective*, Oxford: Blackwell.
- Choi, J. P. 1996. Standardization and experimentation: ex ante vs. ex post standardization. *European Journal of Political Economy*, 12, 273-290.
- David, P. A. 1985. Clio and the economics of QWERTY. *American Economic Review*, 75, 332-337.
- David, P. A. & Greenstein, S. 1990. The economics of compatibility standards: an introduction to recent research. *Economics of Innovation and New Technology*, 1, 3-41.
- Dewulf, G., Blanken, A. & Bult-Spiering, M. 2012. *Strategic issues in public-private partnerships*, Oxford, Wiley-Blackwell.
- Dewulf, G., Garvin, M. & Duffield, C. 2011. What are the benefits of standardised PPP procurement processes? Working paper proceedings. In: Toole, T. M. (ed.) *Engineering Project Organizations Conference, August 9-11*. Estes Park, CO.
- Donahue, J. D. & Zeckhauser, R. J. 2011. *Collaborative Governance: Private Roles for Public Goals in Turbulent Times*, Princeton, NJ/Oxford, Princeton University Press.
- Dunn, E. C. 2009. Standards without infrastructure. In: Lampland, M. & Star, S. L. (eds.) *Standards and Their Stories: How Quantifying, Classifying, and Formalizing Practices Shape Everyday Life*. Ithaca, NY: Cornell University Press.
- Edelenbos, J. & Teisman, G. R. 2008. Public-private partnership: on the edge of project and process management. *Environment and Planning C: Government and Policy*, 26, 614-626.
- Farrell, J. & Saloner, G. 1985. Standardization, compatibility, and innovation. *Rand Journal of Economics*, 16, 70-83.
- Farrell, J. & Saloner, G. 1986. Competition, compatibility and standards: The economics of horses, penguins and lemmings. In: Gabel, H. L. (ed.) *Product Standardization and Competitive Strategy*. Amsterdam: North-Holland.
- Farrugia, C., Reynolds, T. & Orr, R. J. 2008. Public-Private Partnership Agencies: A Global Perspective. Stanford, CA: Collaboratory for Research on Global Projects.
- Feng, P. 2003. Studying standardization: review of the literature. *IEEE Conference on Standardization and Innovation in Information Technology, October 22-24*. Delft.
- Flinders, M. 2005. The politics of public-private partnerships. *British Journal of Politics and International Relations*, 7, 215-239.
- Gilbert, D. U., Rasche, A. & Waddock, S. 2011. Accountability in a global economy: the emergence of international accountability standards. *Business Ethics Quarterly*, 21, 23-44.
- Grimsey, D. & Lewis, M. K. 2005. Are public-private partnerships value for money? Evaluating alternative approaches and comparing academic and practitioner views. *Accounting Forum*, 29, 345-378.
- Grimsey, D. & Lewis, M. K. 2007. *Public Private Partnerships: The Worldwide Revolution in Infrastructure Provision and Project Finance*, Cheltenham, Edward Elgar.
- Grossman, S. A. 2012a. The management and measurement of public-private partnerships: toward an integral and balanced approach. *Public Performance & Management Review*, 35, 595-616.
- Grossman, S. A. 2012b. Public-private partnerships. Introduction: the emerging role of partnership governance. *Public Performance & Management Review*, 35, 575-577.

- Hm Treasury 2007. Standardisation of PFI contracts. London: Stationery Office.
- Hodge, G. A. 2010. Reviewing public-private partnerships: some thoughts on evaluation. In: Hodge, G. A., Greve, C. & Boardman, A. E. (eds.) *International Handbook on Public-Private Partnerships*. Cheltenham: Edward Elgar.
- Hodge, G. A. & Greve, C. (eds.) 2005. *The Challenge of Public-Private Partnerships: Learning from International Experience*, Cheltenham: Edward Elgar.
- Hodge, G. A. & Greve, C. 2007. Public-private partnerships: an international performance review. *Public Administration Review*, 67, 545-558.
- Hodge, G. A. & Greve, C. 2009. PPPs: the passage of time permits a sober reflection. *Economic Affairs*, 29, 33-39.
- Jooste, S., Levitt, R. & Scott, D. 2011. Beyond 'one size fits all': how local conditions shape PPP-enabling field development. *Engineering Project Organization Journal*, 1, 11-25.
- Katz, M. J. & Shapiro, C. 1985. Network externalities, competition, and compatibility. *The American Economic Review*, 75, 424-440.
- Kindleberger, C. P. 1983. Standards as public, collective and private goods. *Kyklos*, 36, 377-397.
- Klijn, E.-H. & Koppenjan, J. F. M. 2000. Public management and policy networks: foundations of a network approach to governance. *Public Management*, 2, 135-158.
- Klijn, E.-H. & Teisman, G. R. 2003. Institutional and strategic barriers to public-private partnership: an analysis of Dutch cases. *Public Money and Management*, 23, 137-145.
- Landow, P. & Ebdon, C. 2012. Public-private partnerships, public authorities, and democratic governance. *Public Performance & Management Review*, 35, 727-752.
- Macdonald, R. 2012. Pinning down the moving target: the nature of public-private relationships. *Public Performance & Management Review*, 35, 578-594.
- Osborne, S. P. (ed.) 2000. *Public-Private Partnerships: Theory and Practice in International Perspective*, London/New York: Routledge.
- Pollitt, M. 2005. Learning from UK Private Finance Initiative experience. In: Hodge, G. & Greve, C. (eds.) *The Challenge of Public-Private Partnerships: Learning from International Experience*. Cheltenham: Edward Elgar.
- Rihoux, B. 2006. Qualitative Comparative Analysis (QCA) and related systematic comparative methods: recent advances and remaining challenges for social science research. *International Sociology*, 21, 679-706.
- Rijkswaterstaat 2012. Rijksbrede Modelovereenkomst DBFM Huisvesting. In: Environment, D. M. O. I. a. T. (ed.). The Hague: Dutch Ministry of Infrastructure and the Environment.
- Scharpf, F. W. 1997. *Games Real Actors Play: Actor-Centered Institutionalism in Policy Research*, Boulder, CO, Westview Press.
- Scott, J. C. 1998. *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed*, New Haven, CT/London, Yale University Press.
- Skelcher, C. 2005. Public-private partnerships and hybridity. In: Ewan, F., Lynn, L. E. & Pollitt, C. (eds.) *The Oxford Handbook of Public Management*. New York: Oxford University Press.
- Skelcher, C. & Sullivan, H. 2008. Theory-driven approaches to analyzing collaborative performance. *Public Management Review*, 10, 751-777.
- Slager, R., Gond, J.-P. & Moon, J. 2012. Standardization as institutional work: the regulatory power of a responsible investment standards. *Organization Studies*, 33, 763-790.
- Spivak, S. M. & Brenner, F. C. (eds.) 2001. *Standardization Essentials: Principles and Practice*, New York/Basel: Marcel Dekker.

- Sussman, O. 1999. Economic growth with standardized contracts. *European Economic Review*, 43, 1797-1818.
- Teisman, G. R. & Klijn, E.-H. 2002. Partnership arrangements: governmental rhetoric or governance scheme? *Public Administration Review*, 62, 197-205.
- Timmermans, S. & Epstein, S. 2010. A world of standards but not a standard world: toward a sociology of standards and standardization. *Annual Review of Sociology*, 36, 69-89.
- Van Den Ende, J., Van De Kaa, G., Den Uijl, S. & De Vries, H. J. 2012. The paradox of standard flexibility: the effects of co-evolution between standard and interorganizational network. *Organization Studies*, 33, 705-736.
- Van Garsse, S., De Muyter, J., Schutyser, B. & Verlinden, A. 2009. DBFM-handboek. Brussels: Vlaams Kenniscentrum PPS.
- Van Gestel, K., Voets, J. & Verhoest, K. 2009. Complexity and control: how do they work in PPPs? *IRSPM XIII Conference, April 6-8*. Copenhagen Business School.
- Van Gestel, K., Voets, J. & Verhoest, K. 2012. How governance of complex PPPs affects performance. *Public Administration*, 36, 137-184.
- Van Ham, H. & Koppenjan, J. F. M. 2001. Building public-private partnerships: assessing and managing risks in port development. *Public Management Review*, 4, 593-616.
- Yescombe, E. R. 2011. *Public-Private Partnerships: Principles of Policy and Finance*, Burlington, MA, Butterworth-Heinemann.

THE DEVELOPMENT OF PPP IN URBAN RAIL SYSTEMS: WHAT HAVE WE LEARNED?

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The need to improve urban transportation systems in order to decrease time travel, increase its reliability while keeping the costs at an affordable level, has taken governments to develop public-private partnerships (PPPs) in urban rail systems. Many cities around the world that engaged in the construction of urban rail systems, particularly light rail, found on the PPP model a quick and easy answer to finance these large investments, although different models were adopted. Most cases use a typical build-operate-transfer model, with long duration (e.g., 30 years), but other innovative models have been used (e.g., dual model with different contracts for infrastructure construction and maintenance – 20 year contract – and another for the systems' operation – 5 year contract). This paper will address these different models, highlighting the main benefits and pitfalls behind the different contractual structures, with a particular emphasis on business mode and risk sharing.

Keywords: contractual arrangements, Public-Private Partnership (PPP), Urban Rail Systems, risk sharing.

INTRODUCTION

Political decision makers need to ensure good liveable and accessible conditions to the population, at the same time that they need to cope with increasing congestion and higher environmental standards (Strukton, 2008). Now planners must find affordable, environmentally friendly and socially responsible transportation solutions that can support further development in urban areas. They are required to look at alternatives to improve transportation services in response to ever-expanding urban populations and growing motorization. Light rail connections can assist in reversing this tendency. These systems are less pollutant and require less urban space than road traffic, providing rapid urban mobility and vital access to city centres from surrounding districts (World Bank, 2010).

Nonetheless, equipping a city with an efficient light rail system can be a complex, and expensive task. To answer to an increasing need for mobility, and with government funding being increasingly limited, PPPs have been used extensively to maximize and enhance transport networks, taking advantage of the innovation, know-how, flexibility and financing from the private sector. This public and private cooperation has already shown that it can provide several benefits, when properly done. As with any other tools, used wrongly, PPP structure could result in quite significant adverse outcomes. PPPs are complex, unique and require a great deal of knowledge, skill and competencies when defining them.

Railway contracts, because of their complexity, require strong and effective management on behalf of the contracting authorities. Governments therefore need to plan institutional arrangements for implementing contracts well in advance to ensure that contract performance is properly monitored and managed.

After this brief introduction, the paper will present the main models for PPP in urban rail, followed by a case study analyses (two Portuguese case studies are presented to illustrate the benefits and pitfalls of alternative contractual structures). These case studies will be analysed under a SWOT approach and finally some conclusions are drawn.

RESEARCH METHOD

The purpose of this paper is two-folded. First, it intends to provide an overview on the different PPP models for developing urban rail systems. This was supported on a literature review, that proved to have few elements on this specific topic, and second on a international benchmark, supporting the theoretical framework with real case studies and real examples. The second objective of the paper is to provide a more insightful analysis on alternative contractual building, maintaining and operating urban rail systems: bundling vs. unbundling infrastructure and operation. Since the different realities in different countries can distort some analysis, as well as comparing projects developed in different time frames. Therefore, two case studies, with alternative contractual arrangements, developed in the same country and within the same period, can provide important lessons and policy implications. To fulfil this objective the methodology followed was a case study approach.

ALTERNATIVE MODELS FOR PPP IN URBAN RAIL

Overview

The PPP projects emergence in rail sector should be found on the urgency of efficiency and effectiveness gains, decreasing overall costs in construction and operation. In some cases, these were not the main drivers, and PPP were used due to the fact that they were not accountable for public deficit calculation (Engel, Fischer and Galetovic, 2011). Nevertheless, there is a myriad of models and a combination of models, each one with its main benefits and pitfalls, and adapted to each specific circumstance. In the next lines, we will illustrate, through real cases, some alternative contractual arrangements for PPP in urban rail.

Design-Build-Finance-Operate (DBFO)

Design-Build-Finance-Operate schemes are quite common, not only in urban rail systems, but in several infrastructure sectors: roads, ports, water and waste water, energy, among others. Kuala Lumpur and Bangkok developed new urban rail systems through Design-Build-Finance-Operate (DBFO) agreements. In the case of Kuala Lumpur rails, it could be said that there was a general lack of knowledge within the government as to get the competitive benefit of the PPP model. There was no competitive tendering when the concessions were awarded. The government ended up assuming all the risks associated with finance and ridership, bailing out its private sector partners. In contrast, the Bangkok rail PPPs were subject to strong competition. The construction risks involved in the underground line project proved to be too intimidating for the private sector to assume. The project was subsequently unbundled, with the public sector responsible for construction, and only a concession to equip and operate the line put out to bid. The private partner assumed property acquisition and right of way delays risk, resulting in substantial delays and increased costs. DBFOs are highly complex projects with long-term impacts (Halcrow, 2004). The contract has to be carefully designed, since it has to deal with all the major risks (construction, demand and financing) for a very long period, usually, not inferior to 30 years.

Operation concession

The operating concession model is far simpler than the DBFO. The concessionaire assumes the risk for the operation, and the demand risk can be either assumed by the concessionaire or by the grantor, or even, shared between the two. Since the financing and construction are not included in this scheme, the concessions' period is shorter than the one found in DBFO schemes.

In Stockholm the option was to award 5–10 year contracts for operating its three metro rail lines, the light rail system, the suburban railway service, as well as commuter rail services. In Argentina the urban commuter railroad services, which were previously operated by the state-owned railway company, were divided into seven separate lines and offered as 20-year concessions to the private sector (Rebelo, 2006).

Unlike Buenos Aires, the state of Rio de Janeiro was able to concession its systems without providing operating subsidies. This was a major achievement, since it was a strong political commitment from the local government (Rebelo, 1999). As compared to DBFOs, operating concession partnerships are less complex, since they do not account for construction and financing risks. In pure concession contracts, the concessionaire typically deals only with operations and, in some cases, maintenance. To ensure that services would be provided efficiently, Buenos Aires and Rio de Janeiro both utilized competitive tendering in their award of concessions.

Since the risks assumed by the concessionaire are significantly lower than those in a DBFO scheme, the contract length should be shorter. Nevertheless, the international experience shows that there are shorter contracts (as the Stockholm's contracts) and longer contracts (Buenos Aires and Rio).

Infrastructure maintenance and upgrading concession

Between 2002 and 2003, the London Underground (LU), then responsible for the entire metropolitan system, saw its responsibility over the maintenance and modernization of the London metropolitan's infrastructure be transferred to the private sector, by means of a PPP attributed to two private consortiums, Tube Lines and Metronet. Three contracts were established with a duration of 30 years, subdivided into four periods of 7,5 years each, to facilitate the review of their requirements and costs throughout the entire period of concession. At the end of the 30-year period, the assets would be returned to LU (Grimsey and Lewis, 2004). However, in 2007, Metronet became insolvent and its two contracts were placed in administration, revealing the true cost of Metronet's insolvency. The UK Tax Payers had to pay much of the debt what damaged the argument that the PPP would place the risks associated with running the metropolitan system on the private sector. This could be seen as a form of bailout of the concessionaire, which is not rare in PPPs. Nevertheless, this model highlighted the complexity of developing concessions for complex infrastructure like an underground metro system, particularly, an old one, like the LU.

Build-Operate-Transfer (BOT)

Mumbai and Hyderabad (India) have undertaken Build-Operate-Transfer (BOT) concession agreements, with the state funding about 28% of the project cost in Mumbai and up to 30% of the cost in Hyderabad. With the governments of PRC and India strongly endorsing the PPP procurement route for urban rail, the future of urban rail PPPs in Asia appears secure and promising. Recent international experience has demonstrated that different strategies have been used to involve the private sector in the urban rail transit business.

Some of these models may have variations. In the next section we will present two particular case studies (Light Rail System of Porto and Light Rail System of Tagus South), both projects in Portugal, that will support an afterward discussion on their merits and disadvantages.

In both systems the financing was not included in the PPP. The Light Rail System of Porto is a particular case since the original contract was a BOT scheme for 10 years. After this period, two separate contracts would be award: an operating concession contract for 5 years and a maintenance and upgrading concession contract for 20 years. On the other hand, the Light Rail System of Tagus South is a typical BOT scheme, which faced several difficulties and ended up with significant cost increases for the public burden.

CASE STUDIES

Light Rail System of Oporto

In 1993, the allocation of the light rail system in the Oporto metropolitan area was granted exclusively to Metro do Porto, S.A., for a period of 50 years. Meanwhile, a sub-concession was granted for a short period of time, in December 1994. An international call for tender for a contract to project, construct and operate that system would be awarded to Normetro on

December 1997. However, since the terms grant would be of only 10 years – subsequently extended for one more year, due to changes to the network’s design and to problems pertaining to its implementation and operation –, in October 2008 a new public tender was launched for the sub-concession of the operation and light maintenance. This was granted to the Via Porto consortium, for a period of 5 years. The tender for the phased construction of the new extensions and for general heavy maintenance, foreseen to be conducted in July 2009, and which would accompany the system’s operation, was never launched due to lack of funds, and it is awaiting governmental authorization still (Metro do Porto, 2008).

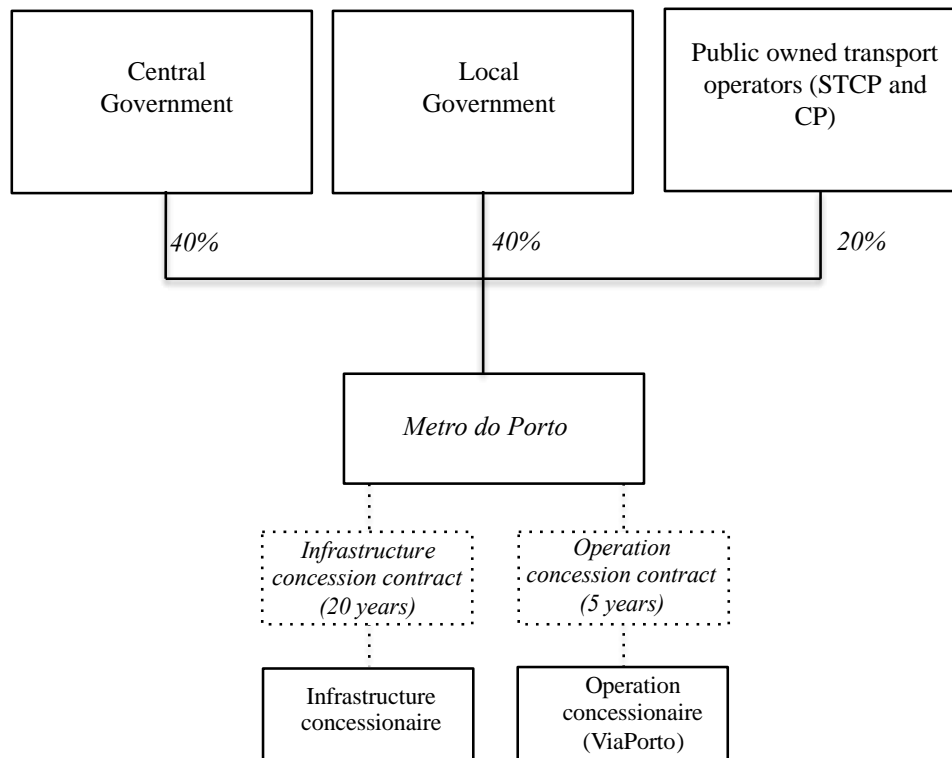


Figure 1: Organizational structure of the light rail system of Porto

Upon contract termination with Normetro, it was possible to modify some conditions related to the initial tender, which would later be signed by Metro do Porto and Via Porto. In addition to the reduction of the contracts basic price, the Grantor also achieved a price 8% lower than that of the previous operator, Transdev (company which took on the network’s operational management on behalf of Normetro), resulting in a contract cheaper than the previous one. However the savings are much higher, since after the first contract, the grantor was able to calculate a more efficient cost per vehicle kilometre, and set a base price (the maximum price for any bid), lower than the previous operating cost.

With this new contract, the Grantor was also able to increase the service quality offered by the sub-concession, as well as attained better conditions in risk-sharing: the majority of operational risk was placed on Via Porto; as for the demand risk, which belonged with the Grantor (compensations to the Concessionaire for the existing offering of seats (vehicles*km), became shared. Moreover, the private partner’s remuneration – up to that point a flat rate, previously established, corresponding to the execution of all necessary works established as subject of the contract – was associated with the performance evaluation of the new sub-concessionaire, Via Porto, which allowed both partners to align their goals: the profit of the private partner and the infrastructure availability on that of the public partner.

Light Rail System of Tagus South (Almada)

The Light Rail System of Tagus South project was always related to a certain political dimension, as it was an emblematic project for the South Bank of Libon, leading to various Governments, regardless of party, committed to bringing this project into reality.

Following a period of obstacles and backtracking, a protocol was signed between the Municipalities and the Government, which promoted an international public tender for the project planning of the construction and operation of the Light Rail System of Tagus South in September 1999. However, only two competitors placed bids, which may be explained by the great dispersion of international groups at the time; the reduced dimension and viability of the project; and by the fact that certain possible competitors felt that Barraqueiro Group, being based on the South Bank, would have an advantage over them from the start.

Following several stages of the tender, the project was awarded to Metro Transportes do Sul (MTS) on March 14th of 2002, with the concession contract being signed on July 30th of the same year, lasting for 30 years. However, the start of that period had to be postponed until December 12th, due to the inclusion of the Environmental Impact Analysis in the negotiation stage.

The concession model approved for this project included, in a single contract, all the foreseen investments, to achieve greater speed and not for any technical and/or financial convenience. The truth is that, by bringing all investments into a single contract the need to have separate tenders for each specialty and for the operation, would have prolonged the project in time, as well as its outset.

This contract represents a model of public procurement financially attractive for the private sector, since its feasibility depends on a guarantee on the State, which has to assume directly most of the projects' investment and financially compensate the Concessionaire in case of traffic deficits. The tariffs in place by the Concessionaire don't support the operational and financial costs of the project, making its economic viability impossible without the States support.

On the other hand, the State defined traffic to be of around 80.000 passengers per day – an amount that was clearly inflated to allow for lower fees and fares and the consequent viability of the concession. The reality was quite different, and real traffic didn't reached half of the forecast.

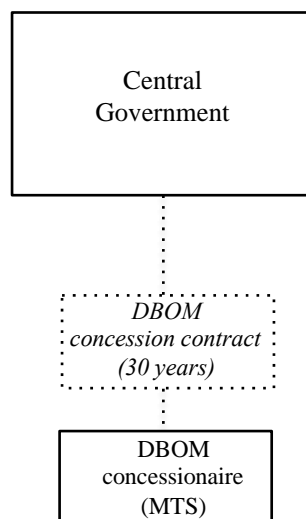


Figure 2: Organizational structure of the light rail system of Porto

The operation of the system, which was expected to start in 2005, only began in 2008, due to the dispute between the Almada Municipality and the State. The Central Government was the grantor but the Almada Municipality had to make available urban space to build the system. The municipality used this leverage to require compensations from the Central Government, namely, the financing of local parking lots. There was a dispute, that resulted in a reimbursement to the Concessionaire around 77,5 million euros (in a 283 million Euro investment).

Regarding risk-sharing in this concession model, the core risk – risk of demand/traffic – is on the grantor side, since that, as mentioned above, during the years that passenger traffic is below the

minimum limit of the reference traffic established, it will have to financially compensate the concessionaire. As such, this contract constitutes an exception, in which the concessionaire is under no traffic risk, which doesn't lead to any incentives to attract passengers.

In 2011 this project had already suffered an increase of around 35,4% from the initially considered public investment. The States expenses, with the 1st stage of the project, were split into: Long Term Infrastructures (283 million Euros, entirely from public funding), Financial Recovery Agreement (77,5million Euros) and compensatory allowance for traffic deficits (27 million Euros).

In order to structure an analysis to both systems, the next section will present a SWOT analysis.

SWOT ANALYSES

Strengths - Light Rail System of Oporto

This system unbundling the infrastructure maintenance and operation, allows to constraint the construction and maintenance risk, and not contaminate the entire project with this risk. Each critical risk (construction & maintenance and operation & demand) are isolated in a specific contract. Besides, it allows getting shorter contracts for the operation, with the advantage of pressuring the incumbent to become more efficient.

Strengths - Light Rail System of Tagus South

This project project, on reasons of regional mobility, concentration of population and aspirations towards the development of clusters in that area, was always greatly supported by municipalities. A single tender allows for greater integration, management and control of the various elements of the project. But essentially, it decreases the transaction costs involved, and may allow for a faster development of the project (which, unfortunately, was not this case).

Weaknesses - Light Rail System of Oporto

The inadequate and ill-productive application of the funds distributed as subsidies, as well as the non-detailed contracting, marked by obligations transparency of the public service and the financing of Metro do Porto on behalf of the State has come to penalize Metro do Porto, dragging it into a situation of growing debt. On the other hand, the lack of guarantee of a financing model based in alternative sources and in percentages that ensured its financial viability and the large bank loans for paying the investments all come together in aggravating its situation of deficits and lack of capital. Nevertheless, this was not created by the type of contract, but by the general governance model of the system.

Weaknesses - Light Rail System of Tagus South

The small scale of the project, its doubtful viability, the dispersion of international groups at the time and the inclusion in a single contract of all specialties, are some of its weak points. The non-separation of the operation of the rail system from its remaining components results in their exposure to demand risk. Regarding to risk sharing, the weak points pertain to the assumption of the demand and financing risks by the grantor. Revenue is based on the traffic bands model, which is not a problem, unless the forecast is unrealistic, which was clearly the case. As for the financing risk, the grantor was entirely responsible.

Opportunities - Light Rail System of Oporto

The unbundling of infrastructure and operation leads to a more attractive contract for the companies, thus increasing the level of competition, which allows for economies of scale, as well as a project marked not only by superior quality but also by greater innovation. The adoption of the negotiation stage in the tender process allows for an increase in the competitive pressure and a better decision regarding the bids. On the other hand, the great increase in demand leads to a

significant reduction of the operational costs. The benefits of the model were seen on the first time the operation contract was put to competition – a new operator had more advantageous proposal than the incumbent.

