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The Public Value Dimension of Social Infrastructure

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1. Introduction

This conference paper has been written in response to the request by the European Investment Bank (EIB) to review the extensive literature on project appraisal - either monetization methods (ERR, CBA...) or other techniques to assess social infrastructure investment projects - and give recommendations. The research draws from some previous reports realized by the EIB and The European PPP Expertise Centre (EPEC), among them *The Economic Appraisal of Investment Projects at the EIB* (EIB, 2013) and *The Non-Financial Benefits of PPP* (EPEC, 2011). The research attempts to add further evidences to the results exposed in the 2017 Report of the High-Level Task Force (HLTF) on investing in Social Infrastructure in Europe chaired by Romano Prodi and Christian Sautter, by elaborating approaches for integrating various forms of public value into projects.

The key research question of this conference paper can be framed in the debate about the shift from New Public Management (NPM) to the concept of Public Value (PV) (Moore, 1995; O'Flynn, 2007), which reconsider the way in which the public and private sectors are engaged in the delivery of public services to achieve superior social impacts.

Despite the emphasis placed on results and efficiency by the NPM movement (Pollitt, 2005), research on project performance reports that the majority of infrastructure projects worldwide failed to meet time and budget targets (Flyvbjerg, Skamris Holm, & Buhl, 2003). Scientific literature also discusses many examples of construction of the so-called white elephants, i.e. facilities and infrastructures of little practical use and negative social value (Robinson & Torvik, 2005).

An indeed, scholars argue that a central issue is why investment is inefficiently allocated, rather than why there is underinvestment. Better incorporating PV into infrastructure planning and evaluation may therefore help to better orient investments and add value to society.

This conference paper is organized as follows: section 2 defines the concept of social infrastructure; section 3 reviews the evaluation frameworks conventionally applied to infrastructure appraisal; in section 4, given that, in the last decades, PV creation has not been the exclusive province of governments, but also private investors and corporates have increasingly incorporated society and environment in their investment decisions, we draw on the literature and practice in social entrepreneurship and social impact investing to discuss some possible applications for social infrastructure; section 5 attempts to discuss some preliminary conclusion and give recommendation to the EIB and the HLTF to better incorporate PV into infrastructure planning and evaluation.

2. The Public Value of Social infrastructure

The concept of infrastructure is broad and it has been defined to mean collectively (Howes & Robinson, 2006): (1) physical infrastructure (i.e. all physical elements of buildings, structures and networks), (2) personal infrastructure (i.e. the human capital, the stock of knowledge and skills embodied in the workforce), (3) institutional infrastructure (i.e. the social and institutional capital related to the system of rules that govern a country).

For the purpose of this conference paper, we can define, in a narrower sense, social infrastructures as the long-term physical assets that facilitate social services (Preqin, 2014) and include schools, universities, hospitals, prisons and community housing which ameliorate human development, quality of life and living standards (Howes & Robinson, 2006). However, in the context of social infrastructure, as opposed to economic infrastructure[1], the understanding of the relationship between the "hard" physical assets and the "intangible" human factors that facilitate social services is crucial, such as the provision of teachers at a school or specialized clinicians at a hospital (Casey, 2005).

Since social infrastructure and services are provided in response to the needs of communities, they generate a variety of explicit and implicit benefits but these are difficult to measure and interiorise into project appraisal.

We know that spending on social service-provision has positive returns. For example, Psacharopoulos & Patrinos (2004) found annual returns to education investment in OECD countries ranging from 8.5 to 13.4%. The RAND Corporation projected that, for every dollar invested in pre-school education, there is a net-return of $2.60 (Karoly, 2008). Casey (2005) purported, for every $1 invested in community infrastructure, $10 could be saved in costs on poor health, reduced crime and better employment outcomes, amongst other things. However, there is less agreement on how infrastructure's contribution to these outcomes can be measured. Over the past 15 years, a growing body of literature has tried to demonstrate the benefits of social

[1] Economic infrastructure is defined as the assets that enable society and the economy to function, such as transport (airports, ports, roads and railroads), energy (gas and electricity), water and waste, and telecommunications facilities.

infrastructure (see Table 1) but links between expenditure and outcomes remain elusive (Gallet & Doucouliagos, 2017).

In Section 3 we discuss the frameworks conventionally used for appraising the impact of infrastructure and prioritize investments.

Table 1: Comparison of traditional economic evaluation frameworks applied to infrastructure

Sector	Evidences	References
Healthcare	▪ Healthcare infrastructure investments reduce hospital infection rates ▪ Hospitals size and volumes reduce delays in cancer diagnosis and cut mortality rate ▪ Better quality infrastructure promote a desire to get well among patients and improve health outcomes ▪ Health Information Technology increases clinician's adherence to guidelines but not health outcomes	Blankart, 2012; Chaudhry et al., 2006; Douglas & Douglas, 2004; Edkins & Ive, 2010; Jamal, McKenzie, & Clark, 2009; Thomson, Pronk, Alalouch, & Kaka, 2010; van den Berg, 2005; Zimring, Joseph, & Choudhary, 2004
Schools	▪ School size and ICT infrastructure improve the well-being of students and have an impact on school attendance and drop-out rates ▪ Students are less likely to attend schools in need of structural repair	Abalde, 2014; Barrett, Zhang, Davies, & Barrett, 2015; Bradley & Taylor, 1998; Cuyvers, De Weerd, Dupont, Mols, & Nuytten, 2011; Durán-Narucki, 2008; Ive & Edkins, 2010; Leithwood & Jantzi, 2009
Social housing	▪ Investments in social housing and community infrastructure lead to savings for reduced crime and better employment opportunities	Casey, 2005

Source: author summary

3. Assessing the Public Value of Infrastructure: traditional evaluation frameworks

Many government authorities and MDBs around the world require that infrastructure projects that apply for funding present a justification which goes beyond the financial sustainability, in order to ensure that their operations comply with their broad objectives of inclusive economic growth, environmental sustainability, and regional integration (ADB, 2017; EIB, 2013; European Commission, 2014; Gertler, Martinez, Premand, Rawlings, & Vermeersch, 2016).

