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15, avenue de Ségur,

75007 Paris, France.

Tel (Fr) 01 45 51 26 07 - (Int.) +33 1 45 51 26 07

Fax (Fr) 01 45 51 26 32- (Int.) +33 1 45 51 26 32

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Do Public Private Partnerships add value to the Building and Construction Industry?

Raymond Turner* and **Hennes de Ridder****

* Dublin Institute of Technology, Ireland. E-mail: ray.turner@dit.ie

** Delft University of Technology, The Netherlands. E-mail: h.a.j.deridder@tudelft.nl

This paper discusses how value, cost and risk are related in a public infrastructure project using a PPP. It reviews the definitions of value, cost and risk and the methodologies applied to measure value, cost and price. The authors propose that there is an orthogonal relationship between the three variables, value, cost and risk which form a solution space. It is proposed that the centre of gravity of this tetrahedron is the optimum value for a public asset, PPP. The motivation behind this paper is to develop the concept through further research for a financial model for a PPP.

Keywords: public private partnerships, value for money, cost, risk

1 Introduction

1 ‘The success of NAMA is not based on any assumption of a return to the recent ‘bubble’ prices for property’ (The Irish Times, 1st September, 2009)

The first objective is to place this paper in context for the Building Construction Industry (BCI) in Ireland. The second objective is to review the current thinking within the literature. The third objective is to clarify what is the value of a public asset? In order to address this question, the authors will present definitions of what is a PPP; what is an asset; what is value? The next objective is to clearly explain what value means from the perspectives of the different stakeholders, the authors introduce a graphic model to illustrate what ‘value’ means to each stakeholder. The next objective is to propose that the centre of gravity of a tetrahedron; that relate the variables value, cost and risk and that is bounded by maxima and minima constraints; is the optimum value. Following this is to review some of the current methodologies that are applied in the decision making with respect to PPPs such as Cost Benefit Analysis (CBA); Net Present Value (NPV); Internal Rate of Return (IRR); Value for Money (VfM) and Capital Asset Pricing Model (CAPM). Finally, the authors will conclude with the proposal for a new paradigm for relating value cost and risk and whether PPPs do add value to the BCI.

The current global economic crises have brought into focus how an asset is valued in relation to the cost and the risk involved. To put this paper in context of the current economic crises in the Irish Building Construction Industry (BCI), the following background information is provided.

The Minister for Finance for the Irish Government, Mr. Brian Lenihan presented his statement for the establishment of a National Asset Management Agency (NAMA) to handle the transfer of development and real estate assets from the six leading banks in the Irish market to NAMA.¹

2 Construction Industry Federation (2007).

Annual Report [www.cif.ie]

3 Royal Institute of Chartered Surveyors (2008). RICS Valuation Standards, 6th Edition, Cromwell Press

4 'Taxpayers face risk over bank bailout' (Irish Times, 1st September, 2009)

5 Butler, C. (2009). Accounting for Financial Instruments, John Wiley & Sons, 1st Edition

6 Hughes, A. (2009). Submission to the Government by Construction Industry Council – Jobs and Infrastructure – A Plan for National Recovery', Construction Industry Council, DKM Consultants

7 Damodaran, A. (2002). Investment Valuation, Tools and Techniques for Determining the Value of Any Asset', John Wiley & Sons, University Edition

8 Blanc-Crude, F. et al (2007). Public Private Partnerships in Europe, European Investment Bank Economic and Financial Report 2007/03, JEL: H54, L33, L98

9 greenbook.treasury.gov.uk

10 World Bank (2008). World Development Indicators, Washington

NAMA is the proposed state agency that will manage the disposal of these property assets and construction projects in an orderly fashion. The public debate is centred on determining what is the value of the asset; what are the risks involved and what cost will the Irish-payer have to pay?

In brief, the Gross National Product (GNP) for Irish economy was estimated at €120 billion in 2007 of which 24% came from the construction sector, €38.5 billion. The contribution from the construction sector consisted of €25 billion from new residential homes, 90,000 completed units in 2007.²

It is suggested that the original value of these residential construction projects was estimated at €120 billion by the developers, the construction companies, the auctioneers and the banks. The loan to value (LTV) of these assets is estimated at 75% or of the order of €90 billion.

The value of commercial properties have fallen 50% according to a quotation of John Mulcahy, Jones Lang LaSalle i.e. the current market value is estimated to be €60 billion using the Principles of the Red Book which defines the evaluation methodology applied by the Royal Institute of Chartered Surveyors (RICS).^{3 4}

It is argued that if there is not a buyer for these assets and the market is illiquid; then what is the actual value of the asset? In order to place a value on the assets requires applying a 'Fair Value' or cost which can be determined by specific accounting rules such as International Accounting Standard (IAS) 39. Butler states that under IAS 39, there are two approaches; 'mark to market' or 'mark to model'.⁵ The former term simply means that the value is the current market price that the asset would sell for. The second term refers to financial instruments such as bonds etc. and then the value is determined by a financial model.

The claim is that the Loan Book contains €49 billion of construction projects with associated loans of €28 billion. The proposal is that the value of this Loan Book is €77 billion however after a reduction due to the collapse in the property market and allowing for 'long term economic value'; it is proposed that NAMA will pay €54 billion for these assets including €9 billion in rollup interest payments.

The Irish Government is proposing to establish a special purpose vehicle (SPV) which will be owned 51% by private investors and 49% by NAMA in order to comply with EuroSTAT recommendations and EU regulations.

This proposed model for a SPV is not too dissimilar to that of a PPP. On a larger canvas, it is necessary to investigate what is the value of these construction projects and in addition, what is the value of PPPs to the BCI.

In March 2009, the Construction Industry Federation (CIF) commissioned a report from DKM Consultants et al on the Irish BCI. The decision on whether the Irish Government will proceed with the recommendations is pending the outcome of the establishment of NAMA.⁶

In a European context, according to the DLA Piper Report, the estimate of the size of the PPP project pipeline is of the order of magnitude of €73 billion.⁷ Blanc-Brude et al provide an update on PPPs in Europe which states that there was 152 projects signed in 2006 which was worth €28.5 billion.⁸ In the United Kingdom, since 1997, there were 622 Private Finance Initiative (PPFs) projects worth St£57 billion as of 2006.⁹ Overall, the size of the PPP market is substantial from a global perspective as both data from the World Bank, 6-7% of GNP will be spent on public infrastructure projects.¹⁰

11 Haughwout, A. (2002). Public infrastructure investments, productivity and welfare in fixed geographic areas, *Journal of Public Economics*, 83:3, pp. 405-428

12 Nilsson, J. (2009). The Value of Public-Private Partnerships in Infrastructure, OECD, JEL Code: D8, L9

13 Parker, D. & Hartley, K. (2001). Transaction costs, relational contracting and public private partnerships: a case study of UK defense, Centre for Innovation Research

14 Broadbent, J. & Laughlin, R. (2003). Public Private Partnership: an Introduction, *Accounting, Auditing and Accountability Journal*, 16:3, pp. 332-341

15 Shaoul, J. (2005). A critical financial analysis of the Private Finance Initiative, *Critical Perspectives on Accounting*, 16:4, pp.441-471

16 Broadbent, J. &

Laughlin, R. (2003). *ibid*

17 Grimsey, D. & Lewis, M. (2005). Are Public Private Partnerships Value for Money?’, *Accounting Forum*, Elsevier, PriceWaterhouseCoopers

18 Spackman, M. (2002). Public-Private Partnerships: Lessons from the British Approach, *Economic Systems*, 26:3, pp. 283-301

Value is not the same as the cost as there is an added premium depending on the measure of risk transferred from the public agency to the private partner. The use of a PPP involves transferring some or all of risk to the partner best able to manage the risk. The partner who is allocated the risk will receive a premium for absorbing the risk.