Opportunities - Light Rail System of Tagus South

The inclusion of all specialties in a single contract allows the private entity to expand its capacity and experience, providing it with tools to reach for additional business opportunities and new markets. The group with the winning bid, being comprised of several companies from different fields of action, has the possibility to attain greater market strength. The granting of the project to MTS, belonging to the Barraqueiro Group – a large operator on the South Bank – allows new synergies between the group's rail and road operations.

Threats - Light Rail System of Oporto

The unilateral changes are costly for the taxpayers, by virtue not only of large financial slippages, but also by the postponement of the availability of the goods and services of the PPP to the population. The budgetary constraints led to the interruption of the tender for General heavy maintenance, which can interfere, on the long run, with the quality of the Oporto metropolitan system.

Threats - Light Rail System of Tagus South

The unilateral changes are, for the same reasons as mentioned above, costly for the taxpayers. The reduced level of competition harms the project both economically and in terms of the proposed solutions. The fact that the projects' development is not solely within the scope of the project manager – the State – led to abuses of dominant position from Almada Municipality (AM), which delayed the entire project and forced the State to pay large compensations to MTS. As for risk sharing, a significant threat for the public partner lies in the overestimation of the demand for rail. The grantor takes over all of the demand and financial risks, becoming dependent of future political decisions. The Concessionaire supports the risk from accessory revenue, which is a non-controllable risk, and for this reason it is dependent on the evolution of the economic-financial environment – which was entirely over-valued by the grantor.

CONCLUSIONS

PPPs can help developing more efficient urban rail systems. Nevertheless, the incomplete nature of the contracts along with the complexity and uncertainty of these projects can raise several problems, as earlier described. The case of the Light Rail System of Tagus South, is a clear example of an inadequate governance model, that resulted in delays and high compensations to the concessionaire. These compensations were even higher due to the problem of optimism bias in the forecasts. Unfortunately, this is a well know problem affecting most transportation and utilities concessions.

All around the world, urban rail systems have been developed using this procurement model, with different contractual structures. Some models pretend to extract the benefits and synergies of an integrated development (Light Rail System of Tagus South), while others adopt a vertical separation in order to develop more specific, tailor made, solutions for each contract (Light Rail System of Oporto).

Acknowledging, that is no such thing as “one size fits all” model, the innovative contract of the Light Rail System of Porto seems to present several advantages. The operating costs decreased considerably, increasing its expenses coverage ratio by 10% (from 59,6% to more than 70%). This was possible due the benefits of competition brought by shorter contracts for operation.

REFERENCES

- Engel, Fischer and Galetovic (2011) *Public-Private Partnerships to Revamp U.S. Infrastructure*. The Hamilton Project, Washington, DC.
- Grimsey, D. and Lewis, M.K. (2004) *Public Private Partnerships: The Worldwide Revolution in Infrastructure Provision and Project Finance*. Edward Elgar, UK.
- Halcrow (2004) *A tale of three cities: urban rail concessions in Bangkok, Kuala Lumpur and Manila*. Report Commissioned for the World Bank East Asia and Pacific Infrastructure Flagship Study, Halcrow Group Limited, London.
- IPPP (2009) *Public-Private Partnerships in E-Government: knowledge map*. The Institute for Public-Private Partnerships.
- Metro do Porto (2008). Report of the second and third stages of the project. Technical report, Porto.
- Phang, S.Y. (2007) Urban rail transit PPPs: Survey and risk assessment of recent strategies. *Transport Policy* 14(3), 214-231.
- Rebelo, J.M. (1999) Reforming the urban transport sector in the Rio de Janeiro Metropolitan region: a case study of concessions. World Bank, Washington, DC.
- Rebelo, J.M. (2006) The Buenos Aires suburban railways and subway concessions: lessons learned. Lyon, France.
- Strukton (2008) The power of PPP in light rail. Strukton Rail
- TfL (2007-2010) London Underground: PPP & Performance Report (2007-2010). Transport for London.
- UNTP (2001) *Light rail for liveable cities*. Union Internationale des Transports Publics.
- World Bank (2010) Light Rail – Light Metro. World Bank, Washington, DC.

THE USE OF PUBLIC-PRIVATE PARTNERSHIP IN INFRASTRUCTURE DEVELOPMENT IN GULF COOPERATION COUNCIL COUNTRIES

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During the past three decades, Gulf Cooperation Council (GCC) countries have witnessed dynamic economic development. One of the most significant trends that have emerged from the GCC project boom during the past decade has been the development of public-private partnerships (PPP), which has resulted in a natural growth in the project finance sector. It has been estimated that more than USD 70 billion worth of infrastructure schemes have been project-financed in the region during the past few years. The drivers behind the current focus across the GCC on the PPP as a viable means of procuring public infrastructure differ from those that are behind the focus of other countries in the Middle East. With these countries being oil-rich states, utilizing private funds or support from international agencies such as the World Bank and International Finance Corporation is not the real motivator for such a trend. The presented research work in this paper aims to review and analyse the use of PPPs in infrastructure development in the GCC countries as well as investigate the possible drivers behind PPPs in that region. The analysis reveals that the PPP is commonly considered to be a better and more effective approach for the development of infrastructure projects in this part of the world. 'Industrial growth', 'efficiency gains' and 'population growth' are the most important drivers behind the PPPs in the GCC region. The study is guided by a comprehensive literature review as well as semi-structured interview sessions with experts and key personnel at companies and organizations from public and private sectors within the GCC region that are involved in the development life-cycle of PPP projects.

Keywords: Public-Private Partnership (PPP), Infrastructure projects, GCC countries.

INTRODUCTION

Public-private partnership (PPP) refers to an arrangement between the public and private sectors in which the private sector provides part of the services or works that fall under the responsibilities of the public sector, with a clear contract on common goals for the delivery of public infrastructure and/or public services (Akintoye et al., 2003, Kelly, 2003, Thia and Ford, 2009). Several types of PPP exist, each of which involves the provision of a public service facility under some combination of the following functions: project initiation and planning, design, financing, construction, ownership, operation, and revenue collection. PPP causes central and local governmental organizations to take on increasingly stronger regulatory roles, focusing their resources on service planning, performance monitoring, and contract implementation instead of on the direct management and delivery of services (Seader, 2004, Ribeiro and Dantas, 2006, Nyarku, 2009, Boussabaine, 1991, AlKass and Harris, 1988, Markab Advisory, 2012, Massoud et al., 2003, World Bank, 2012, UNESCAP, 2011, Yescombe, 2011).

Interestingly, the PPP concept is not a completely new notion in infrastructure development. Indeed, the first PPP in modern history was the concession formed in 1854 to construct and operate the Suez Canal (El-Gohary et al., 2006). PPP projects are now undertaken in many countries and have been used to provide a wide variety of facilities, ranging from bridges, tunnels, and roads to schools and hospitals. Walker and Smith (1995) listed three main benefits of using PPPs in public projects: First, the better mobility that the private sector provides contributes to cost saving, avoidance of bureaucracy, and reduction of administrative burdens. Second, the private sector can provide better service to the public sector, and establishing a strong PPP allows

a balanced risk-return structure to be maintained. Finally, private sector participation can also mitigate the government's financial burden, a significant benefit because the government lacks the ability to raise funds for large-scale infrastructure projects (Walker and Smith, 1995).

The presented work in this paper is part of an on-going research project that aims to review and analyse the use of PPPs in infrastructure development in GCC countries. Three main objectives of this research exist. The first is to review the importance of PPP, its drivers, and the potential future demand in each sector of infrastructure projects. The second is to investigate the possible critical success and failure factors for PPP implementation, and the last objective is to measure the readiness of the GCC region for PPP implementation and to identify the main barriers to that implementation. The study is guided by a comprehensive literature review as well as semi-structured interview sessions with experts and key personnel from public and private sectors within the GCC region that are involved in the development life cycle of PPP projects.

This paper reports on the literature review stage, which focuses on investigating the use of PPP in the infrastructure projects in the GCC countries. Following that, it discusses the results of conducted interview sessions in response to the importance of the PPP and its drivers in the GCC countries. Finally, it ends with a conclusion and a plan for the future work.

THE USE OF PPP IN INFRASTRUCTURE PROJECTS IN THE GCC COUNTRIES

The drivers behind the current focus across the GCC on the PPP as a viable means of procuring public infrastructure differ from those that are behind the focus of other countries in the Middle East. With these countries being oil-rich states, utilizing private funds or support from international agencies such as the World Bank and International Finance Corporation is not the main motivator for such a trend. Indeed, the PPP approach can be considered an attractive transformation mechanism that can facilitate a number of aspects for GCC economics. It can lay the foundation for achieving economic diversification away from its natural resources, develop the private sectors, and inject foreign capital into priority sectors. Moreover, the PPP approach helps GCC governments to avoid some of the consequences of privatization by allowing these governments to maintain ultimate control over the projects. PPPs can also help to enable investment-friendly environments and increase national competition by bringing in top foreign companies with transferable skills and best practices.

Scholars and researchers have been divided in their thoughts regarding the advancement of PPPs in the GCC countries. One faction believes that the GCC and some other Middle East and North African (MENA) countries are considerably more advanced along the PPP experience curve than they would seem to be on the surface. Conversely, other researchers believe that although the GCC governments have recognized the need to encourage private sector participation in the provision of infrastructure, a massive gap remains between rhetoric and results. In this region, where the benefits of PPPs are recognized, most projects are implemented on an unplanned or ad hoc basis (Stark and Qureshi, 2010, Keenan, 2011).

A recent study that KFH Research Ltd, a subsidiary of Kuwait Finance House, conducted, as cited in Markab Advisory (2012), showed that the partnership project contracts between the GCC public and private sectors awarded in the infrastructure sector during the past decade were worth more than USD \$628 billion. Based on the study's report, the indicated acceleration of PPPs is a result of the affluence of infrastructure projects and increased government spending associated with such projects. The GCC has concluded a little more than 100 PPP projects during the past 10 years. Interestingly, the study shows that 50% of those projects were management contracts (Dubai Chronicle, 2011). Moreover, the United Arab Emirates (UAE) and Saudi Arabia were the biggest markets for PPP, mainly in energy and water projects, and to a smaller extent, Kuwait also had a significant market for PPP. The following paragraphs review the PPP projects in different sectors in the near past.

Independent water and power projects (IWPPs)

Rapid population growth and rapid industrialization have been driving the demand for power and water projects in the GCC during the past decade. In fact, the collapse in oil revenues in the 1990s motivated some authorities in the region to explore whether the private sector could get involved and provide power at competitive prices. The answer was extremely positive. Five independent power projects (IPPs) were launched in 2000 in Oman and Abu Dhabi (The Petroleum economist, 2006).

The first independent power project (IPP) was the Al Manah project in Oman (1994), and it is marked as the first infrastructure PPP in the GCC region. This build-own-operate-transfer (BOOT) project involved constructing a 90 MW power station (Ambinder et al., 2001, Keenan, 2011, International Finance Corporation, 2011, Roscoe, 2011). In 1998, Abu Dhabi successfully launched its PPP programme, which became known as the flagship PPP in the GCC region. It was the 710 MW Taweelah A-2 project. The implementation of PPP occurred through the newly created Abu Dhabi Water & Electricity Authority [ADWEA] (Dubai Chronicle, 2011). The process included decreeing new legislation to separate power generation from transmission. Moreover, it included arranging long-term project finance of more than half a billion dollars and applying several lengthy and complex agreements. (Markab Advisory, 2012, Wade et al., 1999, Korn et al., 1999, Ambinder et al., 2001). In 2000, Abu Dhabi broke new horizons for Middle Eastern project finance with the USD 1.4 billion-Taweelah A1 IWPP. The project was on a Build-Own-Operate(BOO) basis and was designed to produce about 25% of Abu Dhabi's power and water needs (Power Technology, 2012). Indeed, since the Abu Dhabi Taweelah A-2 project, other GCC countries have quickly followed suit. Between 2001 and 2004, Saudi Arabia, Qatar, and Bahrain all embarked on the PPP journey (The Petroleum economist, 2006, SNR Denton, 2010). Furthermore, the GCC governments began to extend the PPP model into other infrastructure areas.

Airports

Religious tourism in Saudi Arabia projects have opened the airport markets in the GCC to the PPP concept by adopting the PPP approach in its airport development plans for the Hajj Terminal at King Abdulaziz International Airport in Jeddah and Medina Prince Mohammad Bin Abdulaziz International Airport (International Finance Corporation, 2009, Aéroports De Paris Management, 2010, International Finance Corporation, 2012, Tomlinson, 2009, InfraPPP middle east, 2011). The Saudi Arabia's General Authority of Civil Aviation (GACA) looked for the introduction of private sector financing and technical know-how in order to meet several objectives such as upgrading the Hajj Terminal 's passenger capacity and service quality standards, developing a new terminal infrastructure, and turning the Hajj Terminal into a commercially self-sustaining business independent of financial aids from the government (Aéroports De Paris Management, 2010). The new USD 315 million terminal will meet the level "C" service standard from the International Air Transport Association ("IATA") for peak operations since it has the capacity to process 3,800 arriving passengers and 3,500 departing passengers per hour. (International Finance Corporation, 2009).

The Medinah airport in Saudi Arabia is considered the first airport that GACA has run entirely under a PPP contract as a BOT scheme for 25 years (Fenton, 2011). The new terminal expansion will increase passenger capacity and best practices in energy-efficiency, and environmentally friendly designs will be implemented in the modernized airport. (The Big Project, 2011 , International Finance Corporation, 2012, Tomlinson, 2009). Furthermore, in 2012, Abu Dhabi Airports Company (ADAC) signed a PPP contract to carry out the works on the Midfield Terminal Building [MTB] (Arabian Business, 2012).

Roads and railway networks

About nine major planned railway projects worth USD 112.4 billion exist in the GCC (Manda, 2011). This agrees with the study by research company Business Monitor International (BMI), which indicates that the rail projects in the GCC will require more than 90% of the USD 120

billion investment in the Gulf's infrastructure projects during the next 10 years (Rahman, 2010) in addition to roads and highway projects, which are in the range of USD 18–20 billion (Markab Advisory, 2012).

However, PPP models for this sector are not yet being configured in spite of this considerable development. A main challenge is the demand for risk sharing between the public and private sectors with the fact that the railway projects are difficult to privately finance.

Education

Due to the role of education in national strategies and in improving the economic and social development of nations, the PPP model has already made its way to the GCC areas of the education. Saudi Arabia has established KAUST as a centre of excellence with a donation fund of USD 20 billion. Qatar Foundation's (QF) Education City has attracted international universities such as Carnegie Mellon, Johns Hopkins, etc. (Markab Advisory, 2012). On the other hand, on behalf of the Abu Dhabi Education Council, international companies were managing more than 176 schools as management contracts at the end of 2010 (Abu Dhabi Education Council, 2010). Three major universities have been accomplished in the Abu Dhabi Emirate under the PPP model: the Paris-Sorbonne University, Zayed University and UAE university (Project finance, 2009b, Project finance, 2009a). Indeed, PPPs offer quick-win results for the education sector through the accessibility of resources, international experience, and specialization; however, at the same time, they bring certain risks that need to be effectively managed (Rasul, 2011).

Healthcare

With population growth, increased awareness of healthcare patients, incidence of lifestyle diseases, and new health insurance systems, the GCC's healthcare sector has come under remarkable pressure. Mandatory health insurance is creating opportunities for private sector involvement. The partnerships in this case can take the form of joint ventures or long-term management contracts for existing or new hospitals. An example of this is the involvement of Johns Hopkins and Cleveland Clinic, two of the most renowned hospitals in the world, in managing hospitals in the Abu Dhabi Emirate under long-term management contracts (Markab Advisory, 2012). According to Frost and Sullivan (2012), the GCC's healthcare expenditure is expected to triple by 2018, forecasted to be USD 133.2 billion from present USD46.1 billion. Figure 1 shows the Healthcare Market: percentage of PPP in the GCC in 2010. The study noted that the healthcare PPPs have already proven to save governments as much as 25 % of healthcare costs, and most PPP deals are based on the BOT system (Frost and Sullivan, 2012).

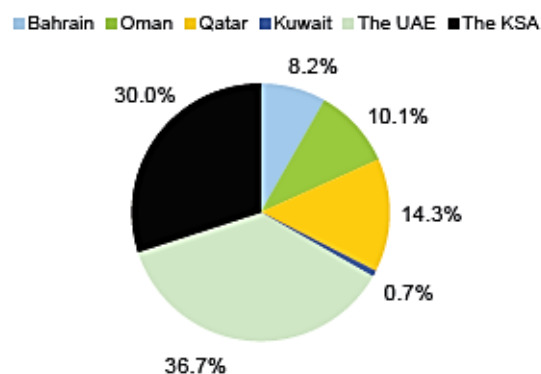


Figure 1: Market share percentage of PPP Healthcare in GCC countries in 2010. Source: Key Hospital Indicators in the GCC (Frost and Sullivan, 2012)

Social housing:

Population growth and age structure are the major factors that determine the rate of household formation, which is considered the main driver behind housing demand in any market (Plumb et al., 2011). In the GCC, the nationals' growth forecast is 2.4% between 2009 and 2013, which is double the world average and young overall age profile. This growth is due to high birth rates and improving life spans due to investment in health care. In general, we can say that the GCC population boom throughout the 2000s was extraordinary by global and historical standards (Hyslop, 2012). All of these factors are driving the increased need for housing cross the region. PPP is considered a new method that is emerging in the affordable housing sector. Bahrain has recently launched a social housing PPP project with a private developer for a total project size of USD 550 million. These projects can serve as PPP templates for other MENA markets as well (Project finance, 2011).

THE IMPORTANCE OF PPP AND ITS DRIVERS IN THE GCC COUNTRIES – SEMI-STRUCTURED INTERVIEWS FINDINGS

Interviews are one of the major qualitative method techniques; they include face-to-face situations for collecting factual information, views, and opinions. According to Naoum (1998), the main advantages of interviews are: knowing the identity of respondents, the interaction between interviewer and respondents, obtaining deep and detailed quality of information, and finally, the high level of interviewer control over the process. Interviews can assume three forms: unstructured, structured, and semi-structured. Semi-structured interviews are the type of interview that uses a combination of open and closed questions with the opportunity for the interviewer to explore particular themes or responses further. It rests between the two extreme types of unstructured and structured interviews. The interviewer has a great deal of freedom to raise more questions or investigate more areas during the course of an interview. The interview also allows both the interviewer and the respondent the flexibility to query details or discuss issues. Dawood (1995) listed two major advantages of the semi-structured interviewing technique. First, it has some of the advantages of reliability, structure, and control associated with the more structured interviews, and secondly, it has some of the scope and flexibility of response obtainable through a less structured interviewing method. For those reasons, the semi-structured interviewing technique is considered to be a good approach for obtaining worthwhile and detailed information for the presented study.

In the context of this study, the semi-structured interviews were conducted to consolidate the different opinions of key personnel at companies and organizations (public and private) within the GCC region and other countries who have experience in the development of PPP projects. A variety of methods were used to conduct the interviews with PPP experts and key personnel. A Web-based questionnaire was developed to consolidate experts' opinions and to provide the basic questions for discussion. Soft copies and hard copies of the questionnaire survey were utilized as the first step of these interviews. Then, face to face interviews, short phone calls, or Skype meetings were conducted to discuss the main topics covered and to document any new issues that might be raised during these discussions.

The development and the structure of the questionnaire survey

The developed semi-structured interview questionnaire was the first step for collecting experts' opinions and their perceptions. The first part of the questionnaire documents the respondent's general information and his/her background. The second part assesses the importance, drivers, demands, and the possible critical success and failure factors of the PPP in the GCC environment, while the third part aims to measure the readiness of the GCC region for PPP implementation.

A combination of closed and opened questions was used. A rating scale was adopted for questions that involved rating issues, and for other questions, some answers were offered. A five-point scale was used for rating issues. The questions were designed in a simple 'tick-it', format and the respondents were offered options for each question to select from as well as adequate spaces for

extra information or comments for each question. This facilitated easy filling and provided a good starting point for discussion.

RESULTS AND ANALYSIS

The questionnaire was sent to experts and key personnel at companies and organizations (public and private) within the GCC and other countries such as the USA, UK, and Turkey, who have experience in the development of PPP projects in this part of the world. Face-to-face interviews, short phone calls, and Skype meetings were conducted to discuss the main topics covered in the responses.

Thirty-three personnel were sampled. In total, 10 responses were received, representing a response rate of approximately 30%. Of the total of 10 respondents, seven respondents were from the GCC, and three were from other countries. These experienced professionals include three in the public sector, four in the private sector, and three from both sectors. Their experiences varied in different areas including project management, academics/research, consultancy, contracting, development, financing, economics and investment, strategic planning, health management, international business development, and political experience. A total of 50% of the respondents had more than 20 years overall experience. Regarding their experience in PPP development, 50% of the respondents had an overall experience in PPP projects of between 5–10 years, 30% had 10–15 years, and 10% had more than 20 years. The respondents had experience in a variety of PPP project types, including roads, railways, ports, airports, water and waste-water treatment, power, health services, educational services, oil and gas, telecommunications, information technology (IT), social housing and landscape, and public parks projects. The following sections discuss the findings of these interviews.

PPP importance and appropriateness

Respondents were asked whether they thought PPP was a better and more effective method for infrastructure procurement in this area of the world. Analysis of the results revealed that 90% of the respondents believed that PPP is a better and much more effective way for infrastructure procurement than the traditional procurement methods. During the interview discussions, several benefits and advantages of the PPP approach that justify the respondents' opinions were identified. The key benefits are listed below:

- PPP facilitates creative and innovative approaches. It encourages the injection of private sector capital, and PPP can remove costly projects from a government's balance sheet. Also, it delivers value for money. Moreover, PPP can reduce the cost of infrastructure projects implementation with more efficient use of resources.
- PPP delivers budgetary certainty and provides better management and allocation of risks.
- The PPP approach provides access to talented and specialized expertise and provides a way to transfer proprietary technology. With PPP, the quality of service has to be maintained for the life of the PPP.
- PPP set-up allows speeding up implementation and construction of the project.

The first three mentioned benefits are generic and support the findings of several research works that identified the benefits and advantages of the PPP approach (World Bank, 2012, European Commission, 2003, Allan, 1999, UNIDO, 1996, Seader, 2004, Li and Akintoye, 2003, Gunnigan, 2007, Bing et al., 2005, Shen et al., 2006, Grimsey and Lewis, 2002, Leiringer, 2006, Efficiency Unit, 2005, Katz, 2006, Cuttaree and Mandri-Perrott, 2011, The Stationery Office, 2000, Kumaraswamy and Zhang, 2001, Singh, 2009). The last benefit is more related to the GCC context, as in this part of the world, a fast-growing infrastructure is present, and the traditional procurement method that governments use cannot achieve such magnitude of expected results in a short period of time.

However, one of the interviewees argued that the PPP approach is not a better and more effective method for infrastructure procurement in this part of the world. He stated that, ‘From evidences and experiences, since the last economic crisis, and in this part of the world, there is less appetite for risks. Governments in this area would only invest in projects that will provide a safe return’. It is the authors’ opinion that PPPs can offer a viable alternative to traditional procurement methods; however, a number of conditions must be met to create a successful PPP. These include environmental and project-related critical success factors such as availability and effectiveness of proper and regulatory framework for PPP; availability of financial market (local and international); political support and stability; proper risk allocation and sharing among project stakeholders; and finally, clear project brief and client outcomes.

Drivers for adopting PPP

Respondents were asked to rate the drivers for adopting PPP in the GCC’s infrastructure projects. They also were invited to add new drivers if any, but no additional drivers were suggested. The rating average reveals that each of the six variables has its respective importance. See Table 1 for more information.

Regarding the efficiency gains, one of the interviewees stated that, ‘Under the PPP approach, there is high potential for efficiency gains in all phases of project development and implementation. In addition, access to advance technological and innovation is high’. Indeed, the GCC countries do not face financial problems at present; nevertheless, the most important post-crisis message is the more efficient use of fiscal resources. Thus, the current focus across the region on the PPP approach is a result of using the scheme as an efficiency gain tool, where PPP is used to attract the technical knowledge, private sector skills, and the expertise that do not exist in the public sector. Usually the involvement of the private sector increases the probability that the infrastructure projects will be accomplished on time and within budget; additionally, it introduces efficiencies and innovations.

Table 1: Mean rating of drivers for adopting PPP in GCC’s infrastructure projects

Drivers for adopting PPP	Mean Rate
Industrial growth (such as power, infrastructure, and fixed investments projects)	3.70
Efficiency gains (PPP is considered an efficiency gain tool used to attract the technical knowledge and private sector skills and expertise that do not exist in the public sector)	3.70
Population growth (such as housing, water sanitation, and transportation projects)	3.50
Secure funding (closing the funding gap in the GCC infrastructure finance market)	3.00
Environmental concerns (such as waste incineration and pollution control projects)	2.80
Tourism and recreation (such as airports, hotels, and resort projects)	2.70

Another highly scored driver in both places was ‘population growth’, with an average of 3.5 out of five, which is a driver, related to the housing, water sanitation, and transportation projects. Most of the interviewees agreed that under the mounting population pressures challenging the GCC, PPPs can play an important role in meeting long term public infrastructure needs; they added that in some GCC economies, while natural resource wealth will secure the short-term need for such infrastructure capital, the GCC's long-term infrastructure needs will require increased utilisation of PPPs. Indeed, rapid population growth rate in the GCC will have a decisive impact and pressure on public services and basic infrastructures, which have not been developed to cope with the current and forecasted population growth. These findings support and follow what has been noted in the study report from the Economist Intelligence Unit (EIU) titled ‘The GCC in 2020: The Gulf and its people’ in 2009, which states, ‘There are also questions about the ability of the GCC countries to cope with such a high rate of population growth for an extended period. Investment in power and water, housing, transport, health, and education would have to rise

sharply'. The report tackles the population growth in the GCC region and ends with the conclusion that the GCC has one of the fastest-growing populations in the world, and by 2020, it is forecasted to increase by one-third, to 53 million people (Singh, 2009).

Conflicting attitudes regarding 'secure funding' were noted. A group of interviewees believe that this is an important driver. During interviewing, a famous PPP company president noted that, 'Funding is a big issue even in oil-rich countries, since funding is: how the money should be best used. It is about return on investment, and governments are existing to make decisions about all kinds of returns, i.e. social returns, not only economical returns'. However, other interviewees believed that, as oil-rich states, utilising private funds or the support from international agencies is not a real motivator for PPP's trend in the region.