Two frameworks have been massively used in the practice for appraising the impact of infrastructure investments. The first set of frameworks, which focuses project selection and prioritization, includes the Cost-Benefit Analysis (CBA) and other methods such as the Cost-Effectiveness Analysis (CEA) and the Multi-Criteria Analysis (MCA) and has been. The second set has been used, at project level, to select the best procurement route and includes the Value for Money (VfM) approach, to support the public-private partnership (PPP) option compared to the traditional procurement. While CBA and other economic evaluation frameworks inherently incorporate PV dimensions, the VfM analysis is inspired by the NPM theory and it has mainly focused on the cost-effectiveness dimension rather than the long-term social impact (Cui, Liu, Hope, & Wang, 2018; Hueskes, Verhoest, & Block, 2017). In this section, these evaluation frameworks are analysed and their application in the context of social infrastructure is discussed.

3.1. Project selection and prioritization: CBA, CEA and MCA

The purpose of economic evaluation is to inform decision-making by assessing the value a project holds for the society as a whole (Drummond, Sculpher, Claxton, Stoddart, & Torrance, 2015). Financial evaluation is an important part of infrastructure projects' assessment. However, indications of financial sustainability do not necessarily provide reliable estimates of the value of a project from a 'social' point of view, as they focus rather on the incremental cash flows (both capex and opex) generated by the project from the investors' perspective. On the contrary, the word 'social' is often used in the literature about economic evaluation to denote the idea that included in the assessment are the effects of the project on all the individuals in the society, and not just the parties directly involved (Brent, 2007).

Different types of economic evaluation methods are used to guide public policy decision-making. CBA is often used as a tool in e.g. environmental and transport policy (Grant-Muller, Mackie, Nellthorp, & Pearman, 2001), while CEA is the dominant method for evaluations of healthcare programs (Drummond et al., 2015). An alternative approach to appraisal is MCA, which offers the potential to overcome the challenges of CBA and CEA, especially when making complex decisions that include multiple criteria, simultaneously consider quantitative and qualitative data, and involve multiple stakeholders (Dodgson, Spackman, Pearman, & Phillips, 2009). For example, MCA is the preferred methodology used by the EIB to assess social infrastructure investments, even if the choice of the appraisal tool is ultimately determined by the circumstances of each investment project (see Box 1).

Table 2 compares CBA, CEA and MCA. Each of these evaluation methods is then briefly discussed in the following sections.

Table 2: Comparison of traditional economic evaluation frameworks applied to infrastructure

	Cost-Benefit Analysis (CBA)	**Cost-Effectiveness Analysis (CEA)**	**Multi-Criteria Analysis (MCA)**
Main Objective	To assess if a project is worth the investment	To select the project configuration that ensure the lowest cost per unit of impact	To compare costs and impacts of alternative investment options
Measurement of cost	Expressed in monetary value and discounted at the financial discount rate	Expressed in monetary value and discounted at the financial discount rate	Expressed in monetary value and discounted at the financial discount rate
Identification of benefits	Single or multiple benefits, not necessarily common to the different alternatives	Single benefit, common to the different alternatives and expressed in the same natural unit, but achieved to different degrees	Single or multiple benefits, common to the different alternatives, but achieved to different degrees
Measurement of benefits	Expressed in monetary value and discounted at the social discount rate Lists benefits that cannot be easily monetised and explain why they cannot be monetised	Expressed in natural units (e.g. life-years gained)	Based on the informed judgement of the appraiser, it applies scores and weightings to each of the benefit in order to arrive to a single score
Main output of analysis	Benefit-Cost Ratio (BCR) Economic Internal Rate of Return (EIRR) Net Present Value (NPV)	Cost-Effectiveness Ratio (CER)	Total Weighted Score (TWS)

Interpretation of main output of analysis	BCR > 1 is worth the investment	Project with lower CER is better	Project with higher TWS is better

Source: author summary

Box 1: EIB Use of economic evaluation methodologies across sectors

In appraising the economic viability of investment projects, the EIB uses CBA, CEA and MCA as complementing methodologies.

The EIB uses CBA whenever possible. Depending on the nature of the alternatives to be assessed, and the type of data available, a comprehensive CBA may not be possible. In such cases, the CBA may be replaced by a CEA or a MCA. Given that the CEA is only practicable when the output is homogeneous and easily measurable, it is usually applied by the EIB in sectors such as energy, waste management, water and wastewater. In sectors such as education, health and projects addressing the urban environment the output can have many dimensions and may not be easily measurable, therefore the MCA is a more suitable methodology.

Table 3 summarises the use of methodologies applied by the EIB across sectors. The table is indicative, as the choice of appraisal technique is ultimately determined by the circumstances of each investment project.

Table 3: Most frequently used methodology per sector

CBA	CEA	MCA
Agro-industry Energy Manufacturing Telecommunications Tourism Transport Water and wastewater	Energy Solid waste management Water and wastewater	Healthcare Education Urban and Regional Development

Source: EIB (2013)

3.1.1. Cost-Benefit Analysis (CBA)

CBA is the most commonly used approach to appraise public investment projects (Florio, 2014). Within CBA, both the potential costs and benefits of a particular project are estimated across a set of impacts and converted into monetary terms by multiplying impact units by prices per unit. CBA is a straightforward concept, allowing comparison of projects based on a single metric (Thomopoulos, Grant-Muller, & Tight, 2009).

The basic principle underlying CBA is that decisions have to maximize the net socio-economic benefits of projects (Boardman, Greenberg, Vining, & Weimer, 2017). In other words, there is an underlying assumption that public investment decisions should be founded on the aggregation of individuals' willingness to pay (Brent, 2007).

Once all project cost and benefits have been quantified and valued in money terms, CBA quantifies the economic performance of a project in terms of:

- Economic Net Present Value (ENPV): the difference between the total social benefits and costs, discounted at the social discount rate; if the ENPV is higher than zero, it means that project's economic benefits exceed project's economic costs;
- Economic Rate of Return (ERR): the rate that produces a zero value for the ENPV; if the ERR is higher than the social discount rate, it means that project's economic benefits exceed project's economic costs;
- B/C ratio: the ratio between discounted economic benefits and costs.