The argument for PPPs is more complex due to recent regulations and treaties, EU member states are restricted under the terms of the Maastricht Treaty (1992) in relation to the cap on borrowings of the individual member states of the European Union (EU) which is 3%. The other constraint is that borrowings is limited to 40% of GDP. It is argued that is why PPP agreements are used to develop infrastructure assets off-balance sheet.

PPPs are used for a number of different reasons:

- to facilitate state borrowing without infringing on EU regulations and treaties
- to gain higher efficiencies through the use of private partners who are better at delivering projects
- to gain better value for money through the use of long-term agreements to enhance commitment from private partners to long term relationships

2 Literature

The literature argues that during times of economic depression, that there is justification for governments to invest in public goods and services in order to generate or rejuvenate economic activity as in the case of President Barack Obama’s recovery plan for the US economy.¹¹

Nilsson states that the value of PPPs in infrastructure can be based on the delivery of roads and rails of appropriate user quality.¹² In other words, the value is based on the sustainable output due to better quality. In addition, he states that although private financing and transaction costs are more expensive than the state borrowing the funds; that these are balanced by enhanced commitment to a long term relationship. Parker and Hartley voice their concerns that PPPs encourage information asymmetry and agency optimum bias which would have a negative impact on the value of PPPs.¹³ Broadbent and McLaughlin review several papers on PPPs in their article and one of their concluding thoughts reinforces the question ‘how are definitions of PFI (PPP) in terms of value for money and risk transfer derived and operationalised?’¹⁴ They, Shaol and Broadbent and McLaughlin advance the discussion as to what is the value of a PPP.^{15 16}

Traditionally, engineering and construction projects were tendered for using public procurement procedures modelled on best competitive price or lowest cost (Design Build – DB). Since the eighties, there has been push for the adoption of a model, Public Private Partnerships (PPPs), for the procurement and delivery of public services. However since the introduction of PPPs, the question is whether PPPs add value? Value is added if there is an optimal allocation and transfer of risk. Grimsey and Lewis state that risk evaluation is complex and presents a framework for assessing risks based on recognised principles and illustrated through the use of a case study for a successful PPP.¹⁷

Spackman presents the lessons learnt of whether PPPs enhances the benefits (value) or increases the costs from a British perspective.¹⁸ In his conclusion, he states that a key characteristic of a successful PPP is the development of long

- 19 Edwards, P. & Shaoul, J.** (2003). Partnerships: for better, or worse? *Accounting, Auditing and Accountability Journal*, 16:3, pp. 397-421
- 20 Grimsey, D. & Lewis, M.** (2005). *ibid*
- 21 Broadbent, J. & Laughlin, R.** (2003). *ibid*
- 22 Li, B. et al** (2005). The allocation of risk in PPP/PFI construction projects in the UK, *International Journal of Project Management*, 23, pp. 25-35
- 23 Grimsey, D. & Lewis, M.** (2000). Evaluating the risks of public private partnerships for infrastructure projects, *International Journal of Project Management*, 20, pp.107-18.
- 24 Shaoul, J.** (2005). *ibid*
- 25 Kunsch, P. et al** (2006). A methodology using option pricing to determine a suitable discount rate in environmental management, *European Journal of Operational Research*, 185, pp. 1674–1679
- 26 Liu, L.** (2006). It takes a model to beat a model: Volatility bounds, *Journal of Empirical Finance*, 15:1, pp. 80-110
- 27 Buehler, K. et al** (2008). The New Arsenal of Risk Management, *Harvard Business Review*
- 28 Ridder, H. de** (2007). Living Building Concept, Paper Series 1, Delft University of Technology
- 29 Li, B. et al** (2001). VFM and Risk Allocation Models in Construction PPP Projects' School of Built and Natural Environment, Glasgow Caledonian University, Working Paper
- 30 Department of Finance** (2006). Guidelines for the Appraisal and Capital Expenditure Pro-

term trust in the relationship between the stakeholders. Shaol and Edwards point to the failure of PPPs as been due to the inability to transfer risk effectively.¹⁹ Grimsey and Lewis ask the same question as to whether PPPs are value for money?²⁰ They conclude with an overview of twenty countries that PPPs under certain evaluation methods such as the Public Service Comparator (PSC), do add value. On the other side, Broadbent and McLaughlin question the application of a PSC in establishing whether PPPs are value for money.²¹ Li et al state that public must secure value by managing, controlling and allocating the risks.²² Grimsey and Lewis illustrate that value is related to risk analysis and evaluation using a case study.²³

Shaol presents a robust argument as to why the use of these tools are flawed on the basis that the use of CBA and NPV are based on specific criteria such as fixed cash flows; known interest rates and a short time frame (3-5 years).²⁴ Also, the risk optimisation models (CAPM and Gordon) originate from portfolio theory and like NPV and DCF; these tools are based on similar criteria. A PPP project can be considered to have an asset life of 25-30 years and in some cases may even be multi generational up 99 years. Kunsch et al proposes that a multi-generational discount rate be applied when evaluating long term projects as opposed to a single rate.²⁵ Liu argues that despite various proposed models that are used, none are truly robust and no one size fits all.²⁶

Buehler et al trace the evolution of risk management and portfolio theory in the article which illustrates how evaluation models have changed but risk is always here to stay.²⁷ Other theorists consider the value of PPPs to include the whole-time cost of the project. The 'Living Building Concept' develops this theory further and proposes that the total component cost of a building should be included over the entire life of the asset.²⁸ Li et al present their 3 tiered model as part of preliminary results of a research.²⁹ They argue that a model for VfM based on qualitative research and surveys should account for project efficiency, sustainability and multi-benefit consideration.

3 What is a PPP?

PPPs are defined in many different ways depending on which country and/or local authority is using a PPP to deliver a project.

According to the Guidelines National Department for the Irish Government, a PPP is an arrangement between the public and private sectors (consistent with a broad range of possible partnership structures) with clear agreement on shared objectives for the delivery of public infrastructure and/or public services by the private sector that would otherwise have been provided through traditional public sector procurement.³⁰

A particular arrangement or project may constitute a PPP where the following key characteristics are present:

- *shared responsibility for the provision of the infrastructure or services with a significant level of risk being taken by the private sector, for example, in infrastructure projects, linking design and construction with one or all of the finance, operate and maintain elements*
- *long-term commitment by the public sector to the provision of quality public services to consumers through contractual arrangements with private sector operators*

posals in the Public Sector, International Infrastructure Manual', Version 3

31 www.ndfa.ie

32 Grimsey, D. & Lewis, M. (2005). *ibid*

33 Yescombe, E. (2007). *Public Private Partnerships, Principles of Policy and Finance*, Butterworth-Heinemann

34 Department of Finance (2006). *Assessment of Projects for Procurement as Public Private Partnerships*, report [www.ppp.gov.ie/new-technical-guidance-note-assessment-of-projects-for-procurement-as-ppp]

- better value for money and optimal allocation of risk, for example, by exploiting private sector competencies (managerial, technical, financial and innovation) over the project's lifetime and by promoting the cross-transfer of skills between the public and private partners³¹

PPP refers to the agreement between a public body and a private entity in order to deliver a public service in an economic, efficient and effective manner to the public user. The term is believed to have originated from the US however the concept has its origins back to the 17th century in Europe where individuals were granted concessions to operate canals in France and roads in the United Kingdom (UK). The concept dates further back in other countries such as Asia and Africa.³² PPPs evolved from a policy implemented by the Conservative government in the UK in 1992 called the Private Finance Initiative (PFI). The succeeding Labour government developed the concept in order to deliver public services and goods. The view adopted was that by combining the perceived experience and expertise of the private sector in its ability to deliver projects successfully to satisfy a public need, the public would receive better value at a lower cost.³³

The common practice is to establish a SPV which will be a legal, corporate entity in its own right. Usually the private consortium establishes a SPV to create, operate, manage and maintain the platform for delivery of the public service. The ownership of the SPV is usually a combination of any or all of the partners, such as the public agency, the project promoters, the private consortium and the financing partner. The objective of the SPV is either to create an asset to deliver a public service or to transfer an existing asset in order to deliver a public service. The intention is that the public receives what is termed, and measured as VfM i.e. the tax-payer receives better value for their money.