The authors believe that paying for everything without private-sector assistance is not practical or sustainable. Indeed, it would seem that the PPPs' trend in the region is somewhat a function of offering financial incentives for the region's state in spite of its wealth. This view was emphasised by others such as Shah (2010), he opined that despite their significant natural resources and high GDP, GCC governments should find alternative funding sources for their infrastructure projects to ensure the sustainability of the development in their nations. This situation was clear in 2009, when the total gross domestic product (GDP) in GCC countries reached USD 850 billion; however, a real challenge still existed in response to the infrastructure needs since USD 723 billion was required within the next five years.

The calculated average ratings show that little support was given to the drivers of 'tourism and recreation' and 'environmental concerns'. This can be understood, as the former driver can be considered influential in some cases in GCC countries, examples of this include: Dubai in the UAE and Qatar, creating and enabling an environment for development in tourism and logistics. Qatar is investing in tourism built around sporting events, while Dubai has completed the world's largest airport with the capacity to handle 120 million passengers per year (Markab Advisory, 2012). Furthermore, religious tourism in Saudi Arabia projects has opened the airport markets in the GCC to the PPP concept as explained earlier.

Regarding the 'environmental concerns' driver, many GCC countries undertook projects such as: waste treatment as well as wastewater and waste management programs on a PPP basis. One example was Asghal, the public works company of the Government of Qatar, which has awarded a USD 1.2 billion design-build-operate (DBO) project for the new Doha solid waste management facility. Also, the National Water Company (NWC) in Saudi Arabia, established through a Royal Decree in 2008, has begun to undertake PPP projects on an operate and maintenance (O&M) joint venture basis. NWC has undertaken or planned a water and waste management program for 16 major cities in the Kingdom (Markab Advisory, 2012).

CONCLUSIONS AND FUTURE WORK

PPP projects are currently undertaken in GCC countries and have been used to provide a wide variety of infrastructure developments. More than 100 projects have been completed on a PPP basis during the past ten years in this region in different infrastructure sectors including: independent water and power projects (IWPPs), airports, education, and healthcare. Social housing is a newly emerging sector in PPP, so GCC governments have been paying remarkable attention to this sector recently.

The analysis of the semi-structured interviews reveals the common belief that the PPP is considered a better and more effective approach for the development of infrastructure projects in this part of the world. A majority of the benefits behind this belief are generic and similar to those that people in other parts of the world experience. Nevertheless, what is special about GCC countries is that the PPP can be utilized as a helpful tool for speeding up the implementation and construction of fast-growing GCC's infrastructure, where the governments are adopting promising huge plans for rapid infrastructure development.

The global interest over PPP shows that it has its own attractiveness. The findings presented in this paper examine drivers that motivate the embracing of PPP approach in GCC countries. While 'secure funding' has been recognized as one of the key initial drivers for adopting PPP schemes across the world, in GCC countries, the situation differs. The findings of interviews reveal that in such oil-rich countries, PPP brings many other attractions besides financing. Respondents rated 'industrial growth' and 'efficiency gains' as the highest drivers. Respondents believe that the 'industrial growth' is the driver that can create competitiveness and investment attractiveness in the country. 'Efficiency gains' is undoubtedly very attractive for governments across the GCC, especially when PPP is utilized to attract the technical knowledge, skills, and the expertise which do not exist in the public sector. Likewise, 'population growth' was the third driver rated by the respondents, which can be understood in the sense that GCC's long-term infrastructure development plans need to cope with the forecasted high rate of population growth, which require more infrastructure developments and services. In contrast, interviewees gave low rates to 'tourism and recreation' and 'environmental concerns' for GCC countries. However, both drivers can be considered as important only when the country intends to create and enable an environment that focus more on tourism and environment concerns, which has become more clear recently in the case of the UAE.

In the future, semi-structured interview sessions will be continued with several key PPP experts from both public and private sectors. The future publications will report on the potential future demand in each sector of infrastructure projects as well as the critical success and failure factors for PPP for GCC countries in general and in the UAE, in particular. These publications will also identify the key areas that measure an environment's readiness for PPP implementation in the GCC countries and in the UAE. Furthermore, they will identify what governments may need to address in order to improve the overall environment and positively integrate the PPP approach in the development process of infrastructure projects.

REFERENCES

- Abu Dhabi Education Council (2010) Education Statistics First- 2010 Statistical Factbook
Emirate of Abu Dhabi-Primary and Secondary Education. Abu Dhabi, Abu Dhabi
Education Council (ADEC).
- Aéroports De Paris Management (2010) PPP in Airport Infrastructure Business: Aéroports de
Paris Experience. *Public-Private Partnerships In The Middle East*. Dead Sea, Jordan.
- Akintoye, A., Beck, M. and Hardcastle, C. (2003) Introduction: public-private partnerships in
infrastructure development. In Akintoye, A., Beck, M. and Hardcastle, C., (Eds.), *Public-
Private Partnerships: Managing Risks and Opportunities*. John Wiley & Sons.
- Alkass, S. and Harris, F. (1988) Expert system for earthmoving equipment selection in road
construction. *Construction Engineering and Management*, 114(3), 425-40.
- Allan, J. R. (1999) Public –Private Partnerships: A Review of Literature and Practice. Retrieved
30 April, 2012, from <http://www.uregina.ca/sipp/documents/pdf/cicreport.pdf>
- Ambinder, L. P., Silva, N. D. and Dewar, J. (2001) The Mirage Becomes Reality: Privatization
And Project Finance Developments In The Middle East Power Market. *Fordham
international law journal*, 24, 1029-655.
- Arabian Business (2012) Arabtec-TAV group wins US\$2.9bn Abu Dhabi airport deal. [Electronic
Version]. *Arabianbusiness.com*. Retrieved December 12, 2012 from
[http://www.arabianbusiness.com/arabtec-tav-group-wins-us-2-9bn-abu-dhabi-airport-
deal-463637.html](http://www.arabianbusiness.com/arabtec-tav-group-wins-us-2-9bn-abu-dhabi-airport-deal-463637.html).
- Bing, L., Akintoye, A., Edwards, P. J. and Hardcastle, C. (2005) The allocation of risk in PPP/PFI
construction projects in the UK. *International Journal of Project Management*, 23(1), 25-
35.

- Boussabaine, A. H. (1991) An expert system prototype for construction planning and productivity analysis. *Department of Building Engineering*. Manchester, UK, University of Manchester, Institute of Science and Technology.
- Manda, S. (2011) Frost & Sullivan Strategic Insight on the GCC Rail Sector. [Electronic Version]. Retrieved January 23, 2013 from <http://www.frost.com/srch/catalog-search.do?queryText=strategic+insight+on+the+gcc+rail+sector&x=40&y=9&pageSize=12>.
- Cuttaree, V. and Mandri-Perrott, C. (2011) Public-Private Partnerships in Europe and Central Asia: Designing Crisis-Resilient Strategies and Bankable Projects. *World Bank e-Library*. World Bank.
- Dawood, N. N. (1995) An integrated bidding management expert system for the make-to-order precast industry. *Construction Management & Economics*, 13(2), 115-25.
- Dubai Chronicle (2011) GCC partnership contracts worth USD 628 bln during the last decade. Retrieved 29 March, 2012, from <http://www.dubaichronicle.com/2011/07/10/gcc-partnership-contracts-worth-usd-628-bln-during-the-last-decade/>
- Efficiency Unit (2005) Private Sector Involvement-Overview. Retrieved 23 March, 2012, from http://www.eu.gov.hk/english/psi/psi_psi/psi_psi_over/psi_psi_over.html
- El-Gohary, N. M., Osman, H. and El-Diraby, T. E. (2006) Stakeholder management for public private partnerships. *International Journal of Project Management*, 24(7), 595-604.
- European Commission (2003) Guidelines for Successful Public – Private Partnerships. Brussels, Belgium.
- Fenton, S. (2011) Turkish-Led Team Wins Medina PPP. [Electronic Version]. *MEED Middle East Economic Digest*, 55, 11-11. Retrieved March 28, 2012 from <http://web.ebscohost.com.ezproxy.uaeu.ac.ae/ehost/detail?sid=83ce1e86-5957-4a3e-b4f8-d0e091106e1c%40sessionmgr11&vid=1&hid=8&bdata=JnNpdGU9ZWwhvc3QtbGl2ZQ%3d%3d#db=bth&AN=65157183>.
- Frost and Sullivan (2012) Key Hospital Indicators in the GCC: Changing Paradigms of Healthcare Delivery System in the GCC Countries. Frost & Sullivan
- Grimsey, D. and Lewis, M. K. (2002) Evaluating the risks of public private partnerships for infrastructure projects. *International Journal of Project Management*, 20(2), 107-18.
- Gunnigan, L. (2007) Increasing effectiveness of public private partnerships in the Irish construction industry. England, University of Salford (United Kingdom).
- Hyslop, L. (2012) GCC population to reach nearly 50 million in 2013. *The Telegraph*. Telegraph Media Group Limited
- Infrapp Middle East (2011) TAV Airports wins tender for Medinah Prince Mohammad Bin Abdulaziz PPP Airport. Retrieved 04 April, 2012
- International Finance Corporation (2009) Saudi Arabia:Hajj Airport Terminal.
- International Finance Corporation (2011) Improving the Financial Attractiveness for PPPs. *Public-Private Partnership: Prospects in the Mediterranean Region*. Paris
- International Finance Corporation (2012) Saudi Arabia: Madinah Airport.
- Katz, D. (2006) Financing Infrastructure Projects: Public Private Partnerships (PPPs) The New Zealand Treasury.
- Keenan, R. (2011) PPPs in the Middle East. Retrieved 23 January, 2012, from <http://www.chadbourne.com/publications/>
- Kelly, J. (2003) Value management in public-private partnerships procurement. In Kelly, J., (Ed.), *Public-private partnerships managing risks & opportunities*. Blackwell Science.

- Korn, A., Bisanz, M. and Ludwig, H. (1999) Privatization of Dual-Purpose Seawater Desalination and Power Plants — Structures, Procedures and Prospects for the Future. *Desalination*, 125(1–3), 209-12.
- Kumaraswamy, M. M. and Zhang, X. Q. (2001) Governmental role in BOT-led infrastructure development. *International Journal of Project Management*, 19(4), 195-205.
- Leiringer, R. (2006) Technological innovation in PPPs: incentives, opportunities and actions. *Construction Management & Economics*, 24(3), 301-08.
- Li, B. and Akintoye, A. (2003) An overview of public–private partnership. In Li, B. and Akintoye, A., (Eds.), *Public-private partnerships managing risks and opportunities*. Blackwell Science.
- Markab Advisory (2012) Public Private Partnerships: A Vehicle of Excellence for the Next Wave of Infrastructure Development in the GCC. Qatar Financial Centre Authority (“QFCA”) and Ministry of Business and Trade (“MoBT”), State of Qatar.
- Massoud, M. A., El-Fadel, M. and Abdel Malak, A. (2003) Assessment of public vs private MSW management: A case study. *Journal of environmental management*, 69(1), 15.
- Naoum, S. G. (1998) *Dissertation Research and Writing for Construction Students*, Boston, USA: Butterworth-Heinemann, Elsevier Science.
- Nyarku, M. (2009) Vectors Towards a Better Understanding of P3s. University of Manitoba/University of Winnipeg. .
- Plumb, C., Hassouni, H. and Sahyoun, S. (2011) Why Affordable Housing Matters? *Affordable Housing in MENA*. Jones Lang Lasalle.
- Power Technology (2012) Taweelah A1 Power and Desalination Plant, United Arab Emirates. Retrieved 04 March, 2012, from <http://www.power-technology.com/>
- Project Finance (2009a) Is There More to PPP in the Gulf than Just Mubadala? *Project finance*. Euromoney Institutional Investor PLC.
- Project Finance (2009b) Zayed University: A study in PPP. *Project finance*. Euromoney Institutional Investor PLC.
- Project Finance (2011) Naseej signs on Bahrain social housing PPP. *Project finance*. Euromoney Institutional Investor PLC.
- Rahman, S. (2010) Partnerships to Drive Projects. [Electronic Version]. *Gulf News*. Retrieved June 30, 2010 from <http://gulfnews.com/business/investment/partnerships-to-drive-projects-1.648158>.
- Rasul, M. D. (2011) Mind the gap: A perspective on increasing risk exposure across the education sector in the GCC. *A Middle East Point of View* Deloitte in the Middle East.
- Ribeiro, K. and Dantas, A. (2006) Private-public partnership initiatives around the world: Learning from the experience. *IPENZ Transportation Conference*. Queenstown, New Zealand.
- Roscoe, A. (2011) Harnessing Private Expertise. [Electronic Version]. *MEED Middle East Economic Digest*, 55, 28-30. Retrieved March 28, 2012 from <http://web.ebscohost.com.ezproxy.uaeu.ac.ae/ehost/detail?sid=08bf5a9b-cca5-4e4d-9de5-48f1c1ca3353%40sessionmgr4&vid=1&hid=8&bdata=JnNpdGU9ZW9ZWhvc3QtG1ZlZQ%3d%3d#db=bth&AN=58795796>.
- Seader, D. L. (2004) The United States Experience with Outsourcing, Privatisation and Public-Private Partnerships. [Electronic Version]. Retrieved 01 April 2012 from <http://www.ncppp.org>.
- Shah, R. (2010) It takes two: PPP in infrastructure in the Middle East. *A Middle East Point of View* Deloitte Corporate Finance Limited.

- Shen, L.-Y., Platten, A. and Deng, X. P. (2006) Role of public private partnerships to manage risks in public sector projects in Hong Kong. *International Journal of Project Management*, 24(7), 587-94.
- Singh, S. K. (2009) High population growth in GCC crucial for global economy. *Emirates Business* 24/7 Dubai Media Incorporated.
- Snr Denton (2010) Financing power and water projects in Bahrain. Retrieved 04 April, 2012, from http://www.snrrenton.com/news__insights/publications/middle_east_legal_update/melu_-_december_2010.aspx
- Stark, R. D. and Qureshi, M. A. (2010) Enhancing Public Private Partnerships in GCC. [Electronic Version]. *Infrastructure Journal*. Retrieved December 12, 2011 from <http://www.curtis.com/sitefiles/publications/92498d6129872945e724be6d26def0b7.pdf>.
- The Big Project (2011) PPP take off. Retrieved 01 April, 2012, from <http://www.thebigprojectme.com/2011/08/10/ppp-take-off/>
- The Petroleum Economist (2006) Middle East powers up. *The Petroleum economist (English edition)*.
- The Stationery Office (2000) Public Private Partnerships: The Government's Approach. London, Stationery Office.
- Thia, H. and Ford, G. (2009) Delivery of Economic Benefits using Public Private Partnerships in the Development of Infrastructure Projects. *International Review of Business Research Papers*, 5(3), 214-26.
- Tomlinson, H. (2009) Private Sector to Expand and Operate Medina International: Airport First in Kingdom to be Developed Under Public-Private Partnership Deal. [Electronic Version]. *MEED Middle East Economic Digest*, 53, 10. Retrieved March 14, 2012 from <http://web.ebscohost.com.ezproxy.uaeu.ac.ae/ehost/detail?sid=ac9d1cbd-7691-4ff6-bcbb-e3f30dbc8a7b%40sessionmgr12&vid=1&hid=8&bdata=JnNpdGU9ZWWhvc3QtbGl2ZZQ%3d%3d#db=bth&AN=40507533>.
- Unescap (2011) A Guidebook on Public-Private Partnership in Infrastructure. Bangkok, United Nations.
- Unido (1996) Guidelines for infrastructure development through Build-Operate-Transfer (BOT) projects Vienna: United Nations Industrial Development Organization.
- Wade, N., Willis, J. and Mcsorley, J. (1999) The Taweelah A2 independent water and power project. *Desalination*, 125(1-3), 191-202.
- Walker, C. T. and Smith, A. J. (1995) Privatized Infrastructure: The Build Operate Transfer Approach: Thomas Telford.
- World Bank (2012) Public-Private Partnerships Reference Guide, Version 1.0. Washington, DC, World Bank
- Yescombe, E. R. (2011) Public-Private Partnerships: Principles of Policy and Finance: Elsevier Science

PPP INFRASTRUCTURE DEVELOPMENT IN CHINA - CHALLENGES AND FUTURE TRENDS

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China is one of the fastest growing economies, which demonstrates a strong investment-led growth model to the world. Chinese central government has a strategic infrastructure plan to support its national economic growth and rapid urbanisation. They give high priorities and also provide huge amount of investments directly to build the infrastructure framework, such as national road network and the high speed train system. The massive development of physical infrastructure has resulted in sustained economic growth and increased international competitiveness. Similarly to the other countries, China has adopted PPP as an alternative public procurement tool to assist the infrastructure development effort. PPP delivers social and economic benefits that are crucial to future development. However, its size of output value is trivial if compared to total amount of public investment. The PPP system in China is still immature and the existing financial and institutional systems limit the PPP expansion. China is now in the transitional stage which aims to accelerate the private investment to the infrastructure development and it has been identified that PPP has a large potential to win the market. This paper reviews the development of PPP in China over last two decades, discusses the current challenges and its future prospects and concludes that the third wave of PPP development is coming.

Key words: China, Investment-led Growth, Infrastructure Development, PPP, Project Financing.

INTRODUCTION

China has moved from a centrally planned system to a more market-oriented system since the 'open door' economic reform started in 1978. In the last three decades, China has become one of the world's fastest growing economies (Demurger, 2001, Sahoo, *et al*, 2012). Gross domestic product (GDP) in China has increased from 7.5% between 1970 and 1999 to a double digit between 1999 and 2007 (Sahoo, *et al*, 2012). In the last three years, the GDP has maintained at around 8% (Sahoo, *et al*, 2012, NBSC, 2012).

The dominant economic growth model in China is investment-led model, while China is always keeping high proportion of urban fixed-asset investments such as infrastructure and real estate, which contributed around half GDP growth in 2000s (Ahuja and Nabar, 2012). The public infrastructure development is the main engine of China's investment-led growth. Literature stated that positive impacts of infrastructure development improve productivity, provide better investment conditions, reduce the unemployment rate and also help China avoid the global financial crisis between 2007 and 2009 (Wang, 2010, World Economic Forum, 2010, Sahoo, *et al*, 2012).

As an alternative procurement tool for the public infrastructure provision, Public Private Partnerships (PPPs) bring more private finance into public sectors as early as 1980s in China. China has developed a dynamic PPP market, where private sectors not just harvest gain massive benefits but some suffers pains as well (World Economic Forum, 2010). However, there is a significant lack of knowledge about a whole picture of the huge emerging market. The aim of this paper is to explore the development of PPP in China and analyse its unique characteristics and challenges facing. This paper will initially discuss the importance of infrastructure development for a rapid economic growth. It will also explore the different types of financial systems for

infrastructure development in China. The following section assesses how PPP acted as an alternative procurement tool to support physical and social infrastructure development in China and its different development stages over past twenty years. It finally discusses the facing challenges and future prospects.

INFRASTRUCTURE PROVISION IN CHINA

The role of infrastructure, especially urban infrastructure, in enhancing economic development has been well documented both in the academic literature and in the policy debate (Aschauer, 1989; World Bank, 1994; World Economic Forum, 2010, and Ahuja and Nabar, 2012). Infrastructure development is the foundation of a modern society and plays a crucial role in determining the quality of life of individuals (World Economic Forum, 2010). There are varieties of infrastructure projects including urban public utilities (water supply and drainage, residential gas and heating supply, and public transportation), municipal works (roads, bridges, tunnels, and sewerage), parks, sanitation, waste management, and flood control, etc. Globally, it is estimated that there is a need of infrastructure investment of over US\$ 2 trillion each year over the next 20 years in the global market (World Economic Forum, 2010).

Over the past three decades, China's sustained high economic growth and increased competitiveness has been underpinned by a massive development of infrastructure (Chatterjee, 2005; Stephane, *et al*, 2007; Wu, 2010, and Sahoo, *et al*, 2012). Sahoo *et al* (2012) investigates the role of infrastructure in promoting economic growth in China and identifies that infrastructure development in China has positive contributions to the growth. The growing demand of infrastructure development is driven by pressures such as the country's massive urbanization, industrialization and privatisation programmes (World Economic Forum, 2010). The total amount of investment in urban infrastructure is around 14% of GDP. During 2006 and 2010 under China's 11th five-year plan, 1,250 billion Yuan (about US\$ 155 billion) were spent to develop a comprehensive railway and rapid transit system network by stretching 17,000 kilometres. The construction of road networks increased the total mileage by 0.4 million kilometres, including 24,000 kilometres of highway (World Economic Forum, 2010). During the recent global financial crisis, China has launched a large economic stimulus package of 4 trillion Yuan (about US\$586bn), the equivalent of about 7 per cent of the Chinese GDP focusing on infrastructure development (NDRC, 2009). More recently, China has started to accelerate construction of urban public facilities by investing seven trillion Yuan (\$1.03 trillion) during its 12th Five-Year Plan from 2011 to 2015 (Roach, 2011).

Finance matters in the provision of urban infrastructure. Wu (2010) stated that infrastructure financing in urban China is fundamentally different from that of most other countries. In developed countries, borrowing is the main method to invest urban infrastructure (Chan, 1998). As a developing country, Chinese infrastructure investment was purely financed through the central government's plan committee during the pre-reform period. After the economic reform, innovative financing methods were introduced in addition to traditional fiscal allocation, such as bank borrowing, foreign direct investments and loans; grants or concessional loans from multilateral and bilateral agencies; holding funds in trust; bonds issued by central and local governments; and domestic and foreign capital markets (Wu, 2010). Funding from the government still dominates investment in infrastructure, but its stake has been declining in recent years. It is estimated that 80% from the government and the remaining 20% from the private sector (Ho, 2006). The extent of foreign direct investment (FDI) in infrastructure development has been very little, which accounts for less than 2% of the capital funds invested in infrastructure in 2006 (Sahoo, *et al*, 2012).

Although China generates massive investment in urban infrastructure development, however, because of rapid urbanisation, there is still an increasing gap between the potential demand and the available supply of infrastructure, the central government is under high pressure in direct budgetary spending, which must be filled by borrowing and market based financing.

PPP DEVELOPMENT IN CHINA

PPP has been seen as an effective solution to attract greater private sectors' participation in the development of urban development projects. PPP has been widely adopted by many countries because of its attractive characteristics to transfer risks to the private sectors, reduce public sectors administration cost, solve the problem of public sector budget restraint, provide higher quality public products and services, and save time in delivering the project (Li, *et al*, 2005).

The concept of PPP is not new in China. The private sector entered the traditionally government-controlled infrastructure sector in late 1980s. The first PPP (BOT) project is Shajiao B power plant in Shenzhen, which come to operation in 1998 (Ke, *et al*, 2009). It is now more than twenty years, PPP infrastructure projects has contributed to the national and local infrastructure development by providing investments, advanced technology, and management skills (Adams, 2006, Ho, 2006, Ke, *et al*, 2009, Yuan, *et al*, 2010, and Wang, *et al*, 2012).

Figure 1 illustrates the development of PPP projects from 1990 to 2011, where y axis is project number and x axis is the year. It clearly shows that the development of PPP can be divided into two stages (Wang, *et al*, 2012). The first stage is in 1990s, while Chinese PPP project is mainly financed and supported by Foreign Investors. At that stage, most PPP projects used the BOT model and projects are mainly in Power, Water and Transport sectors. The '1997 Asian financial crisis' had severe negative repercussions on foreign direct investment (FDI) in infrastructure development in China. One of three BOT pilot projects, the Changsha Power Plant, failed to reach financial close because of the falling financing markets (World Economic Forum, 2010). As an effective countermeasure, the Chinese government increased public investment in infrastructure in early 2000s and provide some initial guidance for some PPP projects (Wang, *et al*, 2010). The second stage started in 2000s, market mechanisms have become mature. PPPs become one of the government's strategies for the provision of public facilities and services (Ho, 2006, Wang, *et al* 2012). In this stage, the most successful story is BOT toll road projects where the governments used PPP to pay off the initial cost and in return for a concession to toll the highway.

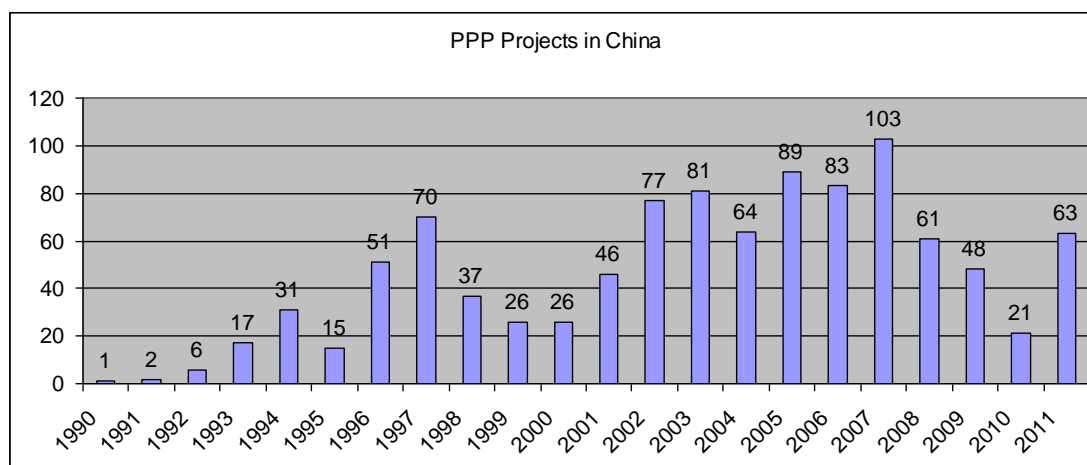


Figure 1: PPP projects in China year 1990 – 2011

Up to 2011, there are total 1018 PPP projects in China and the total capital value is US\$ 116.399 billion. Table 1 shows that PPPs could be mainly divided into 4 sectors: Energy, Telecommunication, Transport and Water. Transportation is the most popular sector for PPP implementation in both project number and total projects' capital value. Wang (2004) has classified Chinese PPPs into three distinct types – outsourcing, concession and divestiture and summarised 14 different modes of PPP in China. The most popular model is BOT, where the private sectors could directly collect the tariff from end users (Wang, 2004, Ho, 2006, Ke, *et al*, 2009, and Wang, *et al*, 2012). Recent years, the central government attempts to remove

constraints to private-sector investment and promotes the development of public-private partnerships (PPPs) in other sectors such as social housing and sport stadium.