While CBA is generally considered a relevant tool for creating better and neutral results for decision-making, it has been criticised for two main reasons (Hwang, 2016):

- Monetary valuation: because there are no natural prices or monetary values for goods like human life, CBA approximates the price of non-market goods whose values are incommensurable (Ackerman & Heinzerling, 2002; Adler, 1998);
- Discounting: discounting future value to compare them with present value becomes controversial when it is applied to the monetary value of non-market goods, as it would encourage, in an extreme example, to adopt a program that saves one life today over a program that would save millions of lives in the future (Ackerman & Heinzerling, 2002; Clowney, 2006); furthermore, the choice of the most appropriate social discount rate has long been a contentious issue (see Box 2).

For the reasons above, CBA for transport infrastructure – i.e. the sector in which this tool has been more extensively applied – has traditionally simplified the evaluation procedure delimiting the domain only to direct effects on the transport market, thus excluding wider economic impacts on other markets such as labour, housing, and consumer goods (Kidokoro, 2004) (see Box 3). Within the context of social infrastructure, benefit valuation has been considered to be more complex than in the transport sector (Adhikari, 1999; Hummel-Rossi & Ashdown, 2002) and the literature lacks guidelines and examples on the categories of benefits to be applied to healthcare, education, and housing infrastructure.

Box 2: The choice of the social discount rate

The social discount rate (SDR) is used in the economic analysis of investment projects to discount economic costs and benefits, and reflects the social view of how future benefits and costs are to be valued against present ones.

Choosing an appropriate social discount rate is crucial for cost–benefit analysis, and has important implications for resource allocations (Zhuang, Liang, Lin, & De Guzman, 2007). The choice of an appropriate social discount rate for cost–benefit analysis of public investment projects has long been a contentious issue and subject to intense debate in the economics literature (Bradford, 1975).

Over the past decades, a number of methods have been proposed to estimate this value (Boardman et al., 2017):

- Using the marginal rate of return on private investment (Harberger, 1969);
- Using the weighted social opportunity cost of capital (Sandmo & Dreze, 1971);
- Using the shadow price of capital (Bradford, 1975; Eckstein, 1958).

However, in recent years, several works have appeared in the literature arguing that the social time preference (STPR) is an appropriate measure of the social discount rate (Evans & Sezer, 2004; Percoco, 2008; Spackman, 2004).

There are significant variations in public discount rate policies practised by countries around the world (Hepburn, 2007; Zhuang et al., 2007), with developing countries in general applying higher social discount rates (6–15%) than developed countries (3–6%). For example, for projects in the European Union, the EIB uses as a reference a social discount rate ranging from 3.5% to 5.5% (EIB, 2013). The World Bank (WB) traditionally has used 10–12% as a notional figure for cost–benefit analysis (Belli, 2001), while the Asian Development Bank (ADB) uses a discount rate of 9% for investment projects such as transport, energy, urban development, and agriculture and 6% for social sector projects (ADB, 2017).

Box 3: CBA and wider economic impacts

CBA for transport infrastructure traditionally assumes perfect competition in all sectors but the transportation one so that it is reasonable to assume that the consumer surplus corresponds to the total social benefit (e.g. Fosgerau & Kristensen, 2005; Jara - Diaz, 1986). This approach has allowed in the past to focus the analysis on the transport market, ignoring any effects on other markets such as labor, housing, and consumer goods (Kidokoro, 2004). In fact, when these conditions are met, the extent of the impact is fully exhausted by measuring the change in surplus that occurs in the primary market.

These assumptions are often convenient for the analysis as they simplify the evaluation procedure delimiting the domain only to direct effects. In traditional valuation methods, therefore, it tends to take the equivalence of the economic benefit from an improvement of the transport system to the travel time saved and the reduction of any other transport costs.

However, this approach has diverted attention from the economic impact analysis of the investment.

The wider economic impacts are the costs and benefits of transport improvements, which have an effect on producers and consumers in other markets, including those effects that can lead to the relocation of businesses and individuals / families, as well as the generation and interregional redistribution of income and employment (Oosterhaven & Elhorst, 2003). The OECD itself has recently called the WEE how those effects are not included in the standard CBA, such as the effects on the economies of scale, economies of agglomeration, thickening of labor markets, as well as changes in the behavior of businesses and individuals as a result of a change in costs or conditions of carriage (Venables, 2017). Whilst there have been relatively strong developments surrounding the theoretical basis for wider economic impacts in recent years, there remains little established practice on how to translate these ideas into robust techniques for individual projects.

3.1.2. Cost-Effectiveness Analysis (CEA)

The CEA approach is similar to CBA but with a fundamental difference. Instead of comparing net benefits with net costs, total costs are divided by an appropriate unit to measure effectiveness.

CEA focuses on a single-dimension of effectiveness and reports it in natural units. It aims to select the project that, for a given level of effectiveness, minimises the net present value of costs or, alternatively, for a given cost, maximises the effectiveness level. Therefore, the CEA is the most suitable approach when the aim of the project is achieving the output at minimal cost (Cellini & Kee, 2010; Johannesson, 1995).

CEA is the preferred evaluation framework when the policy context implies that the service level must be supplied. The project appraisal then focuses on whether the project constitutes the most efficient alternative to supply the service. For these reasons, this methodology is often used in the economic evaluation of health-care programmes (Drummond et al., 2015), but it can also be used to assess some education and environmental projects. For these examples, simple CEA ratios are used, such as the cost per life-year gained, the cost of education per student, the cost per unit of emission reduction, etc.

3.1.3. Multi-Criteria Analysis (MCA)

MCA has been proposed as a means of taking account of a number of different aspects or attributes of benefits (Baltussen & Niessen, 2006).

This evaluation approach is relatively simple (Janssen, 2012). Based on the objectives of the responsible decision-makers, a group of impacts is defined. Unlike CBA, these impacts can be assessed in a number of ways, such as a measured quantity, qualitative assessment or rating. These assessments are then transformed into a scale (typically 0-100), giving a score for each impact for each project. The overall performance of the project can then be estimated by producing an overall project score, calculated by multiplying each impact score by a relative weight for that impact and then summing over all impacts.