PPPs can be a concession or a license granted by the state to a private entity to operate an asset or deliver a service for the benefit of the members the public. The theory implies that this type of arrangement is a 'win-win-win' for the government, the public and the private consortium. PPP agreements enable the use of public assets by the SPV to deliver better VfM.

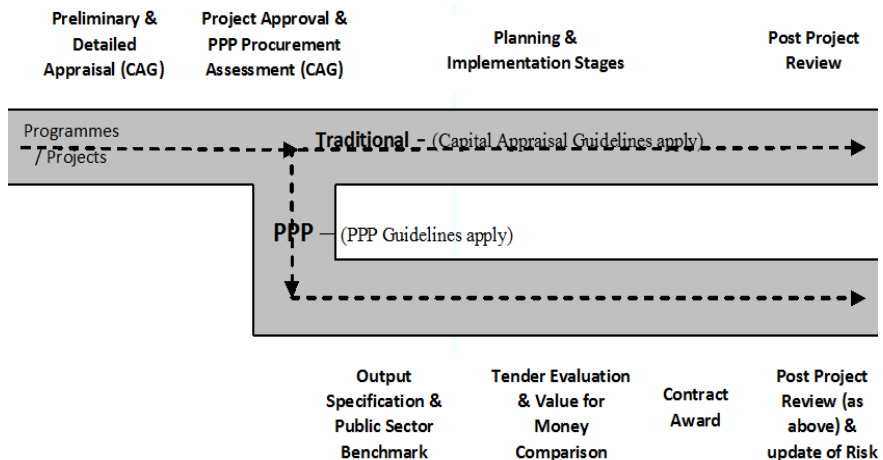


Figure 1 Traditional and PPP Procurement Stages³⁴

- 35 Shaoul, J. (2005). *ibid*
- 36 Keymer, G. (2006). *Best Practice in Public Private Partnerships*, The Parliament Regional Review
- 37 Linder, S. (1999). *Coming to terms with the Public-Private Partnership*, *American Behavioural Scientist*, 43:1, pp. 35-51
- 38 Yescombe, E. (2007). *ibid*
- 39 Grimsey, D. & Lewis, M. (2005). *ibid*

Traditionally, a local authority received its funding through budget allocation and revenue from local charges for services. The public body identified a 'need' for a service such as healthcare or an infrastructure asset such as a bridge. The state fulfilled the need through normal procurement methods i.e. public tender for best price or lowest cost. If the authority could not finance the creation of the public asset within its own budget, it had the ability to obtain funding through government borrowings.

Figure 1 illustrates the different approaches between the traditional procurement process and the use of a PPP.

PPPs are another method of procuring the same public asset in a more cost efficient and effective manner. However Shaol uses the case study of the National Health Service (NHS) in the UK to illustrate the flaws in the practice of using PPPs as opposed to the theory.³⁵

Keymer states that '*PPPs bring public and private sectors together in long term relationship for mutual benefit*'.³⁶

The author argues that PPPs bring together many different stakeholders in a complex and often dysfunctional relationship, however, the reason PPPs have received bad press is due to budget over-runs and lengthy delays which are as a result of project management, implementation and transfer of risk.

The term PPP refers to the actual partnership, not necessarily the public asset. A 'partnership' can take many forms, as Linder describes in his essay. He describes six forms ranging from a tool to a technique in order to reshape and restructure the delivery of public service. He is interested in PPP as a strategy and also as a political symbol and a policy tool.³⁷

Yescombe describes project based PPPs as having four characteristics:

- *a long term contract between a public sector body and a private party*
- *for the design, construction, financing and operation of public infrastructure (the facility) by the private sector party*
- *with payments over the life of the PPP Contract to the private sector party for the use of the facility made the public sector party or by the general public as users of the facility*
- *with the facility remaining in public sector ownership or reverting back to the public sector ownership at the end of the contract*³⁸

He addresses the complex subject of PPP, specifically project PPPs rather than services, in a structured approach from different perspectives.

Grimsey and Lewis state that there is no single definition for a PPP.³⁹ It is the nature of the project and what is the culture of the local authority among many other factors that will define what form a PPP will take. However the authors believe that part of the complexity of defining what a PPP is as a result of the misinterpretation of the fundamental definitions.

A PPP agreement is in the form of a contract which defines the roles, responsibilities, risks and rewards for each of the stakeholders. There are as many forms of PPPs and the types of agreements will vary from country to country. A PPP agreement may use existing public assets to deliver a public service. A PPP agreement may create a new public asset to deliver the public service. A PPP may develop an existing public asset to extract the maximum benefit. But the PPP is just the 'agreement' or contract between the stakeholders such as a company, a bank, consumer and the government. It enables the

40 Pearsal, J. (2002). Concise Oxford Dictionary, Oxford University Press, 10th Edition

41 Scheutz, W. (1993). What is an Asset? Accounting Horizons, 7:3, pp. 66-70

42 Scheutz, W. (1993). *ibid*

consumption of an asset for the benefit of the end user. There are many variations of the type of contract.

The different types of agreements include Design, Build, Operate (DBO), Design, Build, Operate, Finance (DBOF), Design, Build, Operate, Finance, Maintain (DBOFM), Build, Operate, Own (BOO); Build, Operate and Transfer (BOT); each type varies within its form and structure depending on which country it is established in and specifically who the individual stakeholders that make up the partnership.

The distinction between the different types lies in the ownership of the asset and the amount of transfer of risk and responsibility from the public to the private party. The difference between a DBO and the DBOF usually is that the ownership of the asset remains with the public body. The other difference between the different types of PPPs is how the private party is rewarded for accepting the transfer of risk. This can be as a service fee paid based on usage or as a license.

In the case of the BOO and BOT, the difference lies in when the ownership is passed back to the public authority and how the private consortium is reimbursed. If it is a Design, Bid and Construct (DBC) project as executed by the public agency; it is a question of input specification compared to a Design, Build, Operate and Maintain (DBOM); then it is dependent on outputs defined within a Long Term service Agreement (LTA).

This is where the cloudiness of how to evaluate the same asset occurs. It depends on whose balance sheet that the asset resides and which side of the balance the asset resides; is it a cost/liability (public) or a revenue generating (private) asset?

4 What is an asset?

An asset according to the Concise Oxford English Dictionary is defined as:

- *a useful or valuable thing or person*
- *property owned by a person or a company regarded as having value and being available to meet debts, commitments or legacies*⁴⁰

In financial accounting and reporting terms, Schuetze states that the Financial Accounting Standards Board (FASB) defined an asset as having three characteristics, as follows:

- *it [an asset] embodies a probable future benefit that involves a capacity, singly or in combination with other assets, to contribute directly or indirectly to future net cash inflows*
- *a particular entity can obtain the benefit and control others' access to it*
- *the transaction or other event giving rise to the entity's right to or control of the benefit has already occurred*⁴¹

So an asset provides a present or future benefit to someone for something, somehow, somewhere, sometime. In agreement with Schuetze the FASB's definition appears to be vague and open ended and hardly even meets the accounting terms of exchangeability or comparability.⁴² A simple definition is that an asset provides a benefit and increases the wealth of a nation or maximises the shareholder profits. The ownership of the asset will determine who receives the benefit.