There are three key drivers for Chinese public sectors to adopt PPPs. The first driver is due to high rate of urbanisation which causes the high demand for basic public infrastructure and services. Rapid urbanization during China's reform period has resulted in a very high demand for basic urban infrastructure and the need for sustained mechanisms of financing (Chen and Doloi, 2008). The second driver is to relief government's fiscal pressure for infrastructure development (Ho, 2006, and Wang, *et al*, 2012). The third driver is the high saving rate of households and private finance. Chinese households have very high saving rate. The nation saves half of its GDP and its marginal propensity to save approached 60% during the 2000s (Ma and Wang, 2010). Private capital in China is totally 60 trillion Yuan (US\$9.49 trillion), including 35.2 trillion Yuan (\$5.57 trillion) of individual savings deposit and 25 trillion Yuan (\$3.96 trillion) of capital from private enterprises and other sources are ready for infrastructure investment (Lan, 2012). The Government must guide the private capital investment and build a sound and fair financing platform to improve the investment regulations in the infrastructure development.

Table 1: PPP Projects in China

Sector	Project Type	Project No.	Capital Value (US\$ million)
Energy	Electricity	215	38,210
	Gas	194	4,480
Telecommunication	Telecom	4	14,518
Transport	Airport	17	2,555
	Metro	10	7,279
	Highway	138	26,221
	Port	65	13,400
Water	Water	36	3,922
	Sewage Treatment	339	5,813
	Total	1,018	116,399

PPPs have been implemented in the Chinese infrastructure market for many years; however, the impacts of PPPs are very limited in terms of project size, types and geographic locations. Most PPP projects are in developed areas in large cities such as Beijing, Shanghai, Guangzhou and east coast China; the western China's infrastructure heavily relies on solely financed by traditional fiscal allocation. Moreover, the projects are mainly physical infrastructure rather than social infrastructure such as hospital, schools, social housing or community centre, etc. The total output of PPPs is little comparing to total government spending. In 2011, the total public expenditure is 10,893bn Yuan, the total capital value of PPP projects is 2.3044bn, which is only 0.02% of the total public expenditure, but in the mature market e.g. UK, the PFI spending is around 10% of total expenditure, which shows that there is a large space for the PPP development in China.

CURRENT CHALLENGES AND FUTURE TRENDS

There are many risks and barriers to promote PPP in China, but there are four key challenges as described below:

- **Inadequate legal system:** in China, PPP implementation is lack of clear regulatory definitions and value-for-money (VFM) evaluation systems (Ho, 2006, Wang, *et al*, 2012). There is lack of a legislative framework to promote the PPPs in wider public sectors.

- **Lack of a support system:** most PPP projects in China are managed at provincial or municipal government by following sector's departmental guide. However, Wang, *et al*, (2010) argued that there is no organisation at national level in China specifically responsible for PPP projects, such as Partnerships UK or the National Council for Public Private Partnerships in the US. The establishment of the specialised agencies for PPPs is urgently needed to prepare the national PPP Guide and assist the PPP procurement process
- **Unbalanced partnership:** PPPs have been seen as a 'quick fixed' tool to reduce the government fiscal pressure, rather than consider it as an effective tool to improve the productivity. Nearly 30 years practice, the government has not fully recognised the private capital efficiency and better management skills in infrastructure development, and does not believe that private enterprise will shake the dominant position of the centrally planned economy in the supply of public goods. On the other side, private sectors are more focusing on short-term return without a spirit of long-term partnership (Ho, 2006). These factors cause inadequate risk allocation and transfer and do not help build a robust long-term partnership.
- **Lack of experience:** evidence found that the private sectors in China lack experience on the commercial, technical, legal and political aspects of PPPs (Ho, 2006, Wang, *et al*, 2012).

Although PPPs development in China is facing lots of challenges, but the demand and supply of PPP are relatively high. As the aforesaid three main drivers is increasing strong in China, the private sectors has over 60 trillion Yuan are waiting to invest. The urbanisation requests high demand of urban infrastructure and utilities. The government will evolve a deep financial reform to release more private capital entering the emerging PPP market.

CONCLUSION

China is the fastest growing country in the world for last three decades and accounts for nearly one fifth of the world population. The investment-led growth model in China relies on sustain infrastructure investment and development. However, the conventional budgetary allocation from central or local government is unsustainable and facing fiscal decentralisation. Public Private Partnership has become one of the important investment alternative tools to finance and deliver public infrastructures. While PPPs are not new in China, there is still a great potential for their application due to large amount of private capital, the high demand of urbanisation and in-depth fiscal system reform. PPPs in China are facing a series of challenges including inadequate legal system, lack of an agent support system, unbalanced partnership and lack of experience and knowledge. But evidences show that the third wave of PPP has started to take place, which will encourage the private sector to craft innovative project delivery approaches and offer the best value for money to the urban infrastructure development. It is important to make sure that both public and private sectors stand on a fair position and build a long-term partnership in order to gain a win-win strategy for the social and economic development in long-run.

REFERENCE

- Adams, J., Young, A., and Wu, Z., (2006) Public private partnerships in China system, constraints and future prospects, *International Journal of Public Sector Management*, Vol. 19 No. 6, 384-396
- Ahuja, A., and Nabar, M., (2012) *Investment-led growth in China: Global Spillovers*, IMF Working Paper, International Monetary Fund, WP/12/267
- Aschauer, D.A. (1989) "Is Public Expenditure Productive?" *Journal of Monetary Economics*, 23, 177-200.
- Aschauer, D.A. (1989) "Is Public Expenditure Productive?" *Journal of Monetary*

Economics, 23, 177-200

Chan, K. W., (1998) Infrastructure services and financing in Chinese cities. *Pacific Rim Law and Policy Journal*, Vol. 7, 503–528.

Chatterjee, S. (2005) “Poverty Reduction Strategies: Lessons from the Asian and Pacific Region on Inclusive Development,” *Asian Development Review*, 22, 12-44.

Chen, C., Doloi, H., (2008) BOT application in China: Driving and impeding factors, *International Journal of Project Management* 26 (4): 388-398

Demurger, S., (2001) “Infrastructure Development and Economic Growth: An Explanation for Regional Disparities in China?” *Journal of Comparative Economics*, 29(1), 95-117.

Ho, H.K., (2006) "Development of Public Private Partnerships (PPPs) in China", *Surveyors Times*, Vol. 15, No. 10, October 2006, the Hong Kong Institute of Surveyors.

Ke, Y.J., Wang, S.Q., and Chan, A.P.C., (2009) Public-Private Partnerships in China’s Infrastructure Development: Lessons Learnt, Pro. Of International conference on Changing Roles: New Roles and New Challenges, Edited by H. Wamelink, M. Prins & R Garaedlts, Published by TU Delft, Faculty of AREH, The Netherlands, Oct 5-9 2009 pp. 177-188.

Lan, X., (2012) A dream comes true: China is creating a fair, sound market environment for private capital. Beijing Review, http://www.bjreview.com.cn/business/txt/2012-06/11/content_458647_2.htm

[Last visit: 06/01/2013]

Li, B., Akintoye, A., Edwards, P.J., and Hardcastle, C., (2005) Critical success factors for PPP/PFI projects in the UK construction industry, *Construction Management and Economics*, 23 459-471

Ma, G., and Wang, Y. (2010) *China’s high saving rate: myth and reality*, BIS Working Paper, No. 312, Bank of International Settlements

NBSC (2012) *China Statistical Database Annual Data 2011*, (in Chinese), National Bureau of Statistics of China

http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20120222_402786440.htm [last visit: 05/01/2013]

NDRC (2009) More information about 4 trillion RMB stimulus plan (in Chinese)

http://www.ndrc.gov.cn/xwfb/t20090309_26509.htm., National Development and Reform Commission

Roach, S.S., (2011) *China’s 12th Five-Year Plan: Strategy vs. Tactics*, Morgan Stanley, 12th annual China Development Forum, Beijing, March 20-21, 2011.

Sahoo, P., Dash, R.K., and Nataraj, G., (2012) China’s Growth Story: The Role of Physical and Social Infrastructure, *Journal of Economic Development* Vol 37, No. 1, 53-75

Stéphane, S., C. Vellutin, and M. Warlters (2007), “Infrastructure and Economic Growth in East Asia,” The World Bank Policy Research, Working Paper, 4589.

Yuan, J.F., Skinbniowski, M.J., Li, Q., and Shang, J., (2010) The Driving Factors of China’s Public-Private Partnership Projects in Metropolitan Transportation Systems: Public Sector’s Viewpoint, *Journal of Civil Engineering and Management*, Vol 16, No.1 5-18.

Wang, S.Q., Ke, Y.J., and Xie, J., (2012) Public private partnership implementation in China, *Taking Stock of PPP and PFI around the world*, Edited by Winch, G.M.,

Onishi, M., and Schmidt, S., ACCA, Summary of Research Report 126

World Bank (1994) World Development Report 1994: Infrastructure for development,

New York: Oxford University Press

World Economic Forum (2010) Positive Infrastructure: A framework for revitalizing the global economic, Geneva, Switzerland

Wu, W. (2010) Urban Infrastructure Financing and Economic Performance in China, *Urban Geography*, 2010, 31, 5, pp. 648–667

ROAD TRANSPORT INFRASTRUCTURE MANAGEMENT IN SELECTED COUNTRIES: AN APPRAISAL

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Road infrastructure is a major catalyst for the physical and socio-economic development of a country's Gross Domestic Product; as the movement of people, labour, goods and services depend mainly on it. In the traditional procurement system, the public sector (government) assumes all the responsibility for developing a road project, and bears most of the risks associated with its operation and maintenance. Hence, road infrastructure has been managed as a social service for the good of the public. However, managing road network today appears to have become increasingly challenging for all governments as demands increase and resources are limited. In this respect, many countries around the world are now exploring a wide variety of approaches in engaging the private sector in the delivery of road infrastructure. This paper highlights the different institutional and financial arrangements adopted for road facility management in selected developed and developing countries. The paper discovers that the public agencies that manage road assets are structured differently in the various countries. In addition, it observes that 'large' countries appear to decentralise, while 'small' countries centralise management authority. The paper identifies through an evaluation of extant literature that no public agencies or single-point governmental body have sufficient funds to expand, restore, or preserve its highway facilities indefinitely. Despite all the observed differences, all the countries seem to share a common notion of increased participation of the private sector in financing, constructing, operating, maintaining and managing road infrastructure. Given this, it is advocated that good governance and the willingness of the public sector (government) to provide the enabling environment that attracts and supports the private sector is critical to the successful implementation of public-private collaboration in road infrastructure management.

Keywords: Financing, Institution, Management, Road infrastructure.

INTRODUCTION

In the traditional procurement system, the public sector (government) assumes all the responsibility for developing a road project and bears most of the risks associated with its operation and maintenance. Such risks include problems with the quality of road design and construction, delays in the construction schedules, cost overruns, and shortfalls in estimated/projected traffic volume and road revenue (tolls). However, public private collaboration (PPC) has been widely acknowledged to provide the required fund and deliver road projects more quickly at a lower cost than is possible through the traditional method. This arrangement can secure financing for a project through private sources that may require more accountability and assign greater responsibility to private organisations for carrying out the work (Tang et al, 2010).

Public-Private Collaboration has developed into widely applied delivery vehicle for complex infrastructure projects, rising above international borders and diverse governmental structures to form an essential pillar for universal economic growth (Liu and Cheah, 2009). In this respect, international PPC markets are at very different stages in the maturity cycle (Figure 1). Throughout the world between 1985 and 2009, more than 950 transportation facilities worth over US\$550 billion were newly built, upgraded, or operated through PPP (Public Works Financing 2009). The UK has been widely recognised as the pioneer and leading nation in delivering transportation through PPP, alongside such countries as Australia, Spain, South Korea, Canada, Ireland, France, China and Brazil (Deloitte 2009; Smyth and Edkins 2007). The various forms of Public-Private

Collaboration include Private Finance Initiative (PFI), Build-Operate-Transfer, Build-Own-Operate-Transfer, Build-Own-Operate, and Design-Build-Finance-Operate/ Maintain.

The aim of this paper is to compare different institutional and financing arrangements for road infrastructure management in various countries and highlight salient lessons. In order to achieve this, the next section of the paper presents a review of the institutional and financing arrangements in different countries. This is followed by discussion and reflection, and conclusion. In this paper, the terms public private collaboration and public private partnerships are used interchangeably.

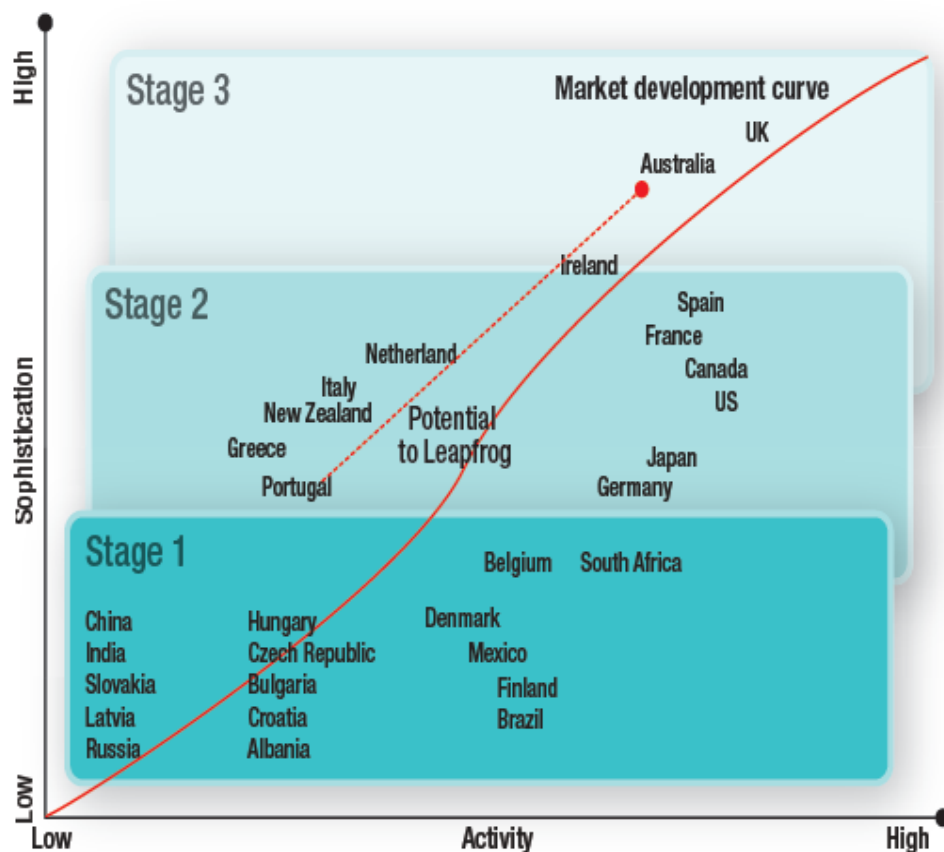


Figure 1: Public-Private Collaboration Market Maturity Curve. Source: Deloitte, (2009)

ROAD TRANSPORT INFRASTRUCTURE MANAGEMENT

This paper presents a critical review of different institutional and financing arrangements adopted for road infrastructure management in selected developed and developing countries. These countries include the United Kingdom, Spain, China, Brazil, Portugal, New Zealand, Croatia, Australia, India, South Korea, and South Africa. A developed country can be described as a nation which has achieved (currently or historically) a high degree of industrialisation, high per capita Gross Domestic Product (GDP), high human development index, and enjoys higher standard of living which wealth and technology make possible. These countries are financially independent and self-sufficient hence, their citizens enjoy a free and healthy life in a safe environment. In common practice, Japan in Asia, Canada and the United States in northern America, Australia and New Zealand in Oceania, and Western Europe are considered ‘developed’ regions. In addition, the Southern Africa Customs Union is also regarded as a developed area in international trade statistics. On the other hand, a ‘developing’ country can be described as a nation which has not achieved a significant degree of industrialisation relative to her population, has a low level of material well-being, and low per capita income. The citizens of a developing country endure

low/poor standard of living. According to the World Bank (2011), Sub-Saharan African countries are typical examples of developing countries.

Road Infrastructure Management in the United Kingdom

Road transport may have a central role to play in the continued health and growth of Europe's economy, since goods are expected to be delivered door-to-door to all corners of the continent, quickly and on time. The demand for this kind of high level of mobility and flexibility apparently can only be met through road transport. The existing policies and regulations in the European Union (EU) road transport sector aims at providing a single harmonised regulatory framework in order to ensure the free movement of people, goods, services and capital within the continent. The road transport sector has been reported to have continuously contributed immensely to the European economy. In this respect, it conveys about 73% of goods on land, provides about 4.5 million jobs, and generates a turnover of about 1.6% of EU 'Gross Domestic Product'. Road transport is also expected to carry the greatest percentage of the estimated increase of goods between EU Member States. This is projected to increase by 50% between now and the year 2020 (European Commission Directorate-General for Energy and Transport, 2006). Furthermore, other modes of transport appear to depend largely on an efficient, safe, cost effective and vibrant road transport system, since most freight and passenger journeys often start and end with a trip on the road. This implies that road transport therefore plays a vital role in the development of Europe's integrated transport networks and intermodal transport solutions.

In the United Kingdom, the Department for Transport (DfT) was established in order to deliver the government's transport scheme. The Department formulates policy and strategy, establishes and manages relationships with the organisations responsible for transport delivery. The DfT has seven executive agencies that are central to delivering the government's transport policies, priorities and services. These include: Driving Standards Agency, Driver and Vehicle Licensing Agency, Vehicle Certification Agency, Vehicle and Operator Services Agency, The Highways Agency, Government Car and Dispatch Agency, and Maritime and Coastguard Agency (Queiroz and Kerali, 2010). The Highways Agency UK (established in 1994) is responsible for operating, maintaining and improving the strategic road network in England on behalf of the Secretary of State for Transport. The strategic road network consists of motorways and major trunk roads, while other roads are managed by Local Authorities. The primary functions of the Highways Agency UK are to manage traffic, handle congestion, make traffic information available to road users, ensure safety and journey time reliability, while respecting and minimising any negative effect on the environment.

For effective management of England's strategic network, the Highway Agency has divided the country into fourteen areas, each of which is assigned an Area team and a general engineering contractor known as a Managing Agent. Each Area team and corresponding Managing Agent is responsible for the maintenance of the Agency's roads in their area. The Managing Agents serve as general engineering consultants who support the Area teams in developing preliminary designs and overseeing the works of project design and construction contractors. In other words, the Agency seems to have bundled portions of the motorway system into commissions and then requests tenders from consultants to take over the maintenance of all road infrastructure within the commission to a specified quality. The successful consultant then arranges a viable term contract between the client (Department of Transport) and the contractor who then undertakes all works based on the advice of the consultant. For example, in West Yorkshire, one of the leading commissions with 330km lane, 420km drains, 305 bridges, 950 road signs and 3,400 lighting columns, there was a cost reduction of about 15% based on the new scheme (Kerali, 2008).

Private sector participation in infrastructure provision and management began in the United Kingdom in the 1980's. This paved the way for the Private Finance Initiative (PFI) which was introduced by the national government in 1992. PFI is a specific UK policy to increase private sector participation in infrastructure financing and provision. The drivers of the policy include: dissatisfaction with the results of the conventional construction contracts which were characterised with schedule slippage, cost overruns, and high asset life-cycle costs; infrastructure deficit; limited public funds; desire to transfer more risk to the private sector; and the desire to get

better value for public sector expenditures. Since 1992, over 67 transportation projects costing more than US\$42 billion have been delivered through PFIs, and an additional 12 projects are in the planning pipeline in UK (Her Majesty Treasury 2009). The first three highway infrastructure procured through PPP/ PFI concession arrangements were Queen Elizabeth 11 Bridge, Second Seven Crossing, and M6 Toll which employed real tolls to secure private financing. Since 1996, new PPP agreements abolished real tolls and made road use free at the point of use to drivers. Most of the PPP highways in England are delivered through the DBFO contract arrangement using shadow tolls, in which the concessionaire finances the project and is reimbursed directly by the Government through road availability payment, vehicle-based payment, or active management payment over the term of the concession agreement. This method of payment eliminates the installation of tolling equipment, collection of tolls directly from the road users, and encourages the concessionaire to operate and preserve the motorway at high performance standards. Report has it that the total cost of PFI projects in UK is about £60 billion (Federal Highway Administration, 2009).

The United Kingdom has about 394,428 kilometres of road network. Of these, the National Motorway System has a network of 7,100km, and carries 33% of all traffic and 62% of freight. The percentage of the national motorway managed under PPP/PFI arrangements is expected to increase from 10% to 17% when the M25 project is procured. The M25, the orbital 400km motorway that encircles London has been described as the largest PPP project to date in UK. It is a DBFO concession model project, using a direct payment mechanism for a contract period of 30 years starting from 2009. The Department of Transport and Local Authorities have also been executing projects under PPP contracts. With the exception of the M6 Toll, the national motorways under PPP arrangements use either shadow tolls or direct payment mechanisms exclusively. While early PPP contracts employed shadow tolls based only on traffic volumes, more recent PPP agreements have adopted a payment mechanism based on such factors as safety performance, lane availability, congestion, and minimum performance criteria. However, funding challenges seem to suggest the use of real tolls on future highway PPP projects (Federal Highway Administration, 2009).

Road Infrastructure Management in Spain

Private sector participation in highway infrastructure management in Spain began in 1960 with the approval of the concession for the Guadarrama Tunnel project. At that time, the Spanish government realised that the nation's infrastructure requirements exceeded its public funding capacity. An earlier (1953) legislation had allowed private organisations to develop and manage toll-ways for a maximum period of 75 years. However, a new legislation came into law in 1960 to make the public sector more flexible in concession arrangements and attract the private sector. This gave birth to the Cadiz Bay Bridge concession (which has been toll-free since 1982), and the Cadi Tunnel concession which is now managed by the Autonomous Community of Catalonia (Spanish Institute of Foreign Trade, 2006). Furthermore, by 1964, a blueprint for Spanish National Expressway System was made, which estimated/proposed the development of about 3,000 kilometres of expressways by 1980. A general legal and regulatory framework which served as the bedrock for concession arrangements (till 2003) was established and passed through Law 8/1972. Similarly, Law 13/2003 was enacted to reinforce private financing of public infrastructure and improve the legal framework (through a new risk-sharing method). Federal Highway Administration (2009) reported that this law was also superseded by Law 30/2007 which was recently promulgated to regulate all public sector contracts including public works concessions.

Spain has no national highways agency hence, highway infrastructure is managed by the Director-General of roads who also has an oversight function of the national PPP programme. The Director-General reports to the Secretary-General for Department of Development. Similarly, the government team representing the Ministry of Public Works play a prominent role in the administration and management of PPP contracts at the Autonomous Communities which also have their own roadway agencies. Spain has a total road network of about 681,298km, highway of about 30,000km, out of which about 16,000km constitutes the National Highway System. About

4,300km of the national highway is under PPP procurement. Presently, about 1,500km of highways network enhancements and upgrades are also being delivered through PPP. This is expected to increase the national highway infrastructure under PPP to 5,800km. About 3,800km of the national highways under PPP attract real tolls, while 500km use shadow tolls. Furthermore, the Autonomous Communities also initiate PPP road projects and receive funding and management assistance from the national government. Since year 2000, a vast majority of transport concession contracts have been on road projects. Spain has a 15 year national plan spanning 2005-2020 for different transportation modes, during which about 25% of the required fund for managing national highways and roadways is expected to be sourced from non-budgetary concession arrangement sources (Federal Highway Administration, 2009; Vassallo and Gallego, 2005).

Since 1960, Spain has pioneered the procurement of infrastructure through the concession model and has continuously sought for better ways to improve the effectiveness and efficiency of the approach. Spain currently depends heavily on real tolls, hence needs to construct toll-free connector roads as part of its concession contracts.

Infrastructure Management in China

In China, the Ministry of Transport (MOT) is charged with the responsibility for policy formulation, monitoring, control and enforcement of standards, and regulation of all transport modes, except railways. The 27 Provincial Transport Departments (PTD) and the transport bureaus for the four mega cities namely Beijing, Chongqing, Shanghai, and Tianjin (which also have the status of a province) are responsible for detailed planning, engineering design, and construction of expressways and other selected roads in China. Since there is no national (central) road authority in China, the provinces finance about 66-90% of the capital cost of expressways through budgetary allocation and debt financing, while the private sector makes finance available on a limited scale through various types of concession schemes. However, as soon as the expressways are commissioned, their operations and maintenance are undertaken by the PTDs through a private company or other authorised organisations. This collaborative engagement strategy has resulted in the rapid expansion of the Chinese expressway network over the past 15 years (Queiroz and Kerali, 2010).

As at 1990, there were only 522 km of expressway in China. In 2005, the number increased to 41,000km, and by the time all links of the planned on-going National Trunk Highway System (NTHS) is completed in 2020, the government of China looks forward to having a national expressway network of 85,000km (Wood, 2006). The system which was launched in 1990 is expected to produce expressways that would link all the major cities with each other as well as the ports. The NTHS, (also known as the 7918 network) links all provincial capitals as well as cities with a population above 200,000 and incorporates the 7 highways from Beijing, 9 North to South vertical expressways, and 18 East to West horizontal expressways. Furthermore, for greater integration of rural areas in the economic development process, the government of China plans to build and modernise about 270,000 kilometres of rural roads (World Bank, 2007). This development by China national government and the provincial governments appear to have created a 65,000 kilometres network of high capacity expressway which now forms the basis for the on-going economic development in all sectors of the Chinese economy.

In an attempt to expand its NTHS, the government of China adopted a toll-based road network, using debt financing as a key vehicle for development. While management and finance of most of the expressway network rests in the public sector (government), China has adopted a public-private collaborative financing for a partial number of expressway projects. In this respect, the provincial governments construct a toll expressway, sets up an expressway corporation as a public limited company that is listed on the stock exchange to manage the facility, while the government sells shares in the toll expressway corporation to the general public. The money accruing from the sale of shares is used to construct new toll roads. The dividend earned by the shareholders is often determined by the profit generated primarily on the growth of traffic, inflation and approved toll increases. The toll revenue is used to offset the principal and interest of loans, while the remainder is used to pay the costs of maintenance, staff salaries and operating expenses. Consequently,

between 2005 and 2010, annual investment on expressway financing in China stood at about US\$17 billion, out of which private investments accounted for about 7% (Heggie, 2008).