Proponents claim that, where standard CBA or CEA are not applicable, MCA provides a systematic, transparent approach that increases objectivity and generates results that can be reproduced (Bonte, Janssen, Mooren, Smidt, & van de Burg, 1998; Korhonen, Moskowitz, & Wallenius, 1992). MCA is considered a useful tool also when the size of the project to be assessed is small and the evaluator possesses limited resources and/or capabilities for carrying out a full CBA (see Box 5).

On the contrary, opponents see the choice and use of weights within the MCA as somewhat arbitrary and the interpretation and role of the overall project score can also be misunderstood in the appraisal context. In particular, there may be a sense that the MCA is *making the decision* rather than *supporting the decision-maker* where projects are ranked by overall score (Grant-Muller et al., 2001).

Box 4 reports a simplified case study on how to apply the MCA to an investment project in the healthcare sector.

Box 4: MCA applied to healthcare infrastructure

Description of the investment project

Building of a new acute hospital of 295 beds, which will facilitate and support the transformation of local healthcare services; two existing acute hospitals are present at local level and they will be merged into a single service and relocated to a new greenfield site acute hospital that is complementary to and networked with other local health and social care services in the area.

Option evaluation

- Do-minimum option, i.e. investing in existing hospital facilities to meet statutory/health and safety standards and replacing the equipment
- Do-medium, i.e. refurbishing and extending the existing hospitals
- Do-maximum, i.e. building a new hospital on a new site

Table 4: Financial evaluation

Capex and Opex (EurM)	Do-minimum	Do-medium	Do-maximum
Initial capex	47.6	180.2	210.7
Life-cycle capex	80.0	34.1	30.1
Annual opex	43.9	44.3	44.2
Net Present Cost (30 years, at 4% financial discount rate)	**846.5**	**967.5**	**991.9**

Table 5: MCA

		Option scores			Weighted option scores		
Benefit criteria	Criteria weights (%)	Do-minimum	Do-medium	Do-maximum	Do-minimum	Do-medium	Do-maximum
High quality care	20	5	8	9	100	160	180
Service synergies	17	3	7	10	51	119	170
Accessibility	17	6	7	9	102	110	153
Patient environment	15	3	7	10	45	105	150
Statutory requirements	10	8	9	10	80	90	100
Ease/timing of implementation	8	6	8	1	48	64	8
Future flexibility	13	2	5	8	26	65	104
Total Weighted Scores	**100**				**452**	**722**	**865**

Table 6: Cost and benefit comparison of options

	Do-minimum	Do-medium	Do-maximum
NPC	846.5	967.5	991.9
TWS	452	722	865
NPC/TWS	**1.87**	**1.34**	**1.15**
Rank	**3**	**2**	**1**

Based on the MCA calculation, therefore taking into account not only the project's capex and opex but also its social benefits, the do-maximum option, i.e. the construction of the new acute hospital, is the preferred option.

Source: adapted from EIB (2013)

Box 5: A revised MCA – The WB Infrastructure Prioritization Framework

Since information in many contexts is limited and many costs and benefits are difficult to monetize, CBA is particularly difficult when governments possess limited resources for appraising large sets of small- and medium-sized projects. In response to the need for an expanded set of tools to support infrastructure prioritization and selection under conditions of imperfect or basic project appraisal and limited resources, the World Bank has developed the Infrastructure Prioritization Framework (IPF) (Marcelo, Mandri-Perrott, House, & Schwartz, 2016).

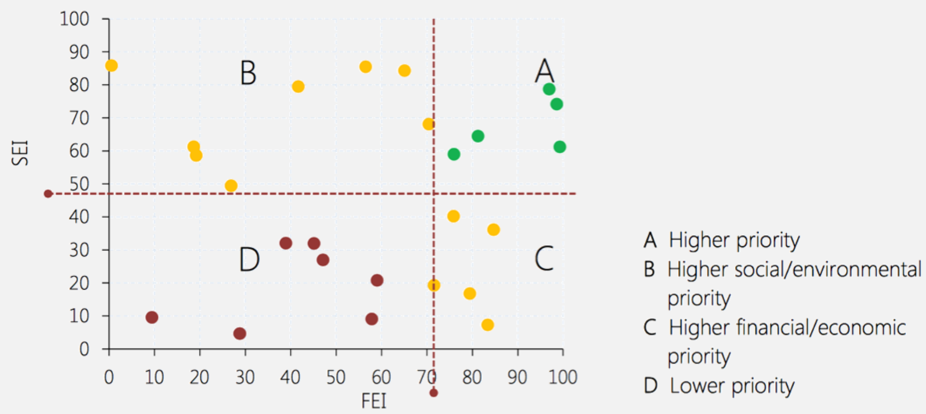
The IPF is a multi-criteria prioritization approach that synthetises project-level financial, economic, social, and environmental indicators into two indices: social-environmental (SEI) and financial-economic (FEI).

The SEI includes different component variables, such as improved access to public services and job and income opportunities created during the construction and execution of investments. Once the social and environmental criteria have been identified, they are scored and weighted to calculate the SEI. The same procedure is used to construct the FEI, but with different component variables. The FEI includes financial profitability and economic value but also indirect economic effects, such as multiplier and network effects on other industries and economic sectors.

Calculation of the SEI and the FEI composite indicators allows the ranking of projects within a sector, according to projected relative performance along each dimension. Projects are then plotted on a Cartesian plane, with axes defined by the SEI and FEI scores, like in Figure 1.

Including the budget limit (i.e. the red dashed lines reported in Figure 1) allows to define the quadrants, where quadrant A includes projects with higher priority to be funded.

Figure 1: WB IPF prioritization matrix



Source: Marcelo et al. (2016)

3.2. Procurement route decision: Value for Money (VfM)

Where government authorities and MDBs can engage in PPPs, they need to supplement the traditional investment decision (whether to undertake the project or not, usually based on an economic justification applying the methodologies shown in Section 3.1) with a procurement route decision. There is general acceptance among scholars and practitioners that this decision should be based on a VfM analysis (Farquharson, de Mästle, & Yescombe, 2011).