A public asset is owned by the state on behalf of community for the collective benefit of the public. The public derives benefits from the consumption of public

43 Pearsal, J. (2002). *ibid*

44 Reilly, R. & Schweih, R (1998). *Valuing Intangible Assets*, Irwin Library of Investment and Finance, McGraw-Hill, 1998

45 Financial Reporting Council (1992), *Financial Reporting Standard FRS 3*

assets. Traditionally, an asset is measured in monetary terms. The value of this figure is a measure of the worth of the asset. An asset is consumed over time by deriving benefits from it. In a company's accounts, this decay of the value of an asset is shown as depreciation of the asset over an agreed time period according to Financial Reporting Standards (FRS) or Generally Accepted Accounting Principles (GAAP) or the International Accounting Standards (IAS).

But as can be seen, it is the transfer of ownership and subsequently the benefits that determine what the value of asset is and most importantly what is the value to whom.

5 What is 'value'?

The Concise Oxford English Dictionary defines value as:

- *the regard that something that is held to deserve; importance or worth; material or monetary worth. The worth of something compared to its price, at €2.00 it is good value*
- *values principles or standards or behaviour*
- *numerical amount denoted by an algebraic term, a magnitude, a quantity or number et cetera*⁴³

In identifying the value of any asset; it is measured in accounting and economic terms which is clearly possible with respect to tangible assets. In today's world, how does one measure the benefits accrued to the public of an intangible public asset such as a park? How does one place a 'fair value' on the benefits of intangible asset?

Traditionally assets are considered to be real, physical entities such as plant, equipment buildings etc. however there are also intangible assets such as licenses, goodwill, reputation, copyrights and patents.

Reilly and Schweih state that there are assets which are both tangible and intangible and that intangible assets have the following defined characteristics:

- *specific identification and recognizable description*
- *it should have a legal existence and be protected legally*
- *it should have the right of private ownership in whole or part of*
- *there is tangible evidence or manifestation that it exists*
- *evidence that it came into at a specific time and*
- *it will decay at a specific date*⁴⁴

A PPP agreement meets all of the above criteria.

According to FRS No. 3, the 'Fair value is the amount for which an asset could be exchanged, or a liability settled, between knowledgeable, willing parties in an arm's length transaction.⁴⁵ Where the fair value of the asset is not able to be reliably determined using market-based evidence, depreciated replacement cost is considered to be the most appropriated basis for determination of value.' The debate about what does 'fair' actually mean can be difficult and challenging.

What is important to state is that the value of an asset is not necessarily the cost of the creation of the asset nor the sum of the total quantitative benefits derived from the consumption of the asset, both tangible and intangible. There are specific tools, techniques, methodologies guidelines and standards as to how to value an asset. It is often the assumptions and application of these clearly defined methodologies that result in an asset been assigned the wrong value. What is important in starting the evaluation of any asset is to determine: what is the

- 46 Reilly, R. & Schweih, R.** (1998). *ibid*
- 47 Smith, A.** (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations* [www.adam-smith.org/smith/won-index.htm]
- 48 Marshall, A.** (1891). *Principles of Economics*, MacMillan, London
- 49 Keynes, J.** (1935). *The General Theory of Employment, Interest and Money*, Macmillan Cambridge University Press, London
- 50 Graham, B. & Dodd, D.** (1934). *Security Analysis*, McGraw-Hill
- 51 Bonbright, C.** (1937). *The value of Property*, McGraw-Hill
- 52 Gordon, M.** (1959). *Dividends, Earnings and Stock Prices*. *Review of Economics and Statistics* 41, pp. 99–105
- 53 Farma, E.** (1970). *Efficient Capital Markets: A review of theory and Empirical Work*, *The Journal of Finance*

purpose and who is the audience. It is accepted that the value of an asset is measured by applying three separate methodologies, market, cost and income under a defined set of accounting and financial reporting standards.⁴⁶

There is the accounting value or 'book' value of an asset and then there is the market value of an asset. There is also the economic value of an asset. The economist uses another measure called the 'economic added value' (EAV) of an asset. This is how much additional value is added by an asset.

The measure of money has been studied down through time, but the evolution of 'value' theory has its origins in Smith's 'An Inquiry into the Nature and Causes of the The Wealth of a Nation'.⁴⁷ Since then, a roll call of economists and experts have contributed to the sea of knowledge, from Malthus to Marshall (*Principles of Economics*), from Keynes (*The General Theory of Employment, Interest and Money*) to Graham and Dodd (*Security Analysis*), from Bonbright (*Valuation of Property*) to Damodaran (*Investment Valuation*); from Lintner and Scholes (*The Gordon Growth Model and CAPM*) to Farma and French ('A Random Walk').^{48 to 53} Often it is asked whether the study of value is an art or science. It may not be an exact science. However, there are accepted and agreed standards on the measurement of an asset. It is agreed that the term 'value' can have different meanings and associated methods of measurement.

Today, due to the climate change and the effects of globalisation on the environment, the definition of value has taken other meanings. Now the societal value of an asset is required to be measured along with the personal value of a public asset. However these are not standard evaluation models as defined by the IAS, GAAP or FRS rules. To society, an asset is of value because it brings merit benefits to be consumed for the public good such as parks and/or art galleries (externalities and merit goods). The value of an asset to society is often determined by society's willingness to pay for admission into an art gallery. Economists have determined that some assets have merit benefits which do not produce an income but are a cost; however, they do provide a qualitative benefit to society. The techniques used to measure these merit benefits are very subjective due to the individual decision makers' personal preferences and uses of applying accepted qualitative techniques such as Multi-Criteria Decision Analysis (MCDA).

The value of an asset can be measured from four or five different viewpoints as mentioned above. This does not mean that value equals benefits which equals costs even though it is the same asset. It is the treatment of this same asset on the balance sheet of the individual stakeholders that will determine its value and not the tool used to decide with to proceed with a project.

A significant factor that needs to be considered is the time value of the asset over the whole lifetime of the underlying asset. The objective of the author here is to clearly establish how the value of a public asset is perceived by different stakeholders.

In Figure 2, the value of an asset in accounting terms is shown over the whole life time of the asset from the identification of the need to the eventual decay of the asset until it reaches its residual value. What can be seen is that the value of the asset changes over time; it may increase and decay; the value may be less than zero.

The value of asset varies depending on which stakeholder is measuring it. For

example the ‘book value’ of a company is measured by totalling the company’s assets and deducting the liabilities and shareholders’ equity. The ‘market value’ is calculated by determining the demand price for a single share and multiplying it by the total number of shares. This could be greater than the book value. The difference between the book value and the market value often represents the value of the intangible assets of a company such as brand, goodwill or reputation.