Several expressways in China were constructed through the 'one road- one company' model. This method allowed for debt control, proper examination of the feasibility of each major road segment, time structuring of the investments, targeted management of the capital formation, and contracting and supervision of construction, and in most cases provided a smooth transfer to operations. Furthermore, the model seem to accommodate most forms of collaboration, secured ownership, direct private sector investment, and various forms of leasing and concessions (Asian Development Bank, 2006). The BOT form of concession appears to have become popular in China, having been used to procure the 137km Lesham-Yibin expressway in 2005. In a comparative study of road transport infrastructure development in China and India, Postigo (2008) reported that China devoted priority attention to the construction of high standard highways and expressways with an investment of about 3.5% of the country's GDP, while India initially concentrated investment on lower level district and rural roads. Furthermore, while China government plays an instrumental role in road infrastructure development, India has encouraged and relied more on the private sector.

Most provinces in China appear to have started charging tolls on goods vehicles in order to discourage overloading, and recover investment costs arising from the damage caused by overloaded vehicles. For instance in Hubei, the standard truck toll is set at RMB 0.08 per ton-km (about US\$0.01/ton-km) in a situation where a vehicle is overloaded up to 30% above its normal capacity. Similarly, an excess load ranging between 31-60% attracts a toll of RMB 0.16/ton-km, 61-80% overloading attracts RMB 0.24/ton-km, 81-100% excess load attracts RMB 0.32/ton-km, while 100% and above excess load attracts RMB 0.4/ton-km (Queiroz and Kerali, 2010).

Road Infrastructure Management in Portugal

For the past four decades, the Portuguese Government has adopted PPP extensively to develop and manage its National Motorways System. This decision was mostly driven by her compliance with the European Union convergence criteria of adopting euro, and reducing public debt and budget deficits. The first concession for a tolled motorway was approved in 1972 with the establishment of Brisa (a private company). However, the 'Carnation Revolution' in 1974 made the Portuguese Government to acquire major shares in and assumed ownership of Brisa as a State-owned enterprise. By the 1990s, the government privatised Brisa and increased the number of private companies taking part in highway infrastructure concessions in order to promote competition and development in the industry (Transportation Research Board, 2009). This arrangement helps to increase private sector capacity, facilitates the execution of the National Road Plan, improves public safety, and allows public funds to be invested in other areas. Similarly, in an attempt to move government debts off the national balance sheet, three public agencies (Instituto das Estradas de Portugal, Instituto para a Construção Rodoviária, and Instituto para a Conservação e Exploração da Rede Rodoviária) were converted into a State-owned enterprise, Estradas de Portugal, S.A. (EP). EP was charged with the responsibility for oversight and development of the Portuguese National Highway network. The company holds a 75 year concession with the national government to develop and manage the national highway system, execute future PPP agreements on behalf of the Portuguese Government, and by implication acquire all assets under existing PPP agreements at the expiration of such contracts (Federal Highway Administration, 2009).

Portugal has a total road network of 82,900km, and roadway/highway of about 16,500km. About 2,500km of the current 2,660km motorway system is operated under a PPP arrangement. This represents only 15% of Portugal's current total highways/roadways. Portugal employs direct real tolls and shadow tolls in order to generate the revenues required to support collaborative projects. In this regard, EP assesses the viability of the proposed projects, and makes recommendations on funding mechanisms to the national government which eventually decides the appropriate toll system. About 1,400km (55%) network of the PPP motorways presently attract real toll, 900km (37%) operate shadow toll, while 200km (8%) is toll-free. Toll-free motorway is achieved when a private partner constructs a connector road that does not attract toll as a part of an overall highway

concession contract. In situations where traffic volumes are high and real tolls are sufficient to meet project financial requirements, shadow tolls become unnecessary (Federal Highway Administration, 2009).

Road Infrastructure Management in New Zealand

On August 1, 2008, the New Zealand Transport Agency (NZTA) was created. This agency incorporated all the activities of two former entities, Land Transport New Zealand (LTNZ) and Transit New Zealand (TNZ) in order to have an all-inclusive transport scheme encompassing planning, funding and procurement. It was discovered that the division of the functions of the two former agencies did not augur well for enduring planning, hence the merger of the agencies into NZTA. The activities of the NZTA are expected to contribute to an integrated, responsive, safe, viable (value-for-money) and sustainable land transport system, thereby supporting the updated New Zealand Transport Policy (Queiroz and Kerali, 2010). Before this development, TNZ had existed as a highway authority responsible for planning, designing, and development of annual national road programmes, construction, rehabilitation and maintenance of state highways. The TNZ also used to draw-up a long-term (10 year) development plan which was always submitted to LTNZ for consideration and approval. Furthermore, the agency had formulated standards, rendered support and offered suggestions and collaborated with the LTNZ, the New Zealand Police and the National Road Safety Committee. On the other hand, the LTNZ had been responsible for specifying construction and maintenance standards, review and audit of highway management authorities, offered suggestions to local authorities, and formulated financial guidelines and assessed projects and determine viable pricing techniques (New Zealand State Services Commission, 2007).

The major tasks of the NZTA include managing the state highway system; land transport planning; allocation of government funding for land transport; regulating access to, and participation in the land transport network; and promotion of land transport safety and sustainability, including driver licensing, road signs, and 'drive safe' advertising campaigns. The NZTA appears to manage about 10, 894 km of state highways, which represent about 12% of New Zealand's roads, and about 50% of the 36 billion vehicle kilometres travelled each year in the country. The agency which seems to have about 4,000 representatives tend to process an average of 5 million vehicle registrations, 1 million vehicle ownership changes, 2 million road user licences, and 5.3 million warrants of fitness annually. Moreover, it seems to offer an important link between government policy formulation and the management of road transport infrastructure (Queiroz and Kerali, 2010).

Road Infrastructure Management in Australia

There are three levels of government in Australia. These are the Commonwealth/ National, State and Local governments. At each level of government, there are also a number of agencies responsible for road infrastructure management. Road network in Australia can be broadly classified as arterial and local roads. Arterial roads are roads that mainly connect one region to another, thereby forming major avenues of travel for traffic movements. On the other hand, local roads are streets or roads primarily used for access to adjoining properties. Both arterial and local roads are usually further subdivided into urban and rural roads. In addition to arterial and local roads, some roads of 'national significance' otherwise referred to as the National Land Transport Network comprising important national and inter-regional land transport passageways are funded by both the Commonwealth and state governments (Austroads 2008).

Arterial roads are owned, funded, operated and maintained by State Governments while the local roads fall within the ownership, management and jurisdiction of the Local Governments. However, both State and Local Governments receive financial assistance from the Commonwealth Government for managing road networks. The agencies responsible for managing the 818,356 kilometres of road network at different levels of government in Australia include the Commonwealth/National Level Agencies; State Level Agencies; Local Level Agencies; The Australian Transport Council; The National Transport Commission; The Department of Infrastructure, Transport, Regional Development and Local Government; Infrastructure Australia;

Road Traffic Authorities; Local Government Grants Commissions; Local Government Associations; and Local Governing Bodies. There are about 565 local governing bodies in Australia owning, operating, maintaining and managing about 660,000 kilometres of local road network. In this respect, the agency receives grants from the Commonwealth Government. Similarly, local governments may also receive fund from state governments in order to provide and maintain arterial (State) roads (New South Wales, 2006).

Unlike Portugal, Spain and the United Kingdom where PPP policies and programmes are controlled at the national level, PPP activity in Australia is prominent in three States to make easy the development of major segments of highway infrastructure in their urban areas. The States are New South Wales (NSW), Victoria, and Queensland while the urban centres are Sydney, Melbourne and Brisbane respectively (Federal Highway Administration, 2009). These three states in Australia seemed to have used somewhat similar contract administration and management methods. The Roads and Traffic Authority has an oversight function of the highway system and PPP programme in NSW. In Victoria, temporary public authorities were created to manage the delivery of its highway projects pending the time the state's highway agency, 'VicRoads' would take over the administration and management of the state contract. Similarly, Queensland established an autonomous public agency to acquire the AirportLink, pending the time the state's Department of Main Roads would take over the management of state contract. Furthermore, real tolls are used for highway PPP contracts by all these states. Report has it that collaborative highway management seem to have improved commuter and freight travel in densely populated cities of Sydney, Melbourne, and Brisbane in Australia (Federal Highway Administration, 2009).

Road Infrastructure Management in South Africa

Since 1994, South Africa has adopted PPC in the provision of road infrastructure. South Africa has a total road network of about 754,000 kilometres, of which about 70,00km (9%) are paved. The Department of Transport is responsible for formulating road policy; while the South African National Roads Agency Limited (SANRAL), the nine provinces, and local governments undertake road construction and maintenance. In addition, SANRAL also manages the country's 20,000km network of national roads. About 3,000km of the national roads attract tolls, of which 1,800km are controlled by SANRAL, while the remaining 1,200km are under concession to private sector investors to develop, operate and maintain (Farlam, 2005; South African National Treasury, 2004).

Road Infrastructure Management in Brazil

The transport system in Brazil was restructured through Law 10.233 of 5th June 2001 which recognised and proscribed some agencies under the Ministry of Transport. The agencies which were set up by the law include the Brazilian National Agency for Land transport (Agencia Nacional de Transportes Terrestres, ANTT); the National Board for Integration of Transport Policies; the National Department for Transport Infrastructure; and the Brazilian National Agency for Ports and Waterways. The agencies which were proscribed by the law include: the Brazilian Transport Planning Agency; and the Brazilian National Highway Department (Amoreli, 2009). The National Department for Transport Infrastructure (DNIT) which derives its fund from the federal budgetary allocation is charged with the responsibility to plan/design, finance, construct, maintain and operate the federal highways, railways, waterways and ports in Brazil. The agency carries out the government's transport programme directly or through contracts and entrustments to other public agencies or the private sector. The activities of the agency include upgrading, expanding and maintaining the federal highway network; planning and construction of new railways; and dredging, expanding, modernising and maintaining ports and waterways (Queiroz and Kerali, 2010).

Brazil has over 1.7 million kilometres of roads, of which 172,897km are paved. The federal government manages a network of 57,211km (33%), the states control 94,753km (55%) while the municipal authorities look after the remaining 20,914km (12%) road network. Road transport service in Brazil consists of about 17.9 million cars, 3.087 million light commercial vehicles, 1.17 million trucks, and 258,000 buses. More than 60% of freight transport is conducted through the

national highways. The ANTT manages the tolled 13,781km federal highway and the concession contracts awarded by the federal and other state governments. The tolled expressway concession contracts under the jurisdiction of the ANTT were given in two phases. The first phase, which was made up of 12 concession contracts covering 4,083km road was given to private concessionaires between 1994 and 1998 for 25 years. The second phase comprised seven concession contracts with a length of 2,601km road given to three different private concessionaires in 2008 for 20 years. The ANTT intends to invite tender for an additional 3,675km road from six states for the next phase of award. The states include Federal District, Minas Gerais, Bahia, Goias, Santa Catarina and Espirito Santo (Perrupato, 2009).

Road Infrastructure Management in Croatia

In recognition of the need for a new road infrastructure for economic, social, political and strategic development, the government of Croatia opted for a supply-driven investment policy for motorway infrastructure development in the late 1990s. This approach resulted in an increased and improved length of the national road network (800km) with about 3.5% of the country's GDP being expended on the development and operation of road network between 2001 and 2004. The Public Roads Act which was enacted in 2001 reorganised the Croatian Road Authority into two separate organisations: Hrvatske Autoceste (HAC), and Hrvatske Ceste (HC). HAC happens to be a joint-stock establishment wholly owned by the state, and responsible for the building and administration of the national motorway network, apart from the roads which are built or maintained by concessionaires. Similarly, the HC is also a joint-stock corporation which builds and operates all other state roads (about 7,000 km) that form the bulk of the road network, just as the county roads are operated and maintained by the County Roads Administration. The users and beneficiaries of road facility often pay user fees and taxes, and this seems to have had an impact on the economic viability of industries and services (Kerali, 2008; Talvitie, 2006).

The reorganisation demanded a new form of funding for the management of road facilities. The Public Roads Act allows for the right to grant the construction and operation of road to a private sector organisation, with the contract being administered by the Ministry of the Sea, Tourism, Transport and Development (MSTTD). In this respect, three road concession contracts were awarded between 1995 and 2004. The MSTTD oversees and monitors the activities of HAC, HC and the Counties and authorises their strategic plans through the road development planning and regular administrative processes. Road infrastructure development plan involves three stages; the method for developing public roads is recommended by the MSTTD and approved by the legislative body. Based on the accepted approach, the Ministry draws up a four-year plan; after which the HAC, HC and the Country Roads Administration make one-year execution plan for the production and upkeep of public roads (Kerali, 2008).

The sources of fund for managing road infrastructure in Croatia seem to include long-term loan, fuel levy and tolls on motorways. The fuel levy appears to have been a regular source of fund to HAC and HC. Moreover, two toll methods seem to be in operation on the road-networks in Croatia: the open and the closed toll systems. The open toll method tends to apply at tolled road structures (i.e. bridges, tunnels) and on shorter road sections, where the toll is collected at either the entry or exit point. On the other hand, the closed toll system is often used on roads with many entrances and exits, hence, the road user collects a toll card at the entry point, and pays the toll commensurate with the distance travelled (as might be indicated by the toll card) at the exit point of the motorway (Queiroz and Izaguirre, 2008).

Road Infrastructure Management in India

Historically, road projects in India were undertaken by the public sector (Government) and financed through budgetary allocation. However, the inadequacies of public funding have resulted in the use of alternative procurement models for road infrastructure provisioning. In this regard, the National Highways Act of 1956 was amended in June 1995 in order to attract private sector participation in road construction, operation and maintenance. The amended Act facilitated private investment in the national highway projects; empowers the private sector to levy, collect

and retain user-fee; and regulate traffic on highways in accordance with the provisions of the Motor Vehicle Act of 1988 (Government of India, 2005).

The Ministry of Road Transport and Highway is responsible for the development and maintenance of national highways. The National Highways Authority of India (NHAI), an agency under the Ministry is responsible for constructing, upgrading and maintaining most of the national highway networks. The National Highways Development Project (NHDP) launched in 2001 and administered by the NHAI, forms the backbone of India's road network with a length of 66,590 kilometres carrying about 40% of the total road traffic. The NHDP is a major effort to expand and upgrade the highway network, and connect the four metropolitan cities of New Delhi, Mumbai, Chennai and Kolkata (the Golden Quadrilateral). This project is spread over seven phases and is expected to be completed by the year 2015. The BOT model of PPC which is in vogue in India assigns a leading role to the private sector while the public sector (government) plays the role of a facilitator (Bahadur, 2006; Farrel, 2006).

India has a total road network of about 3,320,410 kilometres, of which 200km are expressways and 2,623,123km (79%) are rural roads. Road transportation carries nearly 65% of freight and 85% of passenger traffic in India (Government of India, 2007).

Road Infrastructure Management in South Korea

South Korea has a total road network of about 86,990 kilometres, of which 3,000km are expressways, 12,447km are national roads, 64,808km are paved while 22,182km are unpaved. The Korea Expressway Corporation is responsible for constructing, operating and maintaining most of the expressways in South Korea. Almost all freeways/highways/expressways/motorways attract tolls. Privately financed BOT concession roads include Nonsan-Cheonan Expressway, Daegu-Busan Expressway, Incheon International Airport Expressway, Seoul-Chuncheon Expressway and parts of the Seoul Ring Expressway (Amos, 2004).

DISCUSSION AND REFLECTION

The importance of road transport to the economy and social development of a country cannot be over-emphasised. Traditionally, road infrastructure had been managed as a social service for the good of the public. However, managing road network today appears to have become increasingly challenging for all governments as demands increase and resources are limited (Adetola et al, 2013). This review focussed on different institutional and financial arrangements used for road infrastructure management in the United Kingdom, Spain, China, Brazil, Portugal, New Zealand, Croatia, Australia, India, South Korea, and South Africa.

Early attempts at PPC contract began in the late 1970s with highway concessions in France and the mid-to-late 1980s in Spain and the United Kingdom. The economic reforms in the United Kingdom strongly encouraged efforts to privatise major elements of the nation's most developed transportation systems such as roads, transport service, rail, and aviation. The strongest impetus for infrastructure PPC occurred in UK in 1992 when the PFI legislative and regulatory reforms were established. This also made other countries in the British Commonwealth of nations such as Australia, New Zealand, Scotland and Canada to establish their own PPC initiatives. The emergence of PPC in Portugal and Spain was driven by European Union's convergence criteria. Since the United Kingdom is not part of the Eurozone, it is not bound to comply with EU convergence criteria. In this regard, the pressure to move liabilities off the public sector balance sheet appears not to be an urgent issue in UK. While collaborative arrangement is controlled at the national level in UK, Portugal and Spain, it is used primarily in three states (New South Wales, Victoria, and Queensland) in Australia to address mobility issues in their major urban centres. In addition, the UK has implemented a variety of changes overtime which has given birth to a standard PFI contract that is now in use. The Highway Agency (UK) has also realised the need to revisit contracts more frequently in order to evaluate potential changes, rather than allow changes to accumulate and attempt to negotiate a major contract modification. PPC in the UK have been predominantly Design-Build-Finance-Operate (DBFO) contracts financed by government-

supported shadow tolls for highway projects and tolls for bridge/tunnel projects (AECOM, 2007). PPC in Australia and New Zealand have been primarily used for private toll road projects, most of which seem to have been successful.

A project has been likened to a living organism that passes through the stages of conception, birth, growth and end product hence it is often structured in such a way that tangible deliverables are accomplished and visible from its beginning to its end. In this regard, construction projects are usually divided into project inception, design, tendering, construction, completion/handover, operation/maintenance phases. Each of these project phases is marked by the completion of one or more verifiable work product (Adetola, 2007). Similarly, each project phase has its associated risks, thus potential risks in PPC projects have to be identified, analysed and allocated to the partner best capable to manage them. The primary risks often associated with road projects include development risks, construction risks, and operation/maintenance risks. Development risks that may emerge during the life cycle of a road project may relate to land acquisition, design, sourcing for project fund, environmental clearance, credit-worthiness issues, change of government/political instability, inflation, foreign exchange rate, interest rate, force majeure, and market/demand. Construction risks arise during the course of constructing a project and may include such things as difficult site conditions, engineering and technical difficulties, poor performance of suppliers and contractors. Operation and maintenance risks are post-construction threats which may include wrongly estimated traffic volume/demand, toll levels, and the toll collection technology.

Risk allocation often requires a sound knowledge of the market and project finance principles for a balanced/equitable appropriation between the public and private sectors. For example, the public sector (government) might be capable of managing some developmental risks, while the private sector might as well absorb the construction and operation/maintenance risks. Furthermore, risk mitigation instruments can be employed to mobilise private capital to finance PPC infrastructure projects in which financing requirements significantly exceed budgetary/internal resources. These are financial mechanisms that transfer definite risks from project financiers (lenders and equity investors) to creditworthy third parties (guarantors and insurers) that have a better capacity to bear such risks. Risk mitigation instruments are mostly useful when the public sector partner is not sufficiently creditworthy/has little or no partnership experience (Queiroz and Kerali, 2010).

In all the countries reviewed, there is a designated Ministry for Transport that formulates the overall transport policy and also responsible for establishing checks and balances for good governance and management of fiscal risk. In addition, some nations also have a separate agency to manage each transport subsector such as roads, railway, airports and seaports. In particular, China and India have a full-fledged autonomous Ministry of Railways managing that subsector. The review showed that countries have adopted different collaborative engagement approaches that are suitable to their needs and circumstances to manage their road networks. The need to improve the efficiency of managing and financing road infrastructure underscores the establishment of various institutional structures. In this regard, Queiroz and Kerali (2010) identified the factors affecting the efficiency of road transport management agencies. These include outdated management structures, lack of clear responsibilities, human resource constraints, weak management information systems, inadequate financing, and perception of roads as a public good.

This review observes that 'large' countries appear to decentralise, while 'small' countries centralise management authority. For example, the management of all tolled expressway network in China is delegated to the provinces, whereas, it is centrally controlled by the national governments in Portugal, New Zealand, Croatia, and South Korea. In addition, while China borrows money to finance highway/expressway construction and repays such loan with toll revenues, Brazil awards highway/expressway contracts to private concessionaires. All the countries reviewed finance road projects through budgetary allocations and toll revenues. In 2001, Brazil created an agency to manage highway and railway concessions, and another agency to manage non-concession roads, railways, waterways and ports. In contrast, Portugal, China and South Africa have single mode management entities. Furthermore, while most of the highway/expressway networks in Brazil are under concession contracts to private concessionaires,

China manages her expressway networks through public corporation. Similarly, in several countries in Eastern Europe, road administration adopts a decentralised organisational structure which separates works implementation from project management. In this regard, many units are established with specific functions such as planning, inspection/supervision, works implementation, and management. The Ministry of Transport defines the mission, goals, and annual budget of road administration, and delegates responsibilities. In addition, many regional/state implementation organisations are set up to carry out road works in accordance with agreements issued by the road administration or its regional/state offices. This is a clear departure from the traditional Public Works Department that employs thousands of people in many developing countries to manage public infrastructure in which road administration is centralised and its overseeing Ministry micro-manages the resource allocation and project prioritisation with political objectives (Queiroz and Kerali, 2010).

Private sector investment and involvement in infrastructure provisioning may encourage the development of new, innovative and creative strategies to financing, economies of scale, development, operation and maintenance of facilities. Similarly, the private sector can also offer expertise in project, operational and risk management (AECOM, 2007).

Though PPC arrangements seem to have been used on a small-to-modest portion of the total roadway network in most countries (see Table 1), it has played a pivotal role in the development and management of critical highway corridors.

Table 1: Road Network in Selected Countries

Country	Total Network (Kilometres)	Road National Highway/ Expressway/Motorway Network (Kilometres)	PPC Motorway/ Expressway Network (Kilometres)	Percentage of PPC network to Total network
United kingdom	394,428	7,100	710	0.18
Spain	681,298	16,000	4,310	0.63
South Korea	103,029	12,447	3,000	2.9
India	3,320,410	300	300	0.009
United States	6,506,204	90,000	250	0.003
South Africa	754,000	20,000	3,000	0.39
Brazil	1,751,868	57,211	13,781	0.78
Canada	1,042,300	231,000	32,000	3
Portugal	82,900	2,660	2,500	3
China	4,008,200	65,000	45,000	1
France	951,200	30,500	12,000	1.2

Key: PPC = Public-Private Collaboration

Total road network (see Table 1) includes motorways/expressways, highways/national roads, secondary/regional roads, and all other roads in a country. A motorway/expressway is a road designed and built to separate motor traffic flowing in opposite directions. A dual carriageway is a class of highway with two carriageways for traffic travelling in opposite directions separated by a central reservation/barrier/median. Roads with two or more carriageways with controlled access are also generally referred to as motorways/freeways/expressways (see Table 1). Dual carriageways seem to have improved road traffic safety and speed limit over single carriageways. A road without a central reservation is a single carriageway regardless of the number of lanes.

Public Private Collaboration contracts require revenue in order to support capital, operating, financing, and transaction expenses, and provide a return on equity investments. In this regard, some countries adopt such mechanisms as real tolls, shadow tolls, and direct payment. In real tolls, users pay a fee for the use of an asset, while the government (public) pays shadow tolls to a contractor based on traffic volume and the availability of service. Direct payment refers to the fee that the public (government) pays the contractor. Ancillary revenues might also be derived from commercial development such as restaurants, service stations or utility corridors along a highway.

CONCLUSION

This paper critically appraised the institutional and financing arrangements adopted for road transport infrastructure management in selected developed and developing countries through an evaluation of extant literature. Public-Private Collaboration is a procurement method that delivers assets or provides services through joint public and private cooperation. The arrangement allows the private sector to help reduce the overall cost of delivering public facilities and services through increased efficiency and better management of some risks (design, construction, operation and maintenance). Many countries have used PPC to help develop, operate and maintain their road networks. The public agencies that manage PPC are structured differently in various countries. These organisations range from traditional highway agencies to state-owned enterprises. However, despite the observed differences in institutional structures, all the countries appear to share common views about road administration. These common notions include emphasis on increased participation of the private sector in constructing, operating, maintaining, and managing road infrastructure; and the need to devise strategies to communicate with road users in order to incorporate their needs and concerns into road infrastructure provision. Though there seems to be no global regulation regarding whether a country's highway/motorway/expressway should attract fee, road transport infrastructure ultimately has to be paid for either by the government or users. While roads with low traffic volume may operate as a social (free) service, user charges on roads with high volume of (congested) traffic can become an essential source of generating revenues. In this regard, toll might be a useful pricing tool for rationing limited road space to those users who recognise/value its worth.

The review revealed that no public agency has sufficient funds to expand, restore and preserve its highway facilities indefinitely. Hence, public-private collaboration seems to have become an effective strategy for managing highway assets both in terms of service delivery and financial arrangements. In this regard, a moderate percentage of each country's overall road and highway/motorway networks are under PPC arrangements (see Table 1) using various sources of financial arrangements. The policies and practices in these countries clearly show that potential collaborative projects need to be analysed, selected, structured and procured thoughtfully in order to preserve public interests. Furthermore, public sector institutional capacity may require continuous strengthening and improvements for effective collaborative agreements. The ability to manage the partnership throughout the life of the contract might also be critical to providing the expected services and sustaining the public-private relationship.

In this respect, the willingness of the public sector (government) to provide the enabling environment that will attract and support the private sector is critical to the successful implementation of the programme. In addition, good governance will also enable the general public to reap the full/maximum benefits of the involvement and investment of the private sector. Good governance is synonymous with due process or competitive selection of concessionaire, full/proper disclosure of relevant project information to the public, and the establishment of a regulatory body to oversee the contractual agreements throughout the life of the concession. This process will help to engender accountability of both the concessionaire and the regulatory authority.

This appraisal has not been able to cover all the countries of the world. Therefore, there is need for nations to actively embrace the lessons learned from other countries, align interests, share resources, maximise processes, and engage win-win scenario for sustainable road transport infrastructure management.

REFERENCES

- Adetola, A E (2007) Scope of project management services in the Nigerian construction industry. *The Quantity Surveyor, Journal of the Nigerian Institute of Quantity Surveyors*, 55(2), April-June 2007, 10-15.
- Adetola, A, Goulding, J and Liyanage, C (2013) Public-private perception of collaborative infrastructure projects in Nigeria, *Int. J. Procurement Management*, 6(2), 235-254.