In general, in public management, VfM is an umbrella concept that attempts to capture three dimensions of performance simultaneously – the so-called '3Es': Economy, Efficiency and Effectiveness – and it describes an explicit commitment to ensuring the best results possible are obtained from the money spent (McKevitt, 2015; Talbot, 1999).

At project level, VfM is an analysis that compares delivering an investment through a PPP with implementing it through a conventional procurement. The VfM analysis computes the present value of the total lifecycle costs incurred by government in case of a PPP and compares them to an equivalent and usually hypothetical project financed and delivered by the public sector according to a traditional approach, which is referred to as the public sector comparator (PSC).

One of the main criticisms levelled at the VfM is that it focuses solely on the financial cost (risk-adjusted) of PPP or traditional procurement. Scholars like Hodge & Greve (2017) argue that the ‘success’ of the PPP model cannot be determined without asking ‘success for whom’ and Boardman & Hellowell (2015) indicate that PPP should be considered as a VfM option only if it achieves specific government goals and maximizes the value to society.

The EPEC suggests how some non-financial benefits, i.e. socio-economic benefits to service users or wider society from an infrastructure investment implemented via PPP, could be quantified and presented alongside the financial cost comparison for each option in order to acquire a more complete picture of VfM (see Box 6).

Box 6: The non-financial benefits of PPP to be included in the VfM analysis

There is a wide awareness that PPP contracts are more efficient than the traditional public procurement in the management of construction, life cycle and performance risks (Iossa & Martimort, 2015). These benefits are generally referred as *microeconomic case* for the PPP model, achieved by transferring project risk to private investors.

Despite methodologically complex (see, for example, Grimsey & Lewis, 2005), EPEC (2011) suggests that the non-financial benefits of PPP should be incorporated into the VfM framework.

Accordingly to EPEC (2011), the non-financial benefits are delivered through three key mechanisms:

- Accelerated delivery, i.e. an earlier or on-time delivery of the infrastructure, which results in earlier (and potentially increased) output of public services;
- Enhanced delivery, i.e. an applied life-cycle approach to cost optimization and the incentive to provide innovative solutions in the delivery of public services, which result, respectively, in better asset condition and higher residual value, and increased user satisfaction and improved service outcomes;
- Wider social impacts, i.e. positive externalities such as increased employment in depressed areas and reduced carbon emissions.

While the accelerated delivery can be valued in monetary terms, as it is usually calculated in cost-benefit analysis and discounted at the social time preference rate, the other benefits are difficult to be quantified and valued in monetary terms.

3.3. Lessons learnt on traditional evaluation frameworks

Based on the review of existing evaluation frameworks applied by Government and MDBs, as well as on the basis of the relevant literature on the topic, we draw the following lessons learnt.

Lesson 1. Frameworks and metrics to evaluate the PV of infrastructure are abundant.

Traditional evaluation frameworks, such as the CBA, are well established and used by governments and MDBs across the world to evaluate infrastructure project. CBA, CEA and MCA are rooted in the economic theory and inherently incorporate PV dimensions. They are used as complementing tools by many organizations.

Lesson 2. However the evaluation is difficult and full CBA is rarely applied to social infrastructure.

CBA usually considers only the direct effects on the primary market, thus excluding wider economic benefits, in order to simplify the analysis (Kidokoro, 2004). Within the context of social infrastructure, benefit valuation has been considered to be even more complex (Adhikari, 1999; Hummel-Rossi & Ashdown, 2002) and the literature lacks guidelines and examples on how to apply it.

Lesson 3. Ex-ante analyses are not reliable.

CBA is conventionally applied ex-ante and rarely supplemented with empirical ex-post risk analysis focused on documented uncertainties in the estimates of costs and benefits that enter into the analysis. Large inaccuracies in forecasting are well documented and some authors conclude that CBA is not to be trusted for major infrastructure project (Flyvbjerg, 2009). In economics, this have led to discussions of the necessity of “firing the forecaster” (Akerlof & Shiller, 2010, p. 146).

Lesson 4. Results of the evaluation are subject to political influence.

Competition between projects and authorities creates political and organizational pressures that in turn create an incentive structure that makes it rational for project promoters to emphasize benefits and de-emphasize costs and risks (Flyvbjerg, 2009). In addition, policy makers are trapped into a short-term approach (Benitez, Estache, & Søreide, 2010; P. Jackson, 1988) and infrastructure projects are often seen as redistribution aimed at influencing the outcomes of elections (Besley & Coate, 1997). In this context, white elephants may be preferred to socially efficient projects if the political benefits are large compared to the surplus generated by efficient projects (Robinson & Torvik, 2005).

4. Public Value Creation and Measurement: What can we learn from Social Impact Investing?

In the last decade, PV creation has not been the exclusive province of governments, but the private and social sector have also contributed in one way or the other (Meynhardt, 2009). As Jørgensen & Bozeman (2007) argue, PV is not just governmental. And indeed, in recent years, we have witnessed the rise of a new breed of private corporates and investors, who increasingly seek to achieve more than monetary returns with their investment activities and see a value in driving social impact (Bugg-Levine & Goldstein, 2009; Donohoe & Bugg-levine, 2010). This has originated the emergence of different social impact investment approaches, with different social and financial return expectations, such as venture philanthropy, impact investing, ESG (environmental, society and governance) investments, shared value creation, and total societal impact (Bénabou & Tirole, 2010; Buckland, Hehenberger, & Hay, 2013; Freireich & Fulton, 2009; Grabenwarter & Liechtenstein, 2011; Porter & Kramer, 2011).

Along with these efforts aimed at sustainable, responsible business, there has been a rise in the tools available for measuring the social impact of business (Florman, Klingler-Vidra, & Facada, 2016). The most widely advocated set of approaches to social performance measurement involve an assessment of impacts or results, which are broadly labelled as "*impact evaluation"* and "*outcome measurement"* (Ebrahim & Rangan, 2014).

In this section, social impact investing approaches and evaluation frameworks are compared and classified and the application of payment for (social) performance mechanisms in the context of infrastructure is discussed.