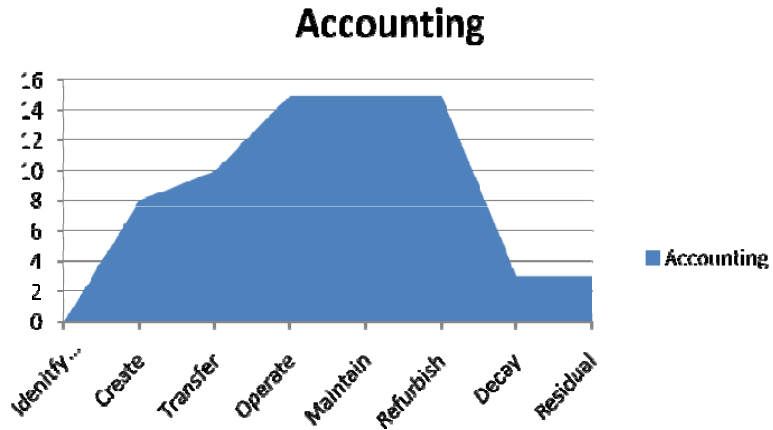


Figure 2 The value of an asset

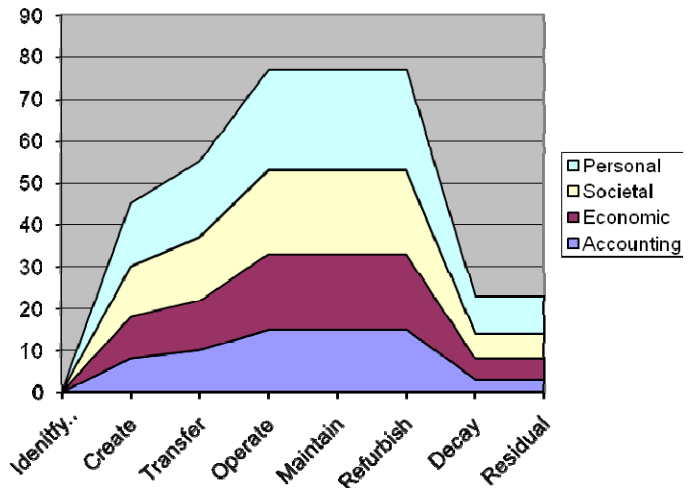


Figure 3 Value depends on the methodology applied by the stakeholder

So the same asset may have different values depending on which stakeholder and which technique is used to evaluate the asset as is illustrated in Figure 3. The public asset may be worth more from an economic perspective to the overall wealth of a nation compared to the book value of the asset i.e. the cost associated with building a toll bridge is normally the value placed on such a class of asset but the value to the company who designed, built, operated and maintained the toll bridge may be substantially more because of the long term earnings from the tolls collected.

6 The Polygon of Perceived Value of a Public Asset

Each stakeholder uses its own methodology and tools to evaluate an asset. It is the same asset but it represents a different value to each stakeholder. In the example of simple PPP agreement between a government, a public consumer, a private company and a lending bank, the value of a public asset is illustrated in Figure 4.

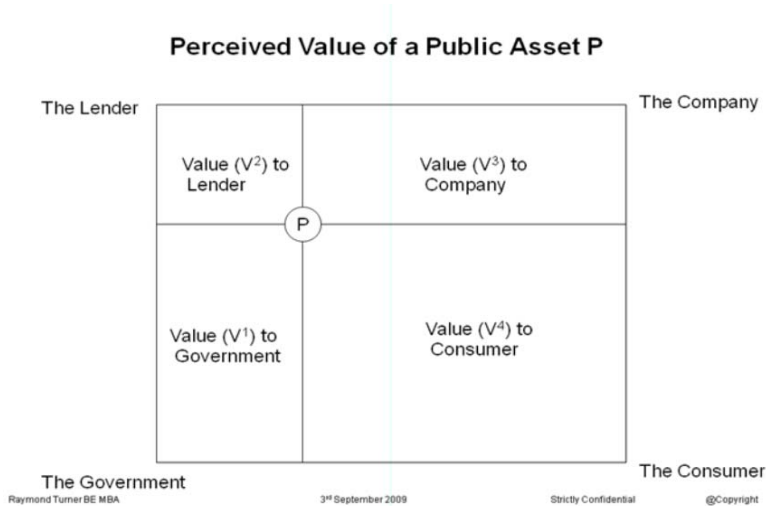


Figure 4 Perceived Value of a Public Asset P

Figure 4 illustrates that value of the same public asset, P, has different values to each of the different stakeholders and is calculated differently. The amount of each Value (V_i) represents the perceived value to each stakeholder. The area of each V_i is different depending on the evaluation methodology applied. If the number of stakeholders changes, so does the number of sides of the polygon. The value of the public asset may also change in value to each of the stakeholders over time as is illustrated in Figure 5.

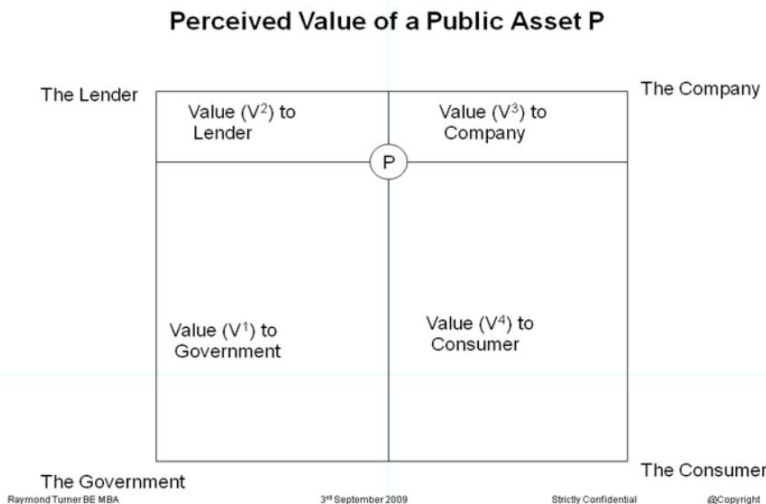


Figure 5 Value to each stakeholder may change over time

54 McDowell, M. & O'Grada, C. (2004). *Economics and Society*, McGraw-Hill

55 Shaoul, J. (2005). *ibid*

56 Indecon International Economic Consultants (2006). *Guidelines and Template for Application of Cost-Benefit Analysis to Appraisal of Capital Projects in the Higher Education Sector*, Vol. 1: 'Summary of Guidelines/Working Rules and Template', The Department of Education and Science and the Higher Education Authority

57 Gurdgiev, C. (2008). *Education: Cost and Benefit Learning Curve*, Business & Finance

So the value of the same public asset is different to each of the stakeholders depending on what evaluation method is used and the stakeholder's perspective. Equally Figure 4 can be adapted to represent the different perceived benefits and also costs for each of the respective stakeholders.

What is important to note is that the value is not equal to the total quantitative net benefits, nor equal to the costs of creating an asset. The value may be greater and over the lifetime of the asset, the value may decay or depreciate to a residual value whilst extra costs may be incurred to maintain the asset in order to derive continued benefits for the users.

For example what value would a married couple place on a house? Depending on what stage of their lives, the value may be different. If they have young children, it may be important to the couple that there would be schools close by; that there would be amenities such as parks and shops in the neighbourhood.

The size of the house may be important to the couple. The layout of the house may be important. In other words there is a wide number of different things associated with the house that determine what is the value of the house to the couple; and subsequently what the couple will pay for the house.

Then there is the market value of the house; the price of a standard 100 sq. meter house in Dublin, Ireland compared to a house in Amsterdam, the Netherlands. Simple laws of economics will determine the value of the house; supply and demand.⁵⁴ People place different values on the same asset depending on their needs at the time. So to determine the value of an asset, such as a school, there are a number of different views of what is the value.