- AECOM (2007) Case studies of transportation public-private partnerships around the world, July 7, 2007, Washington DC: Office of Policy and Governmental Affairs, *US Department of Transportation, Federal Highway Administration*.
- Amorelli, L (2009) Brazilian federal road concessions: New challenges to the regulatory framework, *Institute of Brazilian Business and Management Issues, Minerva Programme*, George Washington University, Washington DC.
- Amos, P (2004) Public and private sector roles in the supply of transport infrastructure and services, *Transport Paper TP-1, World Bank Transport Sector Board*, Washington DC.
- Asian Development Bank (2006) People's Republic of China: Toll roads corporatisation strategy towards better governance. *Project Numbers RSC-C51814 & RSC-C60519*, December 2006, 13-17.
- Austroads (2008) Private sector financing of roads: Review of the major Australian toll roads, *Austroads Publication*, Sydney.
- Bahadur, A P (2006) Financing national highways in India, Paper presented at the expert group meeting 'Regional experiences and lessons in financing highway infrastructure and improving road safety', *United Nations ESCAP*, 8-10 May 2006, Bangkok, Thailand.
- Deloitte, R (2009) Closing the infrastructure gap: The role of public-private partnerships, *A Deloitte Research Study* (July 2009), London
- European Commission's Directorate-General for Energy and Transport (2006) *Road transport policy, European Communities*, Brussels.
- Farlam, P (2005) Working together: Assessing public-private partnerships in Africa, *NEPAD policy focus report*, 2. The South African Institute of International Affairs.
- Farrell, D (2006) Accelerating India's growth through financial system reform, *McKinsey Global Institute*, San Francisco, CA
- Federal Highway Administration (2009) Public-private partnerships for highway infrastructure: Capitalising on international experience, *United States Department of Transportation Technical Report*, Washington DC.
- Government of India (2007) Financing of the national highway development programme, *Report of the core group*, New Delhi, India: Government of India, Planning Commission, Secretariat for the Committee on Infrastructure.
- Government of India (2005) Roads and India, New Delhi, India: *Government of India*, Ministry of Commerce and Industry.
- Heggie, I G (2008) Private financing options for roads, *University of Birmingham*, United Kingdom
- Her Majesty Treasury, (2009) Public-private partnerships signed project List. *HM Treasury*, 15, September. Available online: http://www.hm-treasury.gov.uk/ppp_pfi_stats.htm
- Kerali, H G R (2008) International trends in road management reforms, *World Bank Report*, Washington DC
- Liu, J and Cheah, C (2009) Real option application in PPP/PFI project negotiation. *Journal of Construction Management and Economics*, 27, 331-342.
- New South Wales, (2006) Parliament Report of the Joint Select Committee on the Cross City Tunnel, Sydney.
- New Zealand State Services Commission (2007) *Next steps in the land transport sector review*, April 2007, New Zealand.
- Perrupato, M (2009) Logistic infrastructure scenario in Brazil, Toll road summit of the Americas: A Bridge to the Future, *International Bridge, Tunnel and Turnpike Association*, Sao Paulo, Brazil, November 16-17, 2009.

- Postigo, A (2008) Financing road infrastructure in China and India: Current trends and future options. *Journal of Asian Public Policy*, 1(1), 71-89.
- Public Works Financing (2009) International survey of public-private partnerships, *Public Works Financing*, 242, 1-8.
- Queiroz, C and Izaguirre, A K (2008) Worldwide trends in private participation in roads: Growing activity, Growing government support, *Public-Private Infrastructure Advisory Facility Gridline Note 37*, World Bank, Washington DC.
- Queiroz, C and Kerali, H (2010) A review of institutional arrangements for road asset management: Lessons for the developing world, *Transport Papers* 32, April 2010, World Bank Group, Washington DC.
- Smyth, A, and Edkins, J (2007) Relationship management in the management of PFI/PPP projects in the UK, *International Journal of Project Management*, 25, 232-240
- Spanish Institute of Foreign Trade (2006) Industry reports: Road Infrastructure concessions in Spain, Madrid.
- South African National Treasury (2004) Public-private partnerships manual, *South African National Treasury Module 1*, 4-5
- Talvitie, A (2006) International experiences in restructuring the road sector. *Transportation Research Record*, 1558, 99-108.
- Tang, L, Shen, Q, and Cheng, E W L (2010) A review of studies on public-private partnership projects in the construction industry. *International Journal of Project Management*, 28 (2010), 683-694.
- Transportation Research Board (2009) Quantifying the benefits of context sensitive solutions. *National cooperative highway research programme report*, 642, Washington DC.
- Vassallo, J M, and Gallego, J (2005) Risk sharing in the new public works concession law in Spain, *Transportation Research Record*, 1932, Transportation research board of the national academies, Washington DC, 1-8.
- Wood, W.G (2006) People's Republic of China: China expressway retrospective study, *World Bank*, Washington DC.
- World Bank (2007) China's expressways: Connecting people and markets for equitable development, *EASTR Working Paper*, 13, January 2007.
- World Bank (2011) World development report 2012: Gender equality and development, *World Bank*, Washington DC.

A CRITICAL PERSPECTIVE OF THE INDONESIAN INSTITUTIONAL FRAMEWORK FOR PPP TOLL ROADS

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The development of toll roads in Indonesia started around 1978. Initially, the management and development of toll roads sat directly under the Government of Indonesia (GoI) being undertaken through PT JasaMarga, a state owned enterprise specifically established to provide toll roads. Due to the slow growth and low capability of toll roads to fulfil infrastructure needs in the first ten years of operation (only 2.688kms/year), GoI changed its strategy in 1989 to one of using private sector participation for roads delivery through a Public Private Partnership (PPP) scheme. In this latter period, PT JasaMarga had two roles, both as regulator on behalf of the private sector as well as being the operator. However, from 1989 to 2004 the growth rate of toll roads actually decreased further to 2.300kms/year. Facing this challenge of low growth rate of toll roads, in 2004 GoI changed the toll road management system and the role of regulator was returned to the Government through the establishment of the Toll Road Regulatory Agency (BPJT). GoI also amended the institutional framework to strengthen the toll road management system. Despite the introduction of this new institutional framework, the growth of toll roads still showed insignificant change. This problem in toll road development has generated an urgent need for research into this issue. The aim of the research is to understand the performance of the new institutional framework in enhancing PPP procured toll road development. The methodology of the research was to undertake a questionnaire survey distributed to private sector respondents involved in toll road development. The results of this study show that there are several problems inherent in the institutional framework, but the most significant problem comes from the uncertainty of the function of the strategic executive body in the land expropriation process.

Keywords: toll roads, Indonesia, PPP, institutional framework.

INTRODUCTION

The development of toll roads in Indonesia started around 1978. In the beginning, the Government of Indonesia (GoI) established PT JasaMarga, a state owned enterprise to be responsible for the management and development of toll roads. Due to the slow growth and low capability of toll roads to fulfil infrastructure needs in the first ten years of the enterprise's operation (only 2.688kms/year), GoI changed its strategy in 1989 to one of using private sector participation through a Public Private Partnership (PPP) scheme. The policy of partnering with the private sector was regarded as being a better way to meet the needs of infrastructure and improve public well-being, in addition to organizing infrastructure management more efficiently (Pessoa, 2007).

Since 1989, PT JasaMarga had two roles, both as regulator for the private sector as well as being the operator (Rostiyanti and Tamin^a, 2010). However, from 1989 to 2004, the growth rate of toll roads actually decreased to 2.300kms/year. Thus PPP has not been able to be a catalyst in accelerating the development of toll roads in Indonesia. The dual role of PT JasaMarga in the

system appears to have weakened both the strength of concession agreements and the transparency of the procurement investment process.

In order to improve the toll road management system, GoI made some changes starting with the issuance of new legislation. In the toll road sector, the Government issued Law number 38 year 2004 relating to Road and Government Regulation number 15 year 2005 on Toll Roads. The legal framework for the provision of infrastructure through PPP resulted from Presidential Decree number 67 year 2005, which relates to Cooperation between Government and Business Entities for Infrastructure Provision. These regulations become the basis for establishment of the Toll Road Regulatory Agency (BPJT) as the organization tasked to manage the development of toll roads in Indonesia. In this new policy, the role of regulator was then returned to the Government.

Since that change of policy in management of toll road development made in 2004, the performance of road development has not shown any significant improvement. Even up to 2010, the growth of toll roads since 2004 had dropped to 21.430kms/year. This paper aims to present some findings from a recently conducted research study into this issue. This issue can be reviewed from many perspectives and the issue of legislative framework in toll road development becomes the focus of the study. The aim of the study was to understand the performance of the new institutional framework in enhancing PPP procured toll road development.

LITERATURE REVIEW

Presidential Decree number 67 year 2005 states that the availability of adequate and sustainable infrastructure is needed to support national development in order to improve the economic and social welfare. Infrastructure comprises physical facilities provided by the government to meet the basic social and economic needs of human populations (Grigg, 1988; Hudson et.al., 1997; Hine et.al., 2009). In this definition, government has the monopoly to manage infrastructure. In fact, the infrastructure management policy contains some elements of monopoly (Juan, 2005; Pongsiri, 2002). 'Monopoly' by an entity for public service is possible at a certain economic scale and scope (Gomez-Ibanez, 2003) and is often a factor of consideration by governments to manage infrastructures by themselves. On the other hand, the implementation of infrastructure projects requires huge investments involving high initial capital investment into long-term assets (Juan, 2005; Shen and Wu in Algarni, Arditi and Polat, 2007; Grimsey and Lewis, 2002). The limited sources of government funding for infrastructure projects and the issue of efficiency of public providers for infrastructure services have become a basis for introducing a new approach, which is private sector involvement in infrastructure provision. Management of infrastructure with private sector involvement in the design, construction, financing and operation of infrastructure has become known as Public Private Partnership (PPP).

The term of Public Private Partnership (PPP) is not clearly defined in Indonesia's legal documentation. According to Presidential Regulation number 67 year 2005, the closest to a PPP definition is:

Cooperation project shall mean the infrastructure provision that is carried out through cooperation agreement or the issuance of operation license between Minister/ Chairman of the Institution/Head of Region and Business Entity.

Characteristics of partnership in general are to share investment, risk, responsibility and results between the two parties, namely the government (public) and private sectors, specifically:

1. Allocation of risk between the government and the private sector,
2. The private sector to design, build, finance, maintain and repair projects over the life of the contract, known as the concession period,
3. The private sector to manage the project in accordance with the quality standards set during the concession period, and
4. The project is returned to the government at the end of the concession period.

By sharing the roles and responsibilities with the sector that is best able to manage them, the operation of infrastructure services is more economical and efficient (Department of the Environment and Local Government, 2000). In PPP implementation, decision-making remains in the hands of the government. Asian Development Bank (2000) notes that in the implementation of the PPP, the government should focus on planning, structuring and regulating the PPP and infrastructure development.

To ensure the satisfactory implementation of PPP in toll road development, government has to prepare an appropriate system. A PPP toll road system includes several inter-related elements such as (1) the legal framework, (2) the institutional framework, (3) governance, (4) risk management framework, (5) funding framework (government support, pricing and payments), and (6) capacity building (Hine et al., 2009). Fischer, et al. (2006) stated that the availability of an institutional framework becomes one of the critical success factors in the implementation of PPP. Partnerships UK (PUK) is a PPP unit in the UK, Partnerships Victoria in Australia, PIMAC in South Korea, the Hong Kong Efficiency Unit are examples that show appropriate institutional frameworks for the successful implementation of PPP.

The institutional framework in the implementation of PPP-based toll roads in Indonesia is regulated by various instruments, ranging from laws to ministerial regulations. An overview of the relevant government agencies in Indonesian PPP toll roads based on the related regulations can be seen in Figure 1.

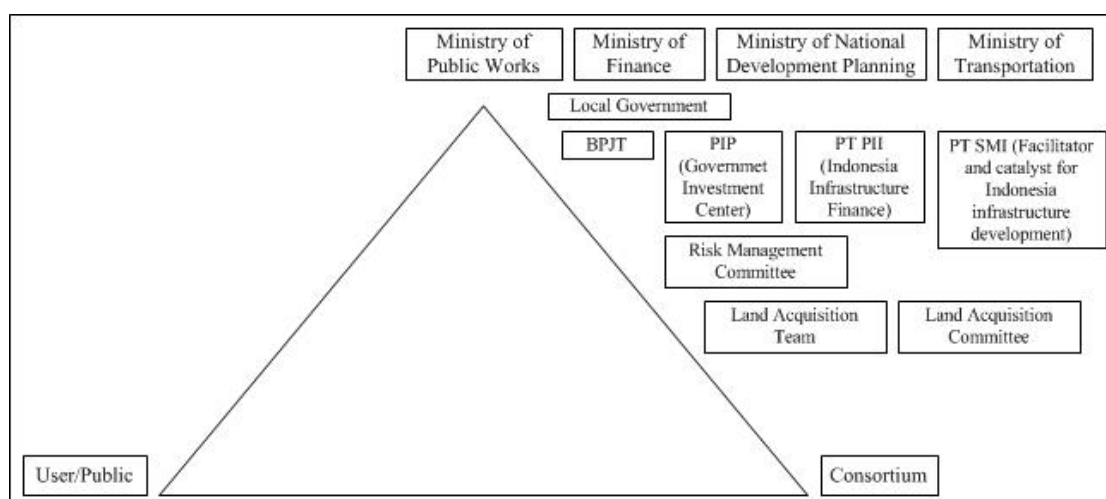


Figure 2: Institutional Framework in Indonesia PPP Toll Road

The authorities as well as roles and responsibilities of some of the government agencies in Figure 1 are as follows:

1. Ministry of Public Works Regulation 11/2006 on the Authority and Duty for Toll Road Operations, Directorate General of Highways under Ministry of Public Works delegates authorities to formulate policies and undertake general planning, to guide the implementation of toll roads (such as formulate technical standards and manuals), to undertake concession (preparation, financing, land acquisition, etc.) and to supervise the implementation.
2. The same regulation states that BPJT has authorities to arrange toll road operation (involves giving advice on the initial rate and its adjustment and taking over the road at the end of the concession period), to oversee the concession such as investment in land acquisition and to supervise including monitoring and evaluation of the toll road.
3. According to Ministry of Finance Decree 518/KMK.01/2005, the task of the Risk Management Committee include conducting assessments of the feasibility of the government support request, establishment of criteria for compliance agreement, monitoring of implementation of cooperation requiring government support and provision of policy recommendations on risk management infrastructure provision to the Minister of Finance.

4. The Land Acquisition Committee appointed by provincial government has duties to inventory land and its legal status, assess and propose the amount of compensation for land, provide consultation for public, and administer and record all land acquisition files.
5. A Land Acquisition Task Team appointed by the Directorate General of Highways has duties to, submit requests for payment, plan land acquisition programs for each toll road, and submit all documents for land acquisition to the Directorate General of Highways.

METHODOLOGY

Figure 1 shows the complexity of the institutional framework required to support the implementation of PPP toll road projects in Indonesia. Based on this framework and on a detailed literature review, a questionnaire was developed focusing on the following factors of interest:

1. The clarity of agency responsibilities for each stage of implementation (Kumaraswamy and Zhang (2001), Zhang (2005), Aziz (2007), Jacobson and Choi (2008));
2. The clarity of coordination among government agencies involved (Tam (1999), Kumaraswamy and Zhang (2001), Zhang (2005), Aziz (2007));
3. Government agency staff knowledge in PPP based toll road (Tam (1999), Kumaraswamy and Zhang (2001));
4. Commitment of the government agency (Tam (1999), Zhang (2005), Aziz (2007), Jacobson and Choi (2008));
5. Not overlapping responsibilities in government (Hine, et.al, (2009));
6. Experienced staff and government agencies (Aziz (2007), McQuaid and Scherrer (2010)); and
7. The independency of regulatory agencies in the management of toll road (Hine, et.al. (2009).

From the review of Indonesian regulatory documents, some factors emerged as follows:

1. The certainty of government agencies functions in the management of toll roads;
2. The certainty of inter-agency coordination in the process of land acquisition due to the complexity of land procedural process;
3. The clarity of the role of government agencies in the implementation of the toll road; and
4. Certainty highest executive body (president) functions in the process of expropriation of land.

These factors are developed into a list of questions that led to the development of a survey that was distributed to private sector respondents involved in toll road development in Indonesia. The survey questionnaire uses a Likert scale that ranges from 'extremely poor' to 'excellent' performance of certain aspects of the PPP-based toll road system in Indonesia. Interviews with some respondents were also conducted to gain thorough information and deepen understanding regarding the perceived problem.

Two methods were applied for data processing, correspondence analysis and factor analysis. Correspondence analysis is utilized to observe the trend of the answers of the respondents to the set of factors. The original scale of measurement described above was simplified as 'poor', 'average' and 'excellent'. The reason behind the simplification is to see the tendency of respondents' answers toward the measurement. The scale is divided into six categories which are the first two scales related to poor, the second two scales to average and the last two to good. Thus, these categories are reduced to three categories. Factor analysis was then applied to identify the dominant factors. The goal of this was to enable retrofit of the dominant factor to improve the subsequent performance of the management system for toll roads.

RESULT AND ANALYSIS

The survey was distributed via electronic mail and in-person interviews with some of the respondents. The backgrounds of the respondents were varied in order to obtain more comprehensive data and different viewpoints. These various sources indicate that the field data collection process is quite valid when viewed from the category of respondents involved. Respondents came from a variety of organizations: State-Owned Enterprises, Private Enterprises, Consortium, and Multilateral Agencies. Respondents of Consortium come from several business

entities that develop and operate toll road in Jakarta, West Java and Central Java. Most respondent from consortiums came from Java Island since toll road development is concentrated in the island. Organizational profiles of the respondents are 61% Consortium, 23% State-Owned Enterprise, 8% Private Enterprise and 8% Multilateral agency.

The results of data analysis based on questionnaires and interviews provided some important insights regarding the perceived problems of the institutional framework that need to be addressed to improve the implementation of the system that exists today. Using factor analysis, there are three main points to be addressed. These are as follows:

1. *Complexity of institutional framework in land acquisition*

In Indonesia, the land acquisition process is started after the consortium selection and procurement process is completed. The short time frame for this process causes problems such as, escalation of land prices, the reluctance of people to release the land, a number of government agencies involved and these all add to the complexity of the process of land acquisition. At least there are six government bodies including local government involved in land acquisition process. As a result, bureaucracy becomes too long and causes delays the process (Rostiyanti and Tamin^b, 2010).

Difficulties with the process escalate when the dispensation from the President for the land expropriation is not working as it stated in the regulations. Private sector agrees that this is considered to be the worst factor in institutional framework for toll road development. This factor is a crucial issue as it has caused uncertainty for private sector. The processes of reformation and democracy in almost all aspects of life have made the government hesitant in making decisions for the public interest (Tamin *et al.*, 2011). Democracy has often been misunderstood as meaning that every decision must be satisfactory to all parties in order to respect human rights. Due to political considerations, the President tends to avoid decisions necessary for national development if they are perceived to be potentially unpopular with the public. However, some land acquisition regulations clearly state that the expropriation of the land as a last resort to acquire land is rest with the President, as the highest executive body. Issuance of a new law (Law number 2 year 2012) regarding Land Acquisition for Development of Public Interest is still causing uncertainty in land acquisition due to the elimination of the expropriation process by President. Final authority for land expropriation is rest with the Supreme Court. This situation can lead to delay in implementation of toll road projects.

Uncertainty in the land acquisition process influences investment in toll roads due to immeasurability of cost and unpredictability of duration of this process. Due to the difficulty of the land acquisition process, consortium financial considerations are affected significantly. The consortium may not be able to receive funding from relevant agencies in situations where land acquisition has not yet been completed.

2. *Clarity of roles, responsibility and coordination of institutional framework in general*

Government forms a regulatory agency and appoints some committees and agencies to supervise all aspects of PPP implementation in toll road development. Such formations and appointments are regulated through current provided laws. The study shows that generally, the private sector considers the development of toll roads through implementation of PPP to be strongly influenced by the clarity of the functions of government bodies involved. Also, private sector considers that the clarity and certainty of government bodies' function is lacking in the institutional framework for PPP toll roads. This finding indicates that private sector expects government to review the existing mechanisms and regulations and develop a new mechanism that avoids overlapping agencies handling PPP for toll roads. Basically, greater clarity is required relating to the roles and responsibilities of government bodies in terms of the completeness of the legal framework governing each agency's involvement in PPP toll road procurement. Without a complete legal framework to regulate the functions, bureaucracy becomes lengthened as exists currently.

PPP implementation in Indonesia's toll road development currently does not reflect a state of cooperative management. The complexity of the institutional framework with such unclear roles is still a major obstacle to improvement. Because of current government bureaucracy, the effective implementation of PPP is still fraught with problems.

3. *Capability of staff and government bodies in PPP*

One of the other factors that is considered to be a dominant issue in the institutional framework was that the staff of government bodies often has relatively little experience in PPP. According to the study, government still manages the toll road development in traditional manner where the private sector involvement is only on construction phase. When PPP as a new approach in providing infrastructure is proposed, the management and bureaucracy have not been changed. It becomes a constraint for private sector to perform its roles in providing infrastructure. The knowledge of PPP paradigm that is different than that of traditional approach should be understood by the staff and government bodies in order to improve the implementation of PPP in toll road development.

Molenaar and Songer (1998) in the Tang, et al. (2010) examined the variables that are statistically correlated to the success of projects such as agency experience in managing PPP projects. Their results were confirmed by McQuaid and Scherrer (2010) who observed that a lack of experience in government agencies and staff causes unequal allocation of risk, one of the main factors that influences the implementation of PPP. Zhang (2005) and Li et al. (2005) noted that the negative factors emerging as constraints in the development of infrastructure such as toll roads are the lack of experience and understanding of PPP.

Problems in the institutional framework of PPP toll roads eventually lead to a review of the feasibility of toll road investment. Perceived from the aspect of investment, private sector assumes that toll road projects offered by government are not bankable. Government is considered immature in project preparation and development of a business plan. The private sector has not seen any financial support from government such as loan guarantees, incentives and appropriate risk allocation to enhance the attractiveness of the investment.

CONCLUSION

While there are some problems that exist regarding the institutional framework of PPP implementation in Indonesian toll road development, other factors are less relevant to be considered as source of problems for PPP implementation. First of all, the most significant factor to be addressed by Government of Indonesia (GoI) in order to enhance PPP implementation in toll road development is to underpin the function of the President in land expropriation process. Although a relevant law has been issued to regulate the process, without a political willingness of the President to execute the law, the problems described in the study will still exist. Political will should not only provide regulations for management and establishment of an institutional framework, but should also ensure that this framework functions according to existing regulations.

The results of this study suggest that the other issue that impacts significantly on the implementation of toll road PPP is the continuing lack of clarity of the functions of government agencies. The complexity of the institutional framework plus an overlap of roles and responsibilities is a problem that must be resolved to reduce bureaucracy. Simplification of bureaucracy is an alternative mechanism to facilitate partnership with the private sector.

The staffs of government bodies need to be more experienced in PPP systems in order to build and operate a competent institutional framework. The necessary experience can be obtained from a variety of approaches, including training, and review of best practices in the implementation of PPP toll roads in other global locations. Improving experience of the staff and government bodies is crucial to improve reliability in facing all aspects of implementing effective PPP procurement of toll roads in Indonesia.

REFERENCES

- Algarni, AM, Arditi, and D, Polat, G (2007) Build-Operate-Transfer in Infrastructure Projects in the United States. In: *Journal of Construction Engineering and Management*, 133(10), 728-735.
- Aziz, AMA (2007) Successful Delivery of Public-Private Partnerships for Infrastructure Development, In: *Journal of Construction Engineering and Management*, 133(12), 918-930.
- Fischer, K, Jungbecker, A, and Alfen, HW (2006) The Emergence of PPP Task Forces and Their Influence on Project Delivery in Germany. In: *International Journal of Project Management*, 24, 539-547.
- Gomez-Ibanez, J, Lorrain, D, Osius, M (2004) *The Future of Private Infrastructure*, Working Paper, Harvard University.
- Grigg, N.S. (1988) *Infrastructure Engineering and Management* John Wiley & Sons, New York.
- Grimsey, D and Lewis, MK (2002) Evaluating The Risks of Public-private Partnerships for Infrastructure Projects. In: *International Journal of Project Management*, 20(2), 107-118.
- Hine, J Queiroz, C and Chelliah, T (2009) *Toolkit for Public-Private Partnership in Roads and Highways*, PPIAF, World Bank.
- Hudson, WR, Haas, R, and Uddin, W (1997) *Infrastructure Management: Design, Construction, Maintenance, Rehabilitation, Renovation*, Mc. Graw Hill. New York.
- Jacobson, C and Choi, SO (2008) Success Factors : Public Works and Public Private Partnership, In: *International Journal of Public Sector Management*, 21(6), 637-657.
- Juan, EJ (2005) *Developing Effective Public Private Partnerships (PPPs) in The Transport Sector*, Workshop PPP in Highways, World Bank.
- Kumaraswamy, MM, Zhang, XQ (2001) Governmental Role in BOT-led Infrastructure Development. In: *International Journal of Project Management*, 1, 195-205.
- McQuaid, RW, and Scherrer, W (2010) Changing Reasons for Public-Private Partnerships (PPPs), In: *Public Money & Management*, 30(1), 27-34.
- Pongsiri N (2002) Regulation and Public Private Partnerships. In: *International Journal of Public Sector Management*, 15(6), 478-495.
- Pessoa, A (2007) Public Private Partnerships in Developing Countries: Are Infrastructure Responding to The New ODA Strategy?. *Journal of International Development*, 20, 311-325.
- Rostiyanti, SF and Tamin, RZ (2010a) Identification of Challenges in Public Private Partnership Implementation for Indonesian Toll Road. In: *Proceeding of the First Makassar International Conference on Civil Engineering*, 8-9 March 2010, Hasanudin University, 1, 1131-6.
- Rostiyanti, S.F. dan Tamin, R.Z. (2010b) Kerangka Institusional Pengadaan Tanah Pada Proyek Jalan Tol Di Indonesia: Beberapa Pembelajaran. *Prosiding Seminar Nasional Teknik Sipil*, 6, G71-G80.
- Tam, CM (1999) Build-operate-transfer Model for Infrastructure Development in Asia: Reasons for Successes and Failures, In: *International Journal of Project Management*, 17, 377-382.
- Tamin, RZ, Marzuki, PF, Rostiyanti, SF (2011) Complex and Uncertain Land Aquisition: One of Major Obstacles in Toll Road Public Private Partnership (PPP) Project in Indonesia, In: *Proceedings of Joint International Symposium on Social Management Systems 2011*, 71-78.