4.1. Social impact evaluation frameworks: a classification

As discussed above, the private sector, in recent years, has been more and more incorporating society and environment in its investment decisions. The term "impact" has become part of the everyday lexicon of social enterprises, social sector funders, as well as investors and companies (Ebrahim & Rangan, 2014), and it is used to refer to an organization's specific and measurable role in creating lasting changes in people's lives and environment.

The desire to demonstrate impact has propelled the proliferation of more than 150 impact evaluation methods (Florman et al., 2016). These tools are based on the approach of the so-called *Impact Value Chain* (see Box 7) and used for different objectives by different stakeholders. They are used by investors as well as investees and intermediary organization for up-front screening, due diligence, on-going performance tracking, and learning (Olsen & Galimidi, 2008).

Since what is being measured is rarely quantifiable in a single number, such as a dollar value, or a quantity, and it can be unlikely standardized across different sectors and organizations, investees and investors have developed specific sets of metrics and evaluation methodologies (Ebrahim & Rangan, 2014).

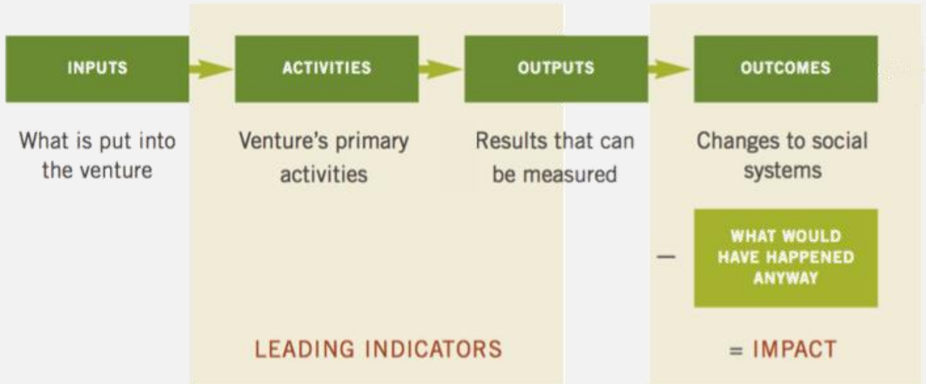
Box 7: Impact Value Chain

The terms *input*, *outcome* and *impact* have been largely applied in the literature as well as in the practice of social impact investing. Olsen & Galimidi (2008) define them as follows:

- *Inputs* are simply the resources invested or allocated to a specific project or organisation to achieve its final mission.
- *Outputs* are results that are directly measurable and leading indicators of impact.
- *Outcomes* are the ultimate intended and unintended changes an organization is trying to make worldwide.
- Finally, *impact* is the portion of total outcome directly related to the organization's activity beyond what would have happened without any intervention.

The relationship among inputs, outputs and final impact is represented by the so-called *Impact Value Chain* (see Figure 2). As Ebrahim & Rangan (2014) point out, however, only few organisations can go beyond their operation output "*to make credible and measurable claims about outcomes*". This is in practice only possible if an organisation either has a narrow scope of activities and the casual link between output and outcomes is clearly established, or the organisation implementing a broad scope of activities is vertically integrated and has control of their entire activity value chain.

Figure 2: Impact Value Chain



Source: Olsen & Galimidi (2008), based on the Impact Value Chain in Clark, Rosenzweig, Long, Olsen, The Rockefeller Foundation. (2003).The Double Bottom Line Methods Catalog.

Many authors have provided a classification for the numerous impact assessment methodologies in use. Such classifications are an important tool, as they shed a light on the peculiarities and commonalities among the different approaches, and provide for a comprehensive understanding of the field.

One classification is provided by Olsen & Galimidi (2008), which analyses impact evaluation methodologies based on their *functional type*; i.e. Rating, Assessment, and Management Systems. In *rating systems*, the impact investment's quality is summarised by a score or symbol, based on a fixed set of indicators. *Assessment systems* deal with a fixed or a customised set of indicators at a specific point in time and evaluate characteristics, practices and/or results of a portfolio. They do not provide the organisations with management tools to track operational data over time. *Management systems* provide tools to manage operational information about impact drivers. Each methodology is further categorised depending on the perspective of the impact created (internal or external to the organisation), and the category of impact it measures (economic, social and environmental).

A second classification is provided by So & Staskevicius (2015), which distinguishes between methodologies used in the pre-investment phase - i.e. methodologies to assess the viability of investments and to decide which to fund - and in the post-investment phase - i.e. methodologies used for goal setting, tracking and monitoring progress, incentives alignment and external reporting throughout the life of the investment, as well as methodologies implemented ex-post to understand what changes in outcome are directly attributable to the implemented programme.

Another classification is provided by Reeder & Colantonio (2013), which groups methodologies according to two main features:

- Degree of integration or synthesis of social and environmental returns; i.e. whether the result is synthetized in a single indicator or a number, or not;
- Degree of participation (consultation and discussion) vs. more technocratic approaches.

Based on these three classification approaches, some of the most common social impact evaluation frameworks have been analysed and compared, as shown in Table 7. For each framework, a brief description of the methodology, the functional type, the phase in which it is applied, the degree of participation and the users who benefit from it are provided. Since the Social Return on Investment (SROI) is probably one of the best known and most applied methodology, with roots in the CBA, is analysed in more details in

Box 8.

Box 8: Social Return on Investment (SROI)

A technique widely advocated is Social Return on Investment (SROI), which is designed to understand, manage and report on the value created by an intervention across three realms: social, economic and environmental – referred to as the *triple bottom line*. SROI was developed in 1997 by the Roberts Enterprise Development Fund with its roots in cost-benefit analysis (Lingane & Olsen, 2004; Nicholls, 2006).