In this example, there is the government, the Department of Education, the school's management, the teaching and administration staff, the students, the parents, the businesses that support the school. There is the community. Each one will have a different value for the school but in accounting and economic terms there are clearly defined statements and rules for the determination of the asset such as IAS, GAAP and FRS. From the perspective of the government, there is the traditional accounting way of valuing a school from how much the school cost to build and operate? The asset is shown to be consumed in accounting terms by depreciating the asset in the accounts for the school. Usually a system of accrual accounting or capital budgeting is used to determine what resources a government body has to spend on delivering its public service. In business terms, value is regarded as the profit which is the difference between the selling price less the total cost. But the school is not selling anything and the school is operated on a non-profit basis. The school as an asset that produces a merit benefit such as education is not a profit maximiser for the shareholders but rather maximises the merit benefits for society.^{54 55}

What value does the education of a pupil bring to society? The Indecon Report recommends that each graduate will earn an average of €36,000 per year over 40 years of their life compared to the average wage of a person who did not attend third level; €30,000.⁵⁶ These figures are specific to Ireland compared to the US. These figures are averages and are actually too low due to the tax contributions from the individuals etc.; also salaries increases over the career of most graduates. Gurdgiev presents the statistics that the value of third level education yields an overall society wide return of productivity of 33% higher than the private sector.⁵⁷ This strengthens the argument for the Irish government to invest

58 Lockwood, C. (2007). Building the Green Way, Harvard Business Review on Green Business Strategy, Harvard Business School Publishing
 59 Ridder, de, H. (2007). ibid

in the rejuvenation of its educational assets.

What can be seen is that value of a public asset, such as a school, changes with time over its whole life time. The value of a school depends on the perspective of the stakeholder and which definition is applied; whether the accountant's, the economist's, the society or the person. The additional benefit or increase in value due to a sustainable building, green value, is often not included. Lockwood argues that using sustainable methods in the design, build and operation of buildings can increase the net value by as much as 20%.⁵⁸

7 Concept of the Value-Cost-Risk (V-C-R) Model.

Earlier, the authors presented the 'Polygon of the Perspective Value of a Public asset' by different stakeholders as illustrated in Figure 4 above. In order to develop this further, it is necessary to consider the mathematical formula for the calculation of value.

$$\sum EAV = \sum B - \sum C \tag{1}$$

Where *EAV = economic added value*
B = Total Benefits
C = Total Costs

Often, the term EAV is replaced by the Total Value (V). It is also reasonable to assume that cost (C) and price (P) are interchangeable terms.

In considering the whole life cycle cost (C) of a project and the total value (V) generated, it is necessary to review the Living Building Concept (LBC). De Ridder et al proposed that the LBC defines a Value-Price solution space as illustrated in Figure 6.⁵⁹

LBC proposes that Value and Cost define a solution space for a project in a two dimensions with maximum and minimum boundaries for value and cost as illustrated in Figure 6.

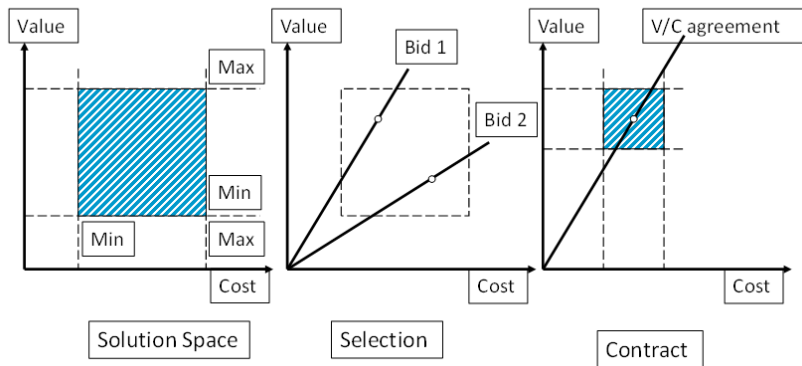


Figure 6 Living Building Concept

The purchaser wishes to obtain the maximum value for the minimum cost however s/he may allow an increase in the cost in order to increase the maximum value. In other words, the project remains along or under the inclined contract agreement line and subject to the maxima and minima constraints, the project

achieves the optimum value for the cost paid.

The area of the solution space is bounded by the Value/Cost Contract line and maxima and minima constraints for value and cost. In developing this concept further, it is argued that risk has a similar orthogonal relationship with value as illustrated in Figure 7.

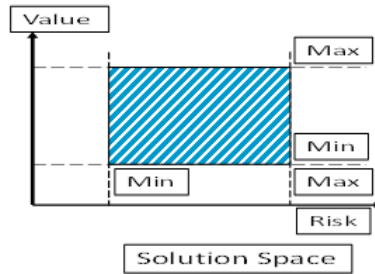
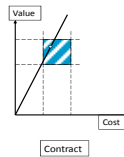


Figure 7 Value- Risk Solution Space

Value – Cost Agreement



Value – Risk Agreement

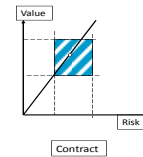


Figure 8 Combining the two orthogonal solution spaces

By combining both solution spaces into three dimensions; a cube is defined with sides A, B and C. The intersection of the two trapezoids produces a tetrahedron in three dimensional space as shown in Figure 9. In effect, the cube that was defined by the orthogonal variables value (V), cost (C) and risk (R) with their respective maxima and minima constraints can be graphically represented by removing a wedge from the cube resulting in an irregular tetrahedron as illustrated in Figure 9.

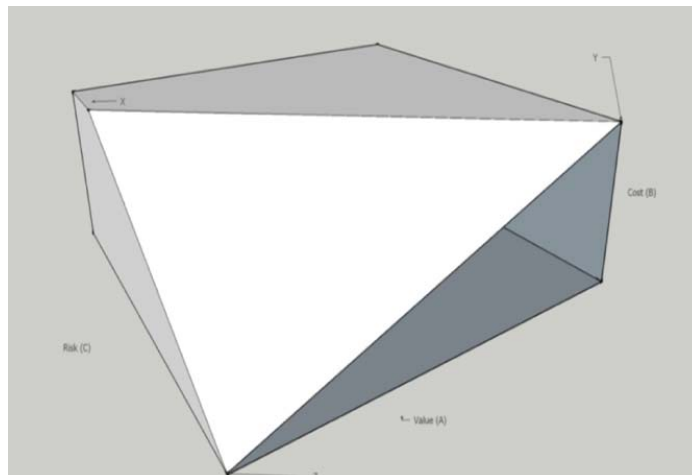


Figure 9 Tetrahedron Solution Space of Value-Cost-Risk for a PPP

60 www.math.tu-dresden.de/~baer/index.shtml

61 Butler, C. (2009). *ibid*
 62 European Commission (1997). Guide to Cost Benefit Analysis of Major Projects, Working Group led by Florio, M.

63 Frank, R & Bernanke, B. (2004). Principles of Economics, McGraw-Hill, 2nd Edition

64 Musgrave, R. (1969). Cost-Benefit Analysis and the Theory of Public Finance. *Journal of Economic Literature*, 7, pp. 797-806

65 Butler, C. (2009). *ibid*

The authors propose that the optimum combination of value, cost and risk for a project is defined as the centre of gravity for the tetrahedron above. If the combination of V-C-R ensures that the project remains within the solution space bounded by the edges of the tetrahedron; the project will provide a positive and successful outcome.