- Tang, L, Shen, Q, and Chen, EWL (2010) A Review of Studies on Public–Private Partnership Projects in The Construction Industry, In: International Journal of Project Management, 28, 683-694.
- Zhang, X, (2005) Paving the Way for Public–Private Partnerships in Infrastructure Development, In: Journal of Construction Engineering and Management, 131(1), 71-80.

IDENTIFICATION OF BARRIERS AND ENABLERS OF E-PROCUREMENT PROCESSES IN PPP PROJECTS DELIVERY IN NIGERIA

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The procurement processes in PPP projects development have come under close scrutiny since the inception of the Infrastructure Concession Regulatory Commission (ICRC) for monitoring and coordinating the procurement procedure which is usually done manually. The manual tendering procedure usually poses many challenges such as delays and high bidding costs. However, with the increasing use of the internet, e-procurement can offer viable alternative procedure that will bring improvements to all aspects of the PPP procurement process, although the implementation of e-procurement processes in such contexts face many challenges in Nigeria. This paper empirically identifies the barriers and enablers that hinder or enhance the e-procurement processes in PPP contexts, drawing upon a questionnaire survey from PPP practitioners. The main findings show that the implementation of e-procurement processes in PPP projects are hindered by poor state of electricity power supply, legal issues surrounding e-procurement, unclearly established procedures, reluctance to embrace new ideas, and lack of e-procurement knowledge. Nevertheless, the adoption of e-procurement system is enhanced by supportive leadership, policies, willingness to embrace the system, trust in management, and security requirement control measures. These findings have considerable relevance to understanding the mechanism of e-procurement processes in PPP projects in overcoming the barriers and enhancing enablers in Nigeria. Similarly, government and PPP practitioners can use the findings to efficiently design e-procurement frameworks that can help to overcome the barriers encountered while enhancing the enablers to implement e-procurement process in PPP projects delivery in Nigeria.

Keywords: Barriers, Enablers, E-Procurement, Nigeria, PPP Projects.

INTRODUCTION

In Nigeria, a range of procurement options have been used for procuring infrastructure projects such as building, civil and heavy engineering projects. The procurement processes which date back to the colonial era have been subjected to various changes and metamorphoses. Wahab (2008) noted that such procurement processes were categorized into pre-1999 procurement process and the 1999 to 2007 procurement reform. This reform informed the establishment of National Council of Public Procurement (NCPP) and Bureau of Public Procurement (BPP) to control procurement procedures in line with international best practice. On the other hand, the Infrastructure Concession Regulatory Commission (ICRC) was also established to control the procurement procedures of Public-Private-Partnership (PPP) projects among other things (Figure 1). This procedure is usually carried out manually, and involves many challenges in the form of delay and high procurement cost (Ibrahim et al, 2006; Gidado, 2010; and Dahiru, 2011).

However, with the increasing used of the internet, electronic procurement (e-procurement) can be used to replace the manual mode of PPP procurement procedure. e-procurement is one of the information technology tools that has been highlighted by construction industry experts to assist in changing the industry's culture and improving the PPP procurement procedure. In addition, there are growing concerns over the application of e-procurement and less is known about the barriers and enablers that can hinder or enhance its application in PPP projects delivery. Therefore

the aim of this paper is to identify and evaluate the relative importance of the barriers and enablers associated with application of e-procurement in PPP projects delivery in Nigeria.

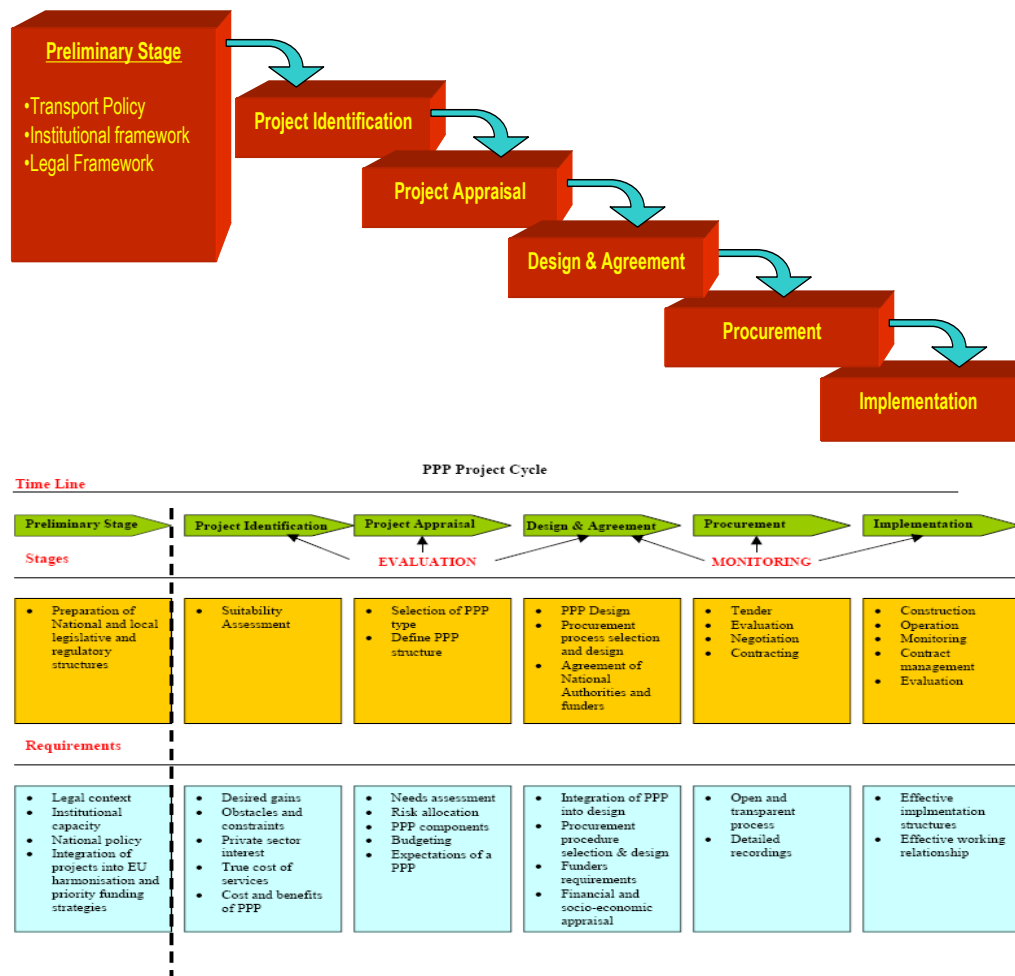


Figure 1: PPP Procurement Process in Nigeria

The manual mode of PPP procurement procedure is more complicated and more costly and time consuming than those of e-procurement approaches (Kwak et al, 2009; Adetola, 2010). Moreover, Dahiru (2011) observed that the manual modes of PPP procurement procedure suffer from various problems such as inordinate delays in tender processing, heavy paper work, multi level scrutiny that consumes a lot of time, physical threats to bidders, human interface at every stage, inadequate transparency, and discretionary treatment in the entire tender procedure. These problems have led to the termination of most PPP projects at the procurement stage of development.

Continuous developments in Information Technology systems and increased globalization require greater and more efficient methods of collaboration between public and private sectors in PPP projects development. E-procurement provides the foundation and strategy for improved collaboration throughout the PPP project lifecycle (Eadie *et al*, 2007). Electronic procurement also provides a centralized process to help ICRC improves efficiency and accountability in PPP projects delivery. In addition to automating and streamlining the procurement processes of the ICRC, improving efficiencies and transparency, thereby reducing the costs of those processes within and between the PPP context (Kajewski and weippert, 2004).

Studies conducted by Wigwe (2008) and Dahiru (2011) shows that PPP infrastructure development in Nigeria has consistently indicated weaknesses in procurement processes. In addition, procurement functions within the PPP context were perceived by many to be routine and repetitive processes. Moreover, the ICRC has separate procurement units to assign its staff to

coordinate the specific PPP procurement tasks and these processes have been labour-intensive, dominated by paper, thereby making them costly and inefficient.

Therefore, the study of e-procurement in PPP is of paramount importance in as it is a relatively new area in academic research in Nigeria, and this research work is expected to add some value on the general concept of e-procurement. This will be beneficial to government and PPP practitioners as a reference material in designing framework for e-procurement in the PPP context. Similarly, the findings of the study could also be of significance to the public sector for better control over PPP procurement spending, reduced duplication in paperwork and tasks, real time bidding and response, shorter tendering cycle and increased geographical outreach.

LITERATURE REVIEW

e-Procurement refers to the use of Internet-based (integrated) information and communication technologies (ICTs) to carry out individual or all stages of the procurement process to accelerate and streamline the process of identifying and selecting reliable concessionaire (Croom & Brandon-Jones, 2004). E-procurement solutions are seen as a way to address BPP and ICRC procurement requirements in PPP projects delivery in Nigeria. It has become apparent that the more the procurement process is supported by Internet technology, the easier it will become to develop and implement efficient and effective service delivery (Susan and Catherine, 2006). The e-procurement infrastructure and procedures can facilitate the achievement of the principles including transparency and accountability requirements of PPP infrastructure projects while enhancing efficiency, effectiveness, and flexibility in the procurement process. Similarly, e-procurement has the potential to promote operating efficiency in public sector procurement and provide significant cost savings (Vaidya et al, 2006). One of key logical advantages of electronic transaction management is that it frees procurement staff for procurement evaluation and contract management roles (Eadie et al, 2006). Furthermore, management information can be extracted from the e-procurement system using standard reporting software (Kaliannan et al, 2009).

Application of e-Procurement strategies is seen as an effort to improve the procurement goals such as: quality; timeliness; cost; minimizing business, financial and technical risks; maximizing competition; and maintaining integrity (Corsi et al, 2006; Lavelle and Bardon, 2009; Tavares, 2010). However, the challenge of controlling the range of variables required to reap the benefits of e-procurement implementation are very high in Nigeria, demanding high cost and time consuming. This may take several years for public sector agencies like BPP and ICRC to fully reap the strategic and operational benefits of e-procurement. Thus one way of facilitating the application of e-procurement in PPP project delivery is by identifying and understanding the barriers and enablers that influence the process to make a success or otherwise.

PPP Infrastructure Procurement Challenges

The main sectors in which PPP procurement option is used to procure public infrastructure facilities in Nigeria include: power, ports, roads, airport terminals, water supply and water treatment, building, schools, oil and gas (National policy on PPP, 2009). It is expected that through e-procurement processes, the ICRC will promote innovation, manage the procurement risks, and provide value for money in PPP projects delivery. In addition, the rate of corruption will be greatly reduce in the procurement procedure, and technical skills and expertise of the private sector will be greatly achieved (Gidado, 2010; Dahiru, 2011).

Despite the number of PPP projects delivered in the country, only few were successful due to several challenges in the procurement, construction and operation (Ibrahim, 2006; Adetola, 2009; Shonibare, 2010; Gidado, 2010). For instance, Ibrahim (2006) identified some of the challenges as the lack of PPP experience in both the public and private sector domains, the complexity of the PPP management structure and lack of clear set of strategies to collaborate with project stakeholders. It is also observed that the barriers of PPP implementation include: lack of enabling environment to allow the PPP procurement option to thrive; political interference by government;

lack of adequate skills and experience in the implementation process; and lack of serious competition (Adetola, 2010). Similarly, the barriers that affect concessionaires' participation in PPP projects were identified as: high transaction and bidding cost; complex procurement procedure; and lengthy negotiation periods (Dahiru, 2011). These challenges have led to inefficiencies in the PPP project delivery processes, thus reducing the competition and efficiency government wishes to harness from the private sector. e-procurement processes are essential in overcoming these inefficiencies. For better performance of PPP projects, e-procurement provides the foundation and strategy for improved collaboration throughout the project lifecycle (Eadie *et al*, 2006). However, due to the challenges faced in PPP projects, it is only prudent for government and private sector to identify, evaluate and rank the barriers and enablers that influence e-procurement process, in order to assist in implementing e-procurement processes in PPP projects delivery in Nigeria.

Barriers and Enablers of e-procurement processes

E-procurement in PPP context can be influenced by barriers and enablers that can restrict or enhance its implementation in Nigeria. For the purpose of this study barriers are defined as those factors or issues which restrict or prevent the implementation of e-procurement, while enablers refer to as those factors or issues which produce benefits/success through the implementation of e-procurement in PPP projects delivery. However, there is still considerable debate on the factors that negatively affect e-procurement system. Pieprzyk and Wang (2009) identified the lack of security to address generic security requirements like confidentiality and integrity; authentication and non repudiation do not provide fairness and are vulnerable to collusion and favouritism. Dishonest participants, either the principal or bidder can collude to alter or view competing tenders which would give the favoured bidder a greater chance of winning the PPP contract. Certainly, as tendering procedure is carried over insecure networks, the e-procurement system should provide communication security which protects information that is sent between all participants. This is generally achieved by using a strong encryption (Assar and Boughzala, 2011). It is also essential that an e-procurement system provides strong security, as submissions are stored in a database. Similarly, lack of specific legal regulation, different national approaches, validity, and enforceability were identified as legal difficulties characterised as major barriers to e-procurement (Gupta *et al*, 2009). In addition, Azar *et al* (2011) pointed out that, resistance to change is one of the biggest barriers to the introduction of e-procurement within the public sector. Moreover, resistance to change, lack of a widely accepted solution and lack of leadership, which are cultural issues, were also highlighted as barriers to e-procurement in the USA (Davila *et al*, 2003). However, many studies (Assar and Boughzala, 2011; Wong and Sloan, 2004; Hawking *et al*, 2004; Azar, 2011) show that lack of IT infrastructure, IT system too costly, and lack of technical expertise were considered as barriers in the construction industry. Lack of e-procurement knowledge/skilled personnel and lack of a business relationship with suppliers capable of e-procurement are related to personnel issues relying heavily on traditional forms and means of procurement (Corsi *et al*, 2006).

The identification of the enablers to e-procurement implementation is paramount to achieving success in PPP infrastructure projects delivery. To this need, several studies (Corsi *et al*, 2006; Lavelle and Bardon, 2009; and Tavares, 2010) had identified willingness, administrative support, policies/procedures, organisational culture, trust in management, supportive leadership and supportive structures as factors that can positively influence a successful implementation of e-procurement in PPP project delivery. Similarly, security requirement was determined as important to e-procurement (Pieprzyk and Wang, 2009; Kaliannan *et al*, 2009). Among other factors, price reduction in tendering; reduction in time to source materials; reduced administration costs; reduced staffing levels in procurement; gaining competitive advantage; improving communication; enhanced decision making and market intelligence; and reduced operating and inventory costs were empirically determined as the most important drivers to e-procurement implementation in Northern Ireland (Eadie *et al*, 2007).

Clearly due to these challenges of e-procurement system, some of these factors must be more important than others. Thus, it is necessary to attempt to rank them from the perspective of PPP

practitioners, in terms of the consideration that should be given to them in the Nigerian environment. Therefore the findings of the study will help in designing framework for the successful implementation of e-procurement in PPP projects delivery in Nigeria.

RESEARCH METHOD

Data needed for this study were collected from PPP practitioners on specific PPP procurement processes via a structured questionnaire that was developed following a thorough review of related literature and interview. The rationale behind the questionnaire survey is to get the opinions of large number of respondents that will reflect the true picture of e-procurement challenges in PPP projects delivery in the country. Systematic sampling technique was also used in getting the appropriate respondents from: Abuja, Abia, Cross rivers, Enugu, Ibadan, Kano, Kaduna, Lagos, Niger, and Rivers state as being the few states in Nigeria where PPP projects are currently being developed. These states were selected from the six geopolitical zones of the federation which offered a greater chance of getting substantial number of experienced respondents. Using such a data collection technique saves a considerable amount of time and effort and normally a generalised fair sample is achieved (Churchill, 1999; Lavelle and Bardon, 2009).

The structured questionnaire was administered on, and completed by the respondents. The survey was identified a total of eighteen factors relating to e-procurement barriers and seventeen factors relating to e-procurement enablers in PPP infrastructure projects delivery. Over 150 questionnaires were administered on respondents using their in depth knowledge and experience in PPP infrastructure development. 96 responses were received out of 150 distributed, representing 64% response rate. Respondents were either senior managers or partners with responsibility for PPP issues and were asked to rank the identified barriers and enablers of e-procurement on a scale of 1 (very important) to 5 (very unimportant). The responses that were received from the survey participants were tabulated and analyzed individually using simple percentages. This technique puts the factors in rank order and indicates how much the top ranked is more important than the next and so on.

STUDY FINDINGS

Barriers that negatively affect e-procurement application

Table 1 shows the respondents' rating of the most important as well as least important barriers to the application of e-procurement in PPP context.

Table 1: Barriers of e-procurement processes

Barriers of e-procurement processes in PPP projects delivery	Respondents	Percentage (%)	Ranking
Poor state of electricity supply	68	71	1
Legal issues surrounding e-procurement	56	58	2
Unclearly established procedures	52	54	3
Reluctant to embrace the new ideas	48	50	4
Lack of e-procurement knowledge	42	44	5
High level of corruption	40	42	6
External influences (political & social)	36	38	7
Relative inexperience stakeholders	34	35	8
Security concerns	32	33	9
Inter operation ability concerns	30	31	10

Lack of supportive IT infrastructure	28	29	11
No business benefits realized	27	28	12
Unnecessary influence made by other parties	25	26	13
Reluctance to change the industry routine	23	24	14
Concerns over complexity and IT skill required	20	21	15
Hard to share information	18	19	16
Poor reliability	16	17	17
IT systems are too costly	15	16	18

The five barriers that negatively affect the application of e-procurement in order of importance are: poor state of electricity supply (71%); legal issues surrounding e-procurement (58%); unclearly established procedures (54%); reluctance to embrace new ideas (50%); and lack of e-procurement knowledge (44%). Similarly, the five less important barriers that negatively affect e-procurement application are: IT systems are too costly (16%); Poor reliability (17%); Hard to hear information (19%); Concerns over complexity and IT skills required (21%); and Reluctant to change the industry routine (24%).

Enablers that positively affect the application of e-procurement

Similarly, Table 2 shows respondents' rating of the most important as well as the least important enablers to the e-procurement application in PPP context.

Table 2: Enablers of e-procurement processes

Enablers of e-procurement processes in PPP projects delivery	Respondents	Percentage (%)	Ranking
Supportive leadership	76	79	1
Policies relating to e-procurement	64	67	2
Willingness to adopt e-procurement	56	58	3
Trust in management	52	54	4
Security requirement control measures	51	53	5
Reduced administrative costs	48	50	6
Reduced staffing levels in procurement	46	38	7
Gaining competitive advantage	42	44	8
Improved communication	40	42	9
Enhanced decision making	36	38	10
Reduced operating & intelligence costs	34	35	11
User friendly technology	30	31	12
Direct networking	28	29	13
Common language and understanding	26	27	14
Reduced risk exposure	22	23	15
Likely to be more sustainable	20	21	16
Good communication between the relevant parties	18	19	17

Table 2 indicates that the top five enablers that positively affect the application of e-procurement are: supportive leadership (79%); policies relating to e-procurement (67%); willingness to embrace the e-procurement system (58%); trust in management (54%); and security requirement control measures (53%).

The five enablers that least positively affect e-procurement application are: good communication between the relevant parties (19%); likely to be more sustainable (21%); reduced risk exposure (23%); common language and understanding (27%); and direct networking.

DISCUSSION

From a Barrier Perspective

Poor state of electricity supply is perceived as the most significant barrier that negatively affects the application of e-procurement processes (Table 1, 71% of respondents). This shows that the epileptic nature of electricity power supply across the nation has become a stumbling block in supporting ICT infrastructure facilities for e-procurement application in Nigeria. The result indicates that inconsistency of electricity power supply nationwide that can guaranteed the e-procurement application remain to be a serious problem. This has also translates to the nation's problems of electricity supply and capacity to support and facilitate effective e-procurement services through electronic means has been a great problem. Similar findings have been reported (Assar and Boughzala, 2011; Wong and Sloan, 2004; Hawking *et al*, 2004; Azar, 2011). Therefore the finding suggests that for e-procurement to thrive, government need to provide consistent electricity supply that can effectively support ICT facilities throughout the country.

The second most significant barrier that affects the e-procurement process is legal issues surrounding e-procurement (Table 1, 58% of respondents). This suggests that lack of proper legal framework to support and control the complexity in e-procurement contractual relationships between the PPP projects participants remain a strong factor hindering the implementation of e-procurement. Similarly, various studies show that there is enormously wide degree of legal strategies of e-procurement approaches worldwide (Eadie et al, 2007, Bardon, and Lavelle, 2009; Gupta et al, 2009). This has been the case in Nigeria where legal and regulatory institutions remain less effective than the developed countries. Legal difficulty is one of the main barriers to e-procurement. Therefore, a well structured e-procurement regulation framework can effectively facilitate its implementation in PPP projects delivery.

From an Enabler Perspective

Supportive leadership is perceived as the most significant enabler that positively affects e-procurement processes (Table 2). 79% of the respondents believed that this was the most important factor that positively enables successful e-procurement processes. This finding concurs with previous findings by Azar et al, (2011) that supportive leadership functions do foster and enhance effective implementation of e-procurement. The finding suggests the need to have supportive, good leadership from the government and other PPP practitioners for e-procurement to successfully be implemented and sustained. Relying solely on frameworks may not be sufficient. Effective and supporting leaders will be able to support favourable e-procurement framework through clearly articulated goals and strategies.

Policies relating to e-procurement (67%) and willingness to embrace the system (58%) were determined as the 2nd and 3rd factors that positively influence the application of e-procurement in PPP projects delivery. This translates to appropriate policies relating to e-procurement especially in PPP context should be put in place. Willingness to embrace the e-procurement system was also determined as a significant driver to e-procurement application. The finding is similar to the previous findings by numerous researchers from different countries (Corsi et al, 2006; Lavelle and Bardon, 2009; and Tavares, 2010). This suggests that for successful e-procurement to occur in PPP projects, government and relevant stakeholders should secure commitment. Thus, in order to achieve a successful e-procurement process, the government and PPP practitioners should commit their best resources to the development of e-procurement in PPP context.

CONCLUSIONS

Even though there has been an increase in the use of PPP to procure public infrastructure facilities in Nigeria, there are still growing concerns over the difficulties in the procurement aspects of several PPP projects. Electronic procurement system is being proposed as solution, but many factors influence the application of the system. In fact, it is possible to identify and rank the relative importance of the factors that hinder or enhance the application of electronic procurement in PPP context. This paper has investigated and identified the most significant barriers and enablers to a successful e-procurement process in PPP projects in Nigeria. Data from questionnaire survey has been used to identify and rank the most significant factors that enable or hinder a successful e-procurement process in PPP projects. The five barriers that emerged as negatively affecting the e-procurement process, in order of descending significance are: poor state of electricity power supply; legal issues surrounding e-procurement; unclearly established procedures; reluctant to embrace the new ideas; and lack of e-procurement knowledge. Similarly the five most significant enablers that positively affect e-procurement processes are identified, in order of descending significance as supportive leadership; policies relating to e-procurement; willingness to embrace the system; trust in management; and security requirement control measures. These have concurred with previous findings on the success factors of e-procurement processes in PPP context (Azar et al, 2011; Corsi et al, 2006; Lavelle and Bardon, 2009; and Tavares, 2010). Therefore the findings summarily translate that both public and private sectors should commit their best resources to the development of e-procurement in PPP context.

Based on the research findings, the paper proposes that, for the government to effectively design e-procurement framework in PPP context, more attention should be paid to the identified barriers and enablers for the success of e-procurement processes in Public-Private-Partnership projects delivery.

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REFERENCES

- Adetola, F O (2010) An over view of Public-Private-Partnership and concession in the delivery of public services and infrastructures. A paper presented at the NIQS Abuja chapter on infrastructure concession held at merit house, Abuja.
- Assar, S and Boughzala, I (2011) E-procurement Platforms in the French Public Sector: *Journal of Information Technology in Construction* 2(16)pp 1-20
- Azar, S A; Zarei, B Soltanpanah, H and Alaniazar, S (2011) E-Procurement System Challenges and Design: An UTM Approach: *Australian Journal of Basic and Applies Sciences*, 5(12) pp 1 & 2
- Bardon, A and Lavelle, D (2009) e-tendering in construction: time for change? Built Environment research paper presented at Northumbria University, UK.
- Corsi, M Gumina, A and Ciriaci, D (2006) How e-government may enhance public procurement. International public conference proceedings held between 21 – 23rd September, 2006 in Italy.
- Dahiru, A (2011) Appraisal of Build-Operate-Transfer (BOT) Procurement Process in Infrastructure Projects Development in Nigeria. Unpublished PhD thesis, Department of Building, Ahmadu Bello University Zaria, Nigeria.

- Dahiru, A (2012) Assessment of Public-Private-Partnership Regulatory Framework for Infrastructure Development in Nigeria. In: Hughes, W (Ed.), West Africa Built Environment Research (WABER) Conference Proceedings held at Merit Award House, Maitama, Abuja, Nigeria. 2(1) pp 451 – 562
- Eadie, R Perera, S Heaney, G and Carlisle, J (2007) Drivers and Barriers to public sector e-procurement within Northern Ireland's construction industry: *Journal of Information Technology in Construction* 3(12) pp 103 – 120.
- Gidado, K (2010) A model for PFI implementation in the Sub-Saharan Africa. Nigeria as a case study. A paper presented at the third international world of construction project management conference held in Coventry University, UK
- Gupta, S L; Jha, B K and Gupta, H (2009) E-procurement: A Developing Country Perspective (A Study on New Trends Concerned with Developing Countries): *AIUB Journal of Business and Economics*, 8(2) pp (3)
- Ibrahim, A D, Price, A D F; and Dainty, A R J (2006) The analysis and allocation of risks in Public-Private-Partnerships in infrastructure projects in Nigeria. *Journal of Financial Management of Property and Construction*, 3(11) pp 149-163
- ICRC (2011) Public-Private-Partnership infrastructure projects development nationwide. Publication of the Infrastructure Concession Regulatory Commission (ICRC), Abuja.
- Kajewski, S and Weippert, A (2004) E-tendering: Benefits, Challenges and Recommendations for Practice: *Proceedings CRCCI International Conference: Clients Driving Innovation, Surfers Paradise, Australia*.
- Kaliannan, M Awang, H Raman, M and Dorasamy, M (2009) e-procurement for the public sector: Determinants of attitude towards adoption. A paper presented at the Faculty of Administrative Science & policy studies, University of Technology, Malaysia.
- National Policy on PPP (2009) The Need for Investment in Nigeria's Infrastructure. Approved document by the federal executive council.
- Pieprzyk, J and Wang, H (2009) A fair e-tendering protocol. Seminar paper presented at the Department of computing, Macquarie, Sydney, Australia.
- Shonibare, W (2010) Encouraging sustainable investment in infrastructure through public-private-partnerships. A paper presented at a 3-day workshop on public-private-partnership approach for infrastructure development in Nigeria, organized by NIQS held at Shehu Musa Yar'adua centre, Abuja.
- UNIDO (1996) UNIDO BOT Guidelines: Guidelines for infrastructure development through Build-Operate-Transfer (BOT) projects. UNIDO publication, Vienna, Austria, ID/SER.O/22.
- Wigwe, J S (2008) Concessions in Nigeria: The reality. A book published in Nigeria by Victor Company Limited.