The SROI Network outlines a 6-step framework that can be implemented and adapted to the needs of any organisation and project:

1. Definition of scope and key stakeholders: before starting the analysis, it is fundamental for an organisation to establish its scope (purpose, audience, resources, activities, etc.), the stakeholders involved (people or organisations that experience change of affect the activity, because of the project being analysed) and to what extent they will be involved in the analysis.
2. Mapping of outcomes: the central point of this step is the creation of the so-called Impact Map (or Impact Value Chain). At this stage, the organisation should focus on defining and valuing its inputs and describing its outcomes.
3. Evidencing of outcomes and attribution of value: for each outcome defined in the previous stage, the organisation should come up with suitable indicators of performance, collect related data, establish long-term effects of such outcomes, and finally value them.
4. Establishment of impact: at this stage, the organisation needs to work on attribution; understanding if and to what extent the analysed outcomes are directly linked to the activities of the organisation. At the end of this analysis, only outcomes that are strictly related to the working of the organisation will remain and be counted in the final SROI evaluation.
5. SROI calculation: this is the most technical part of the analysis. Data projection and NPV analysis are performed, along with a sensitivity analysis of the results and of payback period (optional).
6. Reporting, use and embedding: the results of the SROI calculation and of the precedent analysis should be summarised in a meaningful and effective way for the project's stakeholders. The results should, also, be interpreted to obtain management insights for the organisation itself.

Even if SROI is based upon the principles of CBA, as costs and benefits are quantified and compared to evaluate the desirability of a given intervention expressed in monetary units, key differences exists between the two approaches:

- Context of application: SROI has its focus on the third sector, compared to CBA that has been extensively applied to public service and infrastructure provision;
- Scope of the impact assessment. SROI has been described as an extension of the CBA to incorporate in addition the broader socio-economic and environmental outcomes (Banke-Thomas, Madaj, Charles, & van den Broek, 2015)
- Stakeholders' involvement: The calculation of SROI requires to involve stakeholders at every stage (Arvidson, Lyon, McKay, & Moro, 2013) through assessing how much stakeholders value the intervention.

This method has fuelled strong debates among academics and practitioners. If, on one hand, it is one of the few approaches that allows the quantification of social impact in dollar-value and forces organizations to frame their argument to make a case for clear expected benefits and costs (So & Staskevicius, 2015), on the other, it fails to account for many instances of impact, since the quantification of social value depends on the ability to determine associated costs and revenues thus leaving out those social benefits that do not have easily identifiable gains or savings (Polonsky & Grau, 2011).

Table 7: A comparison and classification of most used social impact evaluation methodologies

Method	Description	Methodology	Functional type	Timeline	Degree of participation	Users
B Rating System	Online survey, database and report designed to analyse and improve a company's performance relative to social and environmental standards.	Depending on the industry, organisations are asked between 60 and 170 questions to assess their performance across 5 categories: governance and impact on employees, community, environment and consumers. The report gives a real-time overall score (out of 5 stars) and 10 to 15 sub-categories scores.	Rating	Planning and Monitoring Impact	Low	Entrepreneurs /organizations and investors
Global Impact Investing Rating System (GIIRS)	Comprehensive and transparent system for assessing the social and environmental impact of developed and emerging market companies and funds with a ratings and analytics approach analogous to Morningstar investment rankings and Capital IQ financial analytics	It provides a score by assessing performance against several impact areas (governance, community, workers, environment, socially- and environmentally-focused business model). After completing a GIIRS Assessment, companies are assessed and reviewed by GIIRS and only at the end receives a GIIRS Ratings Report.	Rating, Assessment	Monitoring and Evaluating Impact	Low	Investors
IRIS Metrics	Online library with performance indicators with standardised definitions. Its aim is to provide a set of standardised indicators for organisations to use when reporting their social and environmental performance.	Organisations can adopt IRIS metrics by selecting a set of IRIS indicators that are applicable to their work, and reporting performance data consistent with those indicators. IRIS does not indicate which metrics an organisation should use; it is left to the organisation to decide.	Rating, Assessment	Monitoring and Evaluating Impact	Medium / High	Entrepreneurs /organizations and investors
Social Impact Assessment (SIA)	Projected impact assessment like financial projections. It follows the SROI Framework to define, measure and document impact.	3 steps: 1. definition of an organisation's social value proposition through the theory of change 2. qualification of social value by listing the 3 most correlate social indicators with the desired outcomes. 3. monetisation of social impact value	Assessment	Estimating Impact	Medium / high	Entrepreneurs /organizations and investors

		to be created in the next 10 years.				
SROI Framework	Set of guidelines for the measurement of non-financial impact per investment for use by companies and investors, non-profits and funders, and governmental entities.	Six stages: Scope and stakeholders, Mapping outcomes, Evidencing outcomes, Establishing impact, Calculating the SROI, Reporting and Embedding. Guidelines include advice on the attribution of impact, how to determine whether an impact is worth measuring and cost accounting.	Assessment, Management	Estimating, Monitoring and Evaluating Impact	High	Entrepreneurs /organizations and investors
Balanced Scorecard Modified to Include Impact	It assumes that companies measure operational performance in terms of five outcomes perspectives that go beyond financial measures alone: financial, customer, business process, learning-and-growth, and social impact to arrive at a more useful view of near term and future performance.	Each organisation establishes a scorecard to measure performance and to communicate performance to stakeholders.	Management	Planning and Monitoring Impact	Medium	Entrepreneurs /organizations

4.2. Applying impact evaluation frameworks to pay for (social) performance: the case of Social Impact Bonds

A form of social impact investing is Social Impact Bond (SIB), which is an innovative contractual and financing mechanism in which governments or commissioners enter into agreements with social service providers, such as social enterprises or non-profit organizations, and private investors to pay for the delivery of pre-defined social outcomes (OECD, 2016; Social Finance, 2011).

Given the set of contracts involved, the up-front capital provided by private investors and the payment made by the government if pre-determined performance standards are met (see Box 9), SIBs have been considered as an expansion of the infrastructure PPP model into social program delivery (Joy & Shields, 2013; Warner, 2013). However, the focus of this form of partnership is no more an infrastructure-based service, as it is in the traditional PPP/PFI scheme, but social issues that require new approaches to be tackled. And, indeed, SIBs have been conceived not only to overcome the shortcomings of traditional public and third-sector service provision, i.e. lack of capital, performance management, efficiency and accountability, but also to bring more innovation in service design and delivery and encourage key stakeholders to focus on the achievement of higher social outcomes (Fraser, Tan, Lagarde, & Mays, 2018; Leventhal, 2012).