The formula for the centre of gravity of this tetrahedron is proposed below:

$$\frac{\{-48 A^2 B C + \sqrt{X^2 + Y^2 - Z^2} (X^2 - Y^2 + Z^2) \sqrt{-X^2 + Y^2 + Z^2}, -48 A B^2 C + (X^2 + Y^2 - Z^2) \sqrt{X^2 - Y^2 + Z^2} \sqrt{-X^2 + Y^2 + Z^2}, -48 A B C^2 + \sqrt{X^2 + Y^2 - Z^2} \sqrt{X^2 - Y^2 + Z^2} (-X^2 + Y^2 + Z^2)\}}{(-96 A B C + 4 \sqrt{2} \sqrt{X^2 + Y^2 - Z^2} \sqrt{X^2 - Y^2 + Z^2} \sqrt{-X^2 + Y^2 + Z^2})} \quad (2)$$

Where A, B, and C represent the sides of the original cube and X, Y and Z the sides of the wedge that is removed from the cube.⁶⁰

8 Evaluation Methodologies

The author introduces the different evaluation methodologies for the appraisal of an asset. The assumptions surrounding the use of these analytical tools are reviewed such as CBA (economic analysis); NPV (financial analysis) and CAPM (risk analysis).

The use of risk as a measurement to evaluate an asset is reviewed as a possible proxy model, however, the author points to fact that the use of these risk optimisation models, such as the Gordon Growth and CAPM, require specific criteria for them to be applied. These are mark to model as Butler suggests.⁶¹

In CBA, it is the economic costs that are measured which include the accounting costs but it may also measure the opportunity costs. *The opportunity cost of a good is defined as the quantity of other goods sacrificed to get another unit of this good*⁶². Frank and Bernanke define *the Cost-Benefit Principle as that an individual (or a firma or a society) should take an action if, and only if, the extra benefits from taking the action are at least as great as the extra costs*.⁶³

Musgrave states that *'A theory of public finance remains unsatisfactory unless it comprises both the revenue and expenditure sides of the fiscal process'*.⁶⁴ It is often argued that the application of a CBA is largely subjective because although the costs may be measured and tangible; the benefits may be subject to agency bias and largely immeasurable.

Butler rightly distinguishes that the treatment of an asset is dependent on whether the asset is to be held or traded subject to accounting rules however it is the concern of the authors that often the line between evaluation tools and decision-making methodologies is often blurred.⁶⁵ The authors do point to the fact that the period of the life of a project is substantially different in a public project (25-30 years) as opposed to a private investment (3-5 years) and as such this may contribute to the value placed on an asset.

The economic value of a project should include all of the costs and all of the benefits. A tool or technique that is often used is the CBA but this does not determine the value of the underlying asset. It is often used as a decision making tool in order to decide which alternative projects should be chosen. The

66 Yescombe E. (2007).
ibid

67 Rogers M. (2001).
Engineering Project App-
raisal, Blackwell Science

economist measures the value of asset by what the asset contributes positively to the wealth of a nation. It is the sum of all the benefits less the sum of the total costs.

$$EAV = \sum B - \sum C \quad (3)$$

Where $EAV = \text{Economic Added Value}$
 $B = \text{Total Benefits}$
 $C = \text{Total Costs}$

What is critical is how are the total costs identified and measured and similarly how are the total benefits measured. There are a number of accepted quantitative and qualitative techniques such as ‘shadow pricing’, subsidised by the state, and ‘willingness to pay’ by the consumer.

Due to the nature of public projects, the tools required for decision making and evaluation were quite scientifically developed over time. There are three alternative tools such as:

- *Equivalent Annual Worth*
- *Rate of Return*
- *Benefit Cost Ratio*

All four tools make the assumption that:

- *all cash flows are known for the life of the project*
- *all cash flows are measured in monetary terms*
- *all interest rates are known*
- *the comparison of projects is on the basis of before tax cash flows*
- *all intangible benefits that cannot be measured are excluded from the evaluation*
- *availability of funds is irrelevant*^{66 67}

The tools used to determine VfM for PPPs do not meet these criteria.

CBA is a decision making tool based on economic and accounting principles. These tools require specific assumptions to be made which are not compatible with the intangible and intrinsic nature of a PPP.

CBA is a comparative decision-making technique and not an evaluation tool for determining the ‘value’ of an asset under accounting regulations. CBA can assist the agency to determine which project should be procured if at all. CBA is based on correctly identifying the total costs and the total benefits of each option and alternative for a project.

Generally speaking if the Benefit/Cost (B/C) ratio is greater than one; then the project is compared to alternatives including the ‘do nothing’ option. The authors ask the question do projects get reviewed after they have received the permission to go ahead and at completion; what are the learning outcomes?

In today’s climate and due to the proliferation of the use of PPPs; CBA is used as a comparative tool in order to determine whether procuring a project through the normal public tender process, which is based on lowest cost, is more advantageous than using a PPP to procure the goods or service.

In the United Kingdom (UK), the Government use a Public Service Comparator (PSC) and in Ireland, a Public Service Benchmark (PSB) is used in choosing whether to use PPP as a procurement mechanism. The PSC and PSB are

essentially the same tool for determining the cost of procuring a model using the traditional cost based model and then comparing it to a PPP where a premium is added to the cost for the risk that is transferred to the private partner.

Because governments are able to borrow money to finance projects at the cheapest rates by either issuing bonds or raising taxes; it is argued that the PPPs are an expensive method of raising project finance. The counter argument is that because the transfer of risk from the public sector to the private sector; that the payment of premium to the private sector is justified for carrying the risk in order for the public sector to receive the benefit.

This in simple terms highlights the weaknesses of using a CBA for the determination of proceeding with a public project. The project life time is substantially different; the identification of all the benefits and costs can be subjective and open to optimum agency bias and finally the identification, the assessment and measurement of the risks entailed is complex to say the least.

The stakeholders in a simple form of a PPP are the government, the company, the lender and the consumer. Each has different values that they place on the public asset. In accounting terms, the valuation of any asset can be determined using a variety of different formulae and techniques however depending on the characteristics of the asset; they will dictate which technique is fit for purpose. An asset is consumed by a company to deliver a benefit to its shareholders; the benefit is in the form of a dividend which is paid to the shareholders, thus increasing the wealth of the shareholders. The value of such a commercial business is expressed as the book or market value. The financial health of a company is generally accepted as been represented by its balance sheet, cash-flow and profit and loss statements.

The balance sheet contains a list of all the assets and liabilities including shareholders' equity. These assets can be both tangible (real, physical such as cash, product, buildings and equipment) and intangible (such brands, goodwill and reputation). The balance sheet, in simple terms, lists all assets and liabilities including the cost of equity.

So the 'book' value of the company is simply:

$$BV = \sum \text{Total Tangible Assets} - \sum (\text{Total liabilities} + \text{Equity}) \quad (4)$$

Where $BV = \text{Book Value}$

Often, the simplistic gross sales less the total costs is taken as the book value however this may not include all liabilities such as shareholders' equity which is a cost of capital. Capital is used to generate an asset from which shareholders derive a benefit.

The market value is defined as:

$$MV = \sum \text{Total Assets (Tangible + Intangible)} - \sum (\text{Total liabilities} + \text{Equity}) \quad (5)$$

Where $MV = \text{Market Value}$

For example take the company's traded share price in the stock market and

68 Buehler, K. et al (2008)
ibid

69 Butler, C. (2009). ibid

multiply it by the number of shares. This is the company's market price, the price that a willing buyer is prepared to pay for a share. The difference between the market price and the book price is a measure of the intangible assets such as goodwill or the potential for future earnings.

The use of NPV and DCF often for the basis for evaluating a project or an asset.

$$NPV = \sum P/(1+i)^n \quad (6)$$

Where $NPV = \text{Net Present Value}$

$P = \text{Principle}$

$i = \text{interest rate}$

$n = \text{number of years}$

$$DCF = \sum D/(1+i)^n \quad (7)$$

Where $DCF = \text{Discounted Cash flow}$

$D = \text{Dividend or future earnings}$

$i = \text{interest rate}$

$n = \text{number of years}$

Both formulae are widely used in both the financial markets and BCI and widely similar. They discount future cash flows or amounts back to the present value of money in today's terms. In other words, a €100 in ten years time may not be worth a €100 in today's terms; often referred to as the 'time preference of money'.