CHALLENGES IN IMPLEMENTING PUBLIC PRIVATE PARTNERSHIP STRATEGY FOR INFRASTRUCTURE DELIVERY IN NIGERIA

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The Nigerian government's efforts at engaging the private sector in the massive infrastructure development necessary to meet its goal of being one of the best 20 economies in the world by 2020. However, using PPP for infrastructure delivery in Nigeria is becoming a problem. The purpose of this research is to identify key challenges in implementing PPP in Nigeria with a view to suggesting strategies to address the challenges confronting PPP infrastructure projects in Nigeria. The research adopted case studies on two PPP infrastructure projects viz; the concession of Murtala Mohammed Airport Terminal 2, Lagos and the concession of 105 KM Lagos –Ibadan expressway. The research reviews documentary reports, project documents, among others to identify the sequence of events as to the project unfold and to describe the process of project conception and delivery. The research identified eight main challenges confronting PPP infrastructure delivery in Nigeria, this includes, inadequate knowledge, skills and capacity by participants both in public and the private sectors; poor evaluation, monitoring and due diligence by government; non-competitive bidding; signing of contract with no design and evidence of financing; difficulty in accessing credit facility from banks both locally and internationally; land acquisition problem; failure of risk allocations between the government and the concessionaire; and politicization of the concessions. The research study suggested strategies such as, development of an innovate financing model for PPP infrastructure projects, organize continuous trainings, workshops and conferences for public sector employees, and public enlightenment by stakeholders at very early stage of PPP cycle. These strategies are highly imperative to address the key identified challenges facing the PPP implementation in Nigeria with a view to enhancing PPP infrastructure projects delivery.

Keywords: BOT, Concessions, Financing, PPP, Project, Nigeria.

INTRODUCTION

Physical infrastructure has long been identified as a catalyst for economic growth (Akampurira, et al., 2011). Public Private Partnerships (PPPs) are a veritable vehicle for the development of the Nation's infrastructure. The involvement of the private sector in the development and financing of public facilities and services has increased substantially over the past decade (Li et al., 2005a). In view of increasing adoptions of PPP procurement system all over the world many PPP projects in the UK and other developed economies are regarded as successful (Qiao et al., 2001; Jefferies et al., 2002; Li et al., 2005a). According to (Li et al., 2005b) PPP forms of procurement is recognised as an effective way of delivering value-for-money in the public infrastructure development or services delivering. PPP seeks to combine the advantages of competitive tendering and flexible negotiation, and to allocate risk on an agreed basis between the public and private sectors (Li et al., 2005b). Akintoye and Liyanage (2011) also reported that PPPs are commonly used to accelerate economic growth, development and infrastructure delivery and to achieve quality service delivery and good governance.

International Institute for Sustainable Development Report (2012) states that between 1990 and 2009 there are more than 1,300 PPP contracts signed within the European Union (EU), with a combined capital value in excess of €250 billion. The UK, Spain, Germany, Italy, France and Portugal are the main proponents of PPP in Europe, together they account for 92 per cent of all

PPPs within the period of 1990–2009. The UK is by far the biggest user of PPP with about 67 per cent of the total of EU numbers, and Spain is the second with about 10 per cent. In the United States, there have been 363 funded PPP projects between 1985 and 2010, with a total value in excess of US\$59.5 billion (Public Works Financing, 2010). In Australia, PPPs are used for a large slice of the infrastructure market; this is in the range of 10–15 per cent in terms of total government procurement (Infrastructure Partnerships Australia, 2007). And Australia had more than 127 PPP projects at a combined value of AU\$35.6 billion as at 2005 (English, 2006). In Canada there is a little above 100 PPP projects totaling at US\$31 billion total value since 1985 (Public Works Financing, 2010). Emerging countries in the Asia Pacific region and in Latin America have continued to drive infrastructure development through PPPs (Alitheia, 2010). However, other emerging markets such as India and South Africa are also recording successes using tried and tested PPP templates to create, expand and modernize infrastructure (Frontier Market Intelligence, 2011).

Despite of increasing adoptions of PPP procurement system all over the world, many countries and regions still lack PPP experience, expertise and the provision of an enabling environment for its successful implementation (Leiringer, 2003). In Nigeria, the global adoption of PPP system of infrastructure projects delivery is being embraced as a number of infrastructure projects are being arranged through PPPs. The PPP infrastructure projects implementation in Nigeria is characterise with controversies, failures, delays, litigations, revocations among others. These appalling situations have been subjects of debate by stakeholders, who have expressed worries over the inability of the government to address the situation. This necessitates an investigation into PPPs procurement practice in Nigeria. Therefore, the aim of this paper is to identify the key challenges confronting PPP infrastructure project implementations with a view to ameliorating the challenges in present and future PPP projects in Nigeria.

OVERVIEW OF PPP INFRASTRUCTURE PROJECTS IN NIGERIA

PPPs across the globe are becoming increasingly popular in delivering physical and social infrastructure. Despite the need for more aggressive public-participation in the delivery of basic infrastructure in Nigeria, there has been a rise in the number of PPP-driven infrastructure projects over the last 20 years. Vetiva (2011) fifty one projects within 20 years between 1990 and 2009 were undertaken through PPPs in Nigeria. In terms of actual value, annual investments rose to US\$3.1 billion from US\$22.0 million in 1997, adding up to US\$23.6 billion from 1990 to 2009. Based on actual value, investments in the Telecoms sector was the highest, totalling US\$18.4 billion and accounting for 78% of the total investments within the period (Vetiva, 2011). The rapid growth of population in many developed and developing countries has led to a substantial demand for the provision of infrastructural facilities. Zhang and Kumaraswamy (2001) several arrangements of PPPs have been utilized including the common build-operate-transfer (BOT), and its variants such as build-transfer-operate (BTO), design-build-finance-operate (DBFO), build-own-operate (BOO), design-build-operate maintain (DBOM) in countries that have adopted PPP and Nigeria is not an exception.

The state of Nigeria's infrastructure has been a subject of debate by stakeholders in the economy in recent times (Lucas, 2011). Nigeria's physical infrastructure deficit, especially in transportation – road, rail, airports and sea ports is huge (Vetiva, 2011). Existing studies reveal that about 30% of Nigeria's 193,200 km total road network is paved (Ahmed, 2011; Sanusi, 2012). The gap is wider when compared with advanced economies with an average paved road network of 100%. Nigeria's existing 3,528km rail network is grossly insufficient to cater for the rising need for mass transit of people and goods. Recognizing huge infrastructure deficit triggered the Federal Government of Nigeria (FGN) to first pass the Infrastructure Concession Regulatory Commission (ICRC) Act in 2005 in an effort to create an independent body to manage and develop PPP transactions; the ICRC was officially inaugurated in November 2008. Thereafter, FGN extended these policy reforms by passing a comprehensive National Policy on PPPs in 2009 (World Bank, 2011). The Policy addresses the roles and responsibilities of the ICRC as well as the other key Ministries; Departments; and Agencies (MDAs) involved in PPPs. The policy also outlines a clear process by which proposed PPP transactions are examined upstream to determine their

commercial viability. Following the creation of the National Policy on PPPs, the ICRC has also embarked on drafting detailed PPP regulations that will expand on the provision set forth in the policy and also to address missing information such as institutional arrangements between MDAs and PPP procurement procedures (World Bank, 2011).

The ICRC monitors the effectiveness of the FGN's policies and processes and provides independent advice to the Federal Executive Council on the development of projects through the PPP route. It provides its views to Federal Executive Council on whether projects submitted for Federal Executive Council approval meet the requirements of the regulations (ICRC, 2012). The ICRC works closely with state governments that are developing their own PPP policies to ensure consistency, best practice, and a coordinated approach to the private sectors (ICRC, 2012). The success or failure of PPPs can often be traced back to the initial design of PPP policies, legislation, guidelines and other forms of institutional frameworks (ICRC, 2012). Figure 1 illustrates the Nigerian PPPs institutional framework. The institutional framework shows how specific roles and responsibilities are allocated to various entities and how the entities are harmoniously working together within the federal government in PPP process. In order to make sure that there are checks and balances in the system, as well as oversight of the decision making process, many FGN entities are involved in the PPP process from beginning to end (ICRC, 2012).

RESEARCH METHODOLOGY

The paper conducts case studies on two PPP infrastructure projects in Nigeria, particularly the transport sector being the major beneficiary of PPP contract in Nigeria (Vetiva, 2011). The paper focuses on road and airport PPP project implementation. This includes the concession of Murtala Mohammed Airport Terminal 2, Lagos and the concession of 105 KM Lagos –Ibadan expressway. The rationales behind the chosen of the two PPP projects are; the projects are first set of PPP infrastructure projects awarded by federal government, and the projects were awarded to indigenous concessionaires. The paper reviews documentary reports, project documents among others to identify the sequence of events as to the project unfold and to describe the process of project conception and delivery. The paper is primarily focus on the main challenges from development stage to implementation stage of PPP cycle of the two case studies. The purpose of identifying the key challenges are to be used to address the challenges by stakeholders involved and safeguards the present and future PPP infrastructure projects with a view to encouraging and inducing confidence in both local and foreign private investors.

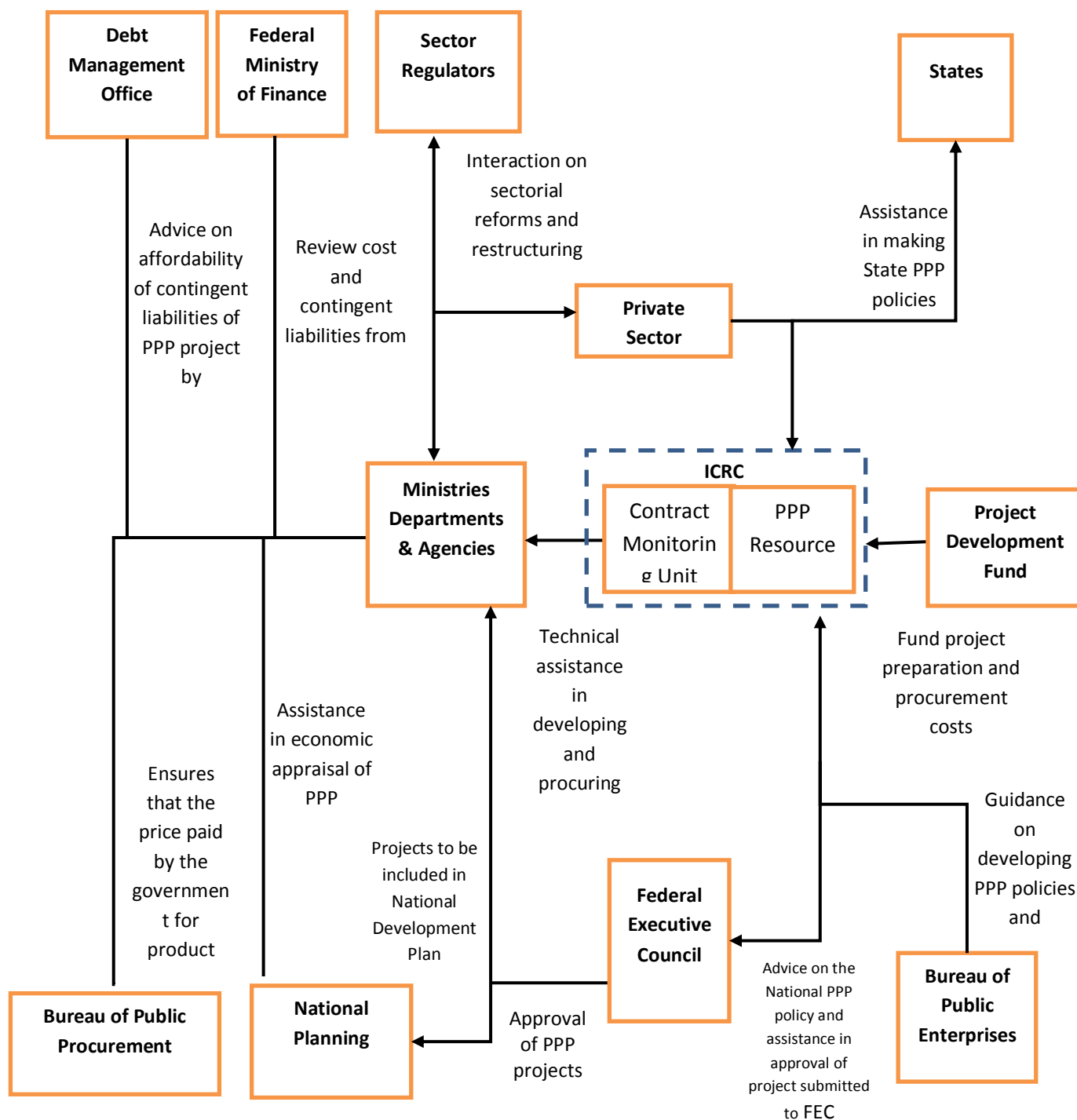


Figure 1: Nigeria's PPPs Institutional Framework (Source: ICRC PPP Manual for Nigeria, 2012)

CASE STUDIES AND FINDINGS

Case Study One- Concession of Muratala Mohammed Airport Terminal 2

In 2003 the federal government chose to rebuild the old domestic airport terminal, that gutted by fire in 2000, through the PPP initiative. The contract was awarded to Bi – Courtney Aviation Services an indigenous company on a build, operate and transfer (BOT) basis. Table 1 reveals the findings from the concession of MMA 2.

Table 1: Concession of Muratala Mohammed Airport Terminal 2

Project name	PPP model	Year of award	Planned construction period (Months)	Concession period (Years)	Estimated construction cost (US\$ million)	Year of commissioning	Status of project	Remark
MMA 2	BOT	2003	33	36	250	2007	Operational	Successful

The BOT contract agreement between the Federal Airports Authority of Nigeria (FAAN) and concessionaire was originally signed in April 2003 (Ahmed, 2011; Lucas, 2011). A supplementary agreement was signed in June 2004 (mainly increasing construction period from 18months to 33months) and addendum agreement was signed on 2 February 2007 mainly extending concession period from 12 to 36 years (Ahmed, 2011; Lucas, 2012; International Centre for Investigative Reporting (ICIR), 2012). The concessionaire invested about US\$250 million on the construction of MMA2 and most of the funding comes from a consortium of six local banks comprising Zenith, Oceanic, GTB, FCMB, Access and First Bank (ICIR, 2012). The construction work on MMA 2 was completed and commissioned on 7 April, 2007 and flight operations commenced on 7 May 2007. Presently, MMA2 is the first BOT project of its magnitude in the area of infrastructure development which was completed successfully by a Nigerian company (Ahmed, 2011; Lucas, 2012). After the completion of MMA2, there has been a substantial improvement and increase in the number of passengers, aircraft movement, among others. Table 2 shows the statistics of passengers and aircraft movement for MMA 2 between 2003- 2011.

Table 2: Statistics for MMA 2 between 2003- 2011

Year	Total Passengers	Total Aircraft Movements
2003	3,362,464	62,439
2004	3,576,189	67,208
2005	3,817,338	70,893
2006	3,848,757	74,650
2007	4,162,424	81,537
2008	5,136,920	77,472
2009	5,644,572	84,588
2010	6,273,454	96,919
2011	6,748,290	105,215

(Source: FAAN, 2012)

The table 2 shows the consistent increase on the total passengers, as the year increases, the total passengers also increase. The total passengers in 2011 are almost double the total passenger in 2003. The total aircraft movements also increase as the year increases but declined in the year 2008. In the year 2009, the total aircraft movements started increases. The total aircraft movements increased substantially in the 2011. It can be deduced from the table that after the commission of the concession of BOT contract in the year 2007, the total passengers started increasing by almost a million in every year. There is also a significant increase in total aircraft movements in the year 2011.

Case Study two- Concession of Lagos-Ibadan Expressway

Lagos-Ibadan Expressway was originally constructed and commissioned in 1978; thousands of vehicles ply the express route daily. Thus, it is one of the busiest and accident-prone roads in Nigeria. The expressway has been neglected by past administrations, that there was no budgetary allocation for the rehabilitation and maintenance of the road. In 2009 the federal government awarded the reconstruction of existing 105 KM Lagos –Ibadan Expressway to concessionaire under a BOT deal, with 100 per cent funding by concessionaire. The investors cost and return on

investment will be recovered via tolls. Table 3 shows the findings from the concession of Lagos-Ibadan Expressway.

Table 3: Concession of Lagos-Ibadan Expressway

Project name	PPP model	Year of award	Total length (Km)	Number of lanes	Planned construction period (Months)	Concession period (Years)	Estimated construction cost (US\$ million)	Status of project	Remark
Lagos - Ibadan	BOT	2009	105	4	48	25	593	Construction not fully commenced	Failure

The concession period is 25 years with the contract valued at US\$593 Million and construction period was four years (Ahmed, 2011; Ayeyemi, 2012; Bisiriyu, 2012). Three years after the concession agreement was signed between the federal ministry of works and concessionaire, the construction has failed to take off (ICIR, 2012). The concession of Lagos –Ibadan Expressway was a failure. Findings reveal that a lot of things are taking for granted by both government and the concessionaire. The officials of the government did not have enough knowledge about PPP project and does not employ the services of experienced legal/transaction consultants or technical advisers. Thus, the designing of the project was left entirely to the concessionaire who drew up an agreement that was entirely skewed in its favour (ICIR, 2012). The PPP experts believe that the Lagos/Ibadan road concession was structured to fail right from the beginning (ICIR, 2012).

DISCUSSIONS OF THE CASES

The failure and controversy in the concession of the two cases presented in this paper is an exemplar of the Nigerian experience in PPPs. Nigerians had hoped that the government would have learnt some lessons from the failure of previous PPP efforts and use the concessions of MMA2 and Lagos/Ibadan highway as a model for the development of Nigeria's airports and roads infrastructure. However, the paper identified three main challenges in the concession of MMA 2. These include: inadequate experience of public (Ministries, Department, and Agencies that regulate PPP) and private sector (concessionaire); political involvement at the implementation level; and inadequate project preparation. The paper further identified eight main challenges responsible for the failure of the concession of Lagos-Ibadan highway as follows: inadequate knowledge, skills and capacity by participants from both the public and private sectors; poor evaluation, monitoring and due diligence by government; non-competitive bidding; signing of contract without designs and evidence of financing; difficulty in accessing credit facility from banks both locally and internationally; land acquisition problem; failure of risk allocations between the government and the concessionaire; and politicization of the concession. The key challenges identified from the two cases reviewed can be grouped as: financial, political, economic, legal, knowledge and cultural behaviours. The findings reveal that the government failed to make use the PPP advantages of competitive tendering and flexible negotiation, and to allocate risk on an agreed basis between the public and private sectors.

SUGGESTED STRATEGIES TO ADDRESS THE PPP IMPLEMENTATION CHALLENGES

In Nigeria, as federal and state government began to explore more private sector resources in the delivery and operation of public facilities through PPPs. The paper suggests some strategies needed to be carried-out by government to encourage the private investors and to enhance PPP infrastructure project implementations. Suggested strategies emanate from the main identified challenges of PPPs implementation in Nigeria. These include:

Development of an innovative financing model for PPP infrastructure projects in order to attract private investors.

Establishment of pertinent PPP laws, regulations and guidelines in the development of efficient frameworks for best PPP practices.

Organise continuous training, workshops and conferences for public sector employees in Infrastructure Concession Regulatory Commission (ICRC), Ministries, Departments, and Agencies (MDAs), Bureau of Public Enterprises (BPE), Bureau of Public Procurement (BPP) and National Planning Commission (NPC) in terms of planning, this includes, project appraisal, procurement, contract and project management, financial modelling, project whole life costing and risk management to broaden their PPPs knowledge.

Public enlightenment, the stakeholders must inform, involve and include the public at very early stage of PPP cycle because of cultural behaviours of Nigerians.

CONCLUSIONS

The Nigerian government is looking to public-private partnerships (PPPs) to speedily improve the country's infrastructure networks and enhance service delivery to the Nigerian people. The current deficit in infrastructure is the major constraint to achieving the national vision of becoming one of the 20 largest economies by 2020. PPPs have the potential to solve Sub-Saharan Africa's profound infrastructure and service backlogs especially in Nigeria where about 70 per cent of the 193,000 km of roads in the country is in a poor condition and 60 per cent of the population lacks electricity supply, about US\$13 billion is spent annually on fuel generators. This paper identified the key challenges confronting PPP infrastructure implementation in Nigeria and it can be grouped as: financial, political, economic, legal, knowledge and cultural behaviours. Having identified the PPP implementation challenges, it will help the stakeholders involved in PPPs practice to safeguard the present and future PPP infrastructure projects in Nigeria. The paper recommends that government must fundamentally improve their systems for dealing with the private sector to realise the efficiency and effectiveness gains that partnerships promise.

REFERENCES

- Ahmed, M (2011) PPP for infrastructure development: the Nigerian experience, available at <http://www.icrc.gov.ng/wp-content> (Accessed 30 August 2012)
- Akampurira, E., Root, D. and Shakantu, S. (2008), Factors Constraining the Implementation of Public Private Partnerships in the Electricity Sector in Uganda, available at: www.cib2007.com/papers/CIDB2008%20Final%20Paper%20No27.pdf (Accessed 6 September 2011).
- Akintoye, A and Liyanage, C (2011) Public private partnerships, proceedings of the CIB TG72 /ARCOM doctoral research workshop, held at University of Central Lancashire, Preston, United Kingdom, 12th October.
- Alitheia, C. (2010) Public private partnerships (PPPs) – the effective mechanism for delivering infrastructure, available at: www.thealitheia.com/newsletters/Alitheia%20Capital%20REInsight%20- (Accessed 6 September 2012)
- Ayeyemi, D (2012) Reconstruction of Lagos-Ibadan expressway to commence before December, the National Mirror, published on Tuesday November 6.
- Bisiriyu, R (2012) Lagos-Ibadan expressway reconstruction to start from Ibadan by Bi Courtney, the Punch, published on Friday January 27
- English, L M (2006) Public private partnerships in Australia: an overview of their nature, purpose, incidence and oversight. *UNSW Law Journal*, 29(3), 250-262.

- Federal Airports Authority of Nigeria (2012) Available at <http://www.faannigeria.org/statistics.html> (Accessed 31 October 2012)
- Frontier Market Intelligence (2011) Why PPPs should work in Africa, available at: <http://www.tradeinvestafrica.com> (Accessed 10 July 2012).
- Infrastructure Concession Regulatory Commission (2012) PPP manual for Nigeria, available at <http://www.ppptoolkit.icrc.gov.ng> (Accessed 31 October 2012).
- International Centre for Investigative Reporting (2012) A failed romance: why PPP do not work in Nigeria, published on Wednesday, February 1st.
- International Institute for Sustainable Development Report (2012), “Harnessing the power of public-private partnerships”: the role of hybrid financing strategies in sustainable development. Available at: <http://www.iisd.org/2012/harnessing>. (Accessed 10 October 2012)
- Infrastructure Partnerships Australia (2007) Performance of PPPs and traditional procurement in Australia, available at: <http://www.infrastructure.org.au/content/ppp.aspx>.(Accessed 10 October 2012)
- Jefferies, M C, 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), 352-61
- Leiringer, R (2003) Technological innovations in the context of public-private partnership Projects, unpublished PhD thesis, Royal Institute of Technology, Stockholm
- Li, B, Akintoye, A, Edwards, P J and Hardcastle, C (2005a) Critical success factors for PPP/PFI projects in the UK Construction Industry, Construction Management and Economics, 23(5), 459-471.
- Li, B, Akintoye, A, Edwards, P J and Hardcastle, C. (2005b) The allocation of risk in PPP/PFI construction projects in the UK, International Journal of Project Management, 23(1), 25–35.
- Lucas, M (2011), Clouds over public-private partnership, the Tell, published on Thursday, March 17th
- Lucas, M (2012) How government scares investors, the Tell, published on Monday October 29.
- Public Works Financing (2010) International survey of public-private partnerships, Vol. 253, available at: http://www.pwfina.net/pwf_major_project.pdf. (Accessed 10 October 2012)
- Qiao, L, Wang, S Q, Tiong, R L K. and Chan, T S (2001) Framework for critical success factors of BOT projects in China”, Journal of Project Finance, 7(1), 53- 61
- Sanusi, L S (2012) The role of development finance institutions in infrastructure development: what Nigeria can learn from BNDES and The Indian infrastructure finance company, 3rd ICRC PPP stakeholders’ forum, held in Abuja, 18th July
- Vetiva (2011) Construction industry report a haven of opportunities, available at <http://www.proshareng.com/admin/upload/reports/VetivResearchConstructioSector2011.pdf> Accessed 15 October 2011)
- World Bank (2011) Towards better infrastructure: conditions, constraints, and opportunities in financing public private partnerships- evidence from Cameroon, Cote d’ ivoire, Ghana, Kenya, Nigeria, and Senegal, available at http://www.ppiaf.org/sites/ppiaf.org/files/publication/PPP_Ghana_Book_FINAL.pdf Accessed 31 October 2012
- Zhang, X and Kumaraswamy, M (2001) Procurement protocols for public private partnered projects, Journal of Construction Engineering and Management, 127 (5), 351–358