The authors argue that the problem as with all models is that often they are used to evaluate what is the value of a project or an asset is without consideration to the terms at which they should be applied. For example, both formulae uses a power series factor based on interest rates which when expanded out is only reliable for approximately 3-5 years due to the impact of the factor 'n' and also who can forecast interest rates for the next 5 years let alone 10, 20 or 30 years.

Often the weakness in applying these formulae as with various decision making techniques such as CBA and MCDA is the inherent nature of people that once the project is approved and financed; it is parked and no one reviews these projects and evaluates their value on a systemic, periodical basis.

Other financial models use future earnings as a proxy to assign a value to an asset. These tools have evolved from Portfolio Theory (MPT) as illustrated by Buehler et al.⁶⁸ Models and techniques such as developed by Lintner and Sharpe, Millar and Modigliani and Black and Scholes etc. as mark to models as described by Butler; in evaluating a portfolio of assets are widely accepted as good tools for measuring risk associated with the valuation of an asset however this portfolio theory of asset pricing has been challenged in recent times.⁶⁹

The value of a company may be determined using the Gordon Growth Model which states that the share price is the sum of the company's total future earnings divided by its cost of equity minus its growth rate.

$$P = \sum E/Ke - g \quad (8)$$

Where $P = \text{Price of share}$

70 Farrell Grant Sparks, Goodbody and Chesterton Consultants (1998). Public Private Partnerships, The Irish Government

71 Yescombe E. (2007). *ibid*

72 Reilly, R. and Schwehs, R (1998). *ibid*

E = Future Earnings
 K_e = Cost of Equity
 g = growth rate, of the market

Some variations of this model will substitute the cost of capital (debt plus equity) for the cost of equity which is the total equity plus the total debt for K_e and in other circumstances, the weighted average cost of capital (WACC) can be used. Care must be taken in each situation when applying these models to determine the value of an asset. The reason for care is that these formulae make certain assumptions regarding risk and interest rates over a short time horizon of 3-5 years as opposed to the lifetime of a PPP which could be 99 years.

Another model is the CAPM. If the CAPM is adopted and applied, the value of a firm is:

$$\sum E = R_f + \beta(R_m - R_f) \quad (9)$$

Where $\sum E$ = Sum of future earnings
 R_f = Risk free rate such as a 20 year US Government Bond
 β = Beta a weighted measure of how the share will perform in relation to the overall market
 R_m = the measure of risk of the individual company

CAPM uses the proxy of the measure of return risk to determine an input into the value of asset. There are variations to this but what is critical is the conditions for the model to be applied must be understood.

Damodaran states that the CAPM (risk and return) model has been in use the longest and is still the standard in most real world analyses of a portfolio of assets.⁷⁰ He proposes that risk, as defined in finance, is measured based on deviations of actual returns on an investment from its expected returns.

The problem with all of these risk option pricing mechanisms is that they are limited by their respective criteria and normally fail with applied to empirical data. However the weakness is that they all depend on an interest rate which varies over the life of a PPP.

9 Value for Money

Farrell Grant Sparks define VfM as the optimum combination of cost, quality, efficiency and effectiveness.⁷⁰ Yescombe defines VfM as the combination of risk transfer, whole life cost and service provided by the facility as a basis for deciding what offers the best value to the public authority.⁷¹

VfM is measure used to determine whether PPPs increase VfM over traditional procurement methods and the decision making tool CBA is one of several tests. Other VfM tests use the tools of NPV, IRR and B/C ratio. In accounting and economic terms, value is perceived as a net benefit from the use of an asset. In order words, if the benefits accrued to the public exceed the costs incurred, then the public has received VfM.

In determining 'value of a public asset, it is required to do an evaluation of an asset. Damodaran and Pratt and Hutchenson et al have written extensively about the valuation of any asset. The methodology used is driven by what is the purpose of the appraisal and who the audience is.⁷²

73 greenbook.treasury.gov.uk

74 www.ndfa.ie

75 Reilly, R. & Schweihs, R (1998). *ibid*

76 Smith, N. et al (2006). *Managing Risk in Construction Projects*, Blackwell, 2nd Edition

A number of autonomous bodies use the term VfM for determining whether a project has enhanced value using a PPP. The Green Book from the UK Government offers a set of comprehensive guidelines on how VfM can be established using the Public Service Comparator (PSC) to determine whether a PPP project offers VfM.⁷³ The PPP Task Force in Ireland is the NDFA; they produce a comprehensive set of guidelines for PPPs and a number of tests to determine VfM. But what is VfM?

The NDFA in Ireland issues specific guidelines for the measurement of VfM.⁷⁴ The NDFA identifies the optimisation of risk allocation as central to deciding whether VfM is achieved. This is dependent on the following risk factors and how their weightings are applied in the Risk Allocation Matrix (RAM) to determine VfM. However, the approach to risk will vary from PPP to PPP and from country to country. The area that the authors believe further research is required in coming papers is the transfer of risk. In the Irish situation, the NDFA considers the following risk categories:

1. Project Specific
2. Planning & Environment
3. Design & Technical
4. Construction (overspend or delay)
5. Demand & Revenue
6. Operational & Maintenance
7. Financial & Insurance
8. Political/Ethics/Regulatory/Legislative/Legal/Contractual
9. Technological & Obsolescence
10. Residual Value

These risk factors are weighted and used as inputs in determining whether a project passes the tests for VfM. Risk and uncertainty are used as proxies to establish VfM however value does not equal cost or benefit as illustrated by Figure 8. However all three are characteristics of an asset and can determine whether the asset P offers VfM. Risk is used as a proxy for determining VfM.

Risk is the key measurement for determining whether a project will be a success or a failure. Risk is the study of several industries and market sectors and in the current global economic and financial crisis; it is the identification, assessment, measurement and management of risk within a project that is often more art rather than science. The argument of whether risk is identified, assessed, measured and managed are subjective or is there a more scientific approach leads to further research. The words of Rumsfeld highlight this conundrum:

*'Reports that say that something hasn't happened are always interesting to me, because as we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns -- the ones we don't know we don't know'.*⁷⁵

In contrast, recognized authors in this area of managing risk state: *'...that risk falls into three categories; namely known risks, known unknowns and unknown unknown'.*⁷⁶

Value for Money may be a measure of risk as the Value at Risk (VaR) which measures downside risk however it is certain that value, risk and cost are interdependent and related.

10 Conclusion

The title to this paper was 'Do PPPs add value to the BC?' This paper sought to answer the question but more significant the authors wished to provoke further discussion and propose a new paradigm in thinking about value, cost and risk.

Yes, it is the view that PPPs do add value to the industry however the caveat it is not the theory of PPPs that is in question but rather the flawed implementation of current evaluation methodologies and decision making techniques. More specifically, a large body of work lies there pending investigation and research on how these formulae, techniques, tools etc are actually applied by ordinary people.

The critical areas of risk identification, assessment, measure and management have been totally undermined under the current global crisis but are history repeating itself or are there a need for a new paradigm.

The authors have sought to clarify what value is to the different stakeholders and how that value can be different. Building on this new perspective, the authors propose that there is a new paradigm to be considered where value, cost and risk are inter-related and the optimum solution is the centre of gravity of the solution space of these three variables, value, cost and risk.

Albeit said, the key driver is that this is a dynamic system which changes over time.

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