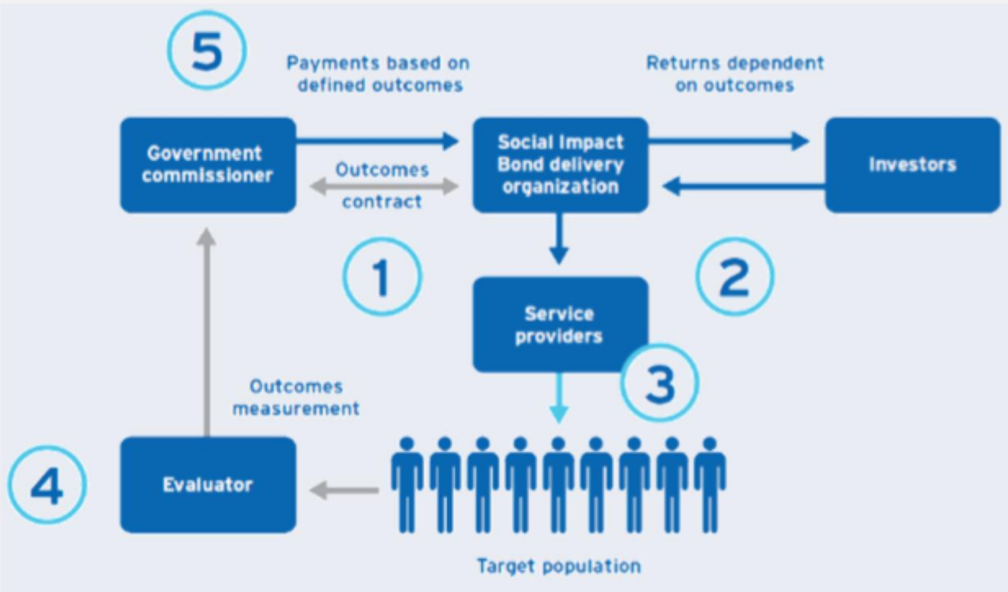
Box 9: How Social Impact Bonds (SIBs) work

As shown in Figure 3, SIBs involve, in essence, a set of contracts, the basis of which is an agreement by government to pay for an improvement in a specific social outcome once it has been achieved (1). Investors provide the up-front capital to deliver the intervention (2), thus assuming the financial risk. These funds are passed to service providers, generally through an intermediary, to cover their investment and/or operating costs to deliver an intervention to a selected target group of beneficiaries (3). If an independent evaluator determines that the measurable outcomes agreed up-front are achieved (4), government will repay the investors for their initial investment plus a return for the financial risks they took (5). In case of lower or higher performance in the achievement of the target outcomes, the payment will be, respectively, higher or lower; in the latter case, no payment is secured in case no outcome is generated. In other words, if the intermediary and subcontractors are not able to generate the expected outcomes, the payment done by the authority is cut or cancelled and no return on the investment is generated.

Considered this financial structure, in spite of their names, SIBs are not bonds in the conventional sense, since the capital, which can be assimilated to an equity investment, is generally provided by one or few investors (Cox, 2011; Liang, Mansberger, & Spieler, 2014; McHugh, Sinclair, Roy, Huckfield, & Donaldson, 2013; Warner, 2013).

The fundamental underpinning mechanism of SIBs relies upon the measurement of social outcomes and the realization of cashable savings as a consequence of improved outcomes (e.g. lower recidivism rates will accrue savings in police, courts, prison, probation, etc.). The savings in public service budgets are used to fund the repayment of the intervention plus the financial return to private investors. This mechanism has been regarded as a way to improve performance management and measurement in social service delivery, introduce greater efficiency and accountability between commissioners and service providers and increase innovation and personalization of services (Fraser et al., 2018; E. T. Jackson, 2013; Liebman & Sellman, 2013)

Figure 3: SIB underpinning scheme



Even if the main rationale for introducing SIBs is the need to improve the outcome delivery, through innovation in social service provision, international experiences show that the majority of SIBs are based on already implemented and well-established models delivered by service providers with proven track record (Arena, Bengo, Calderini, & Chiodo, 2016; Gustafsson-Wright, Gardiner, & Putcha, 2015). One possible explanation of this scarce innovations could be that investors motivated by a return on investment have little incentive to fund risky innovative experiments (Roy, McHugh, & Sinclair, 2018). Since social innovation is risky, as it happens for high-tech innovation (Martin & Scott, 2000), it should imply a strategic role of the government, even with some forms of financial support or risk sharing, which is exactly the opposite of the SIB model, based, on the contrary, on a complete risks' transfer to the private sector. Actually, SIB international experiences show that, in many cases, private investors do not bear the risk of achieving the social outcomes, since commissioning public authorities or, more frequently, philanthropic investors, such as foundations, provided guarantees to cover up to the 95% of capital losses. Drawing on the PPP literature, it must be noted that, if guarantees of any kind are provided, the probability of adverse selection (Saussier, 2013) and moral hazard (Engel, Fischer, & Galetovic, 2009; Hellowell, Vecchi, & Caselli, 2015) increases, therefore investors may loose any incentive to reach the target social outcome. However, well designed guarantees may be important to mitigate the risks associated to innovative experiments and sustain the attraction of private capital into SIBs, especially in their early phase of development, as it has been recommended for PPP for infrastructure development (Vecchi, Hellowell, Della Croce, & Gatti, 2016).

Another key rationale behind SIBs is the realization of savings, for the public sector, as a consequence of improved outcomes, which would be ultimately used to deliver a higher financial return to private investors. In order to assess the desirability of a SIB and quantify the savings for the commissioning authority, international experiences show that a VfM analysis has been usually carried out. While the traditional VfM applied to PPP/PFI typically focuses solely on the financial costs (risk-adjusted) of the different investment options (Boardman & Hellowell, 2017), the VfM methodology applied to SIB represents a first attempt to go beyond the mere financial value and quantify, in monetary terms, the impact of improved outcomes. However, it must be noticed that the focus has been much more on the realization of savings in the public budget as a consequence of improved outcomes rather than on the improved outcomes themselves (e.g. savings in police, courts, prison, probation, etc., as a consequence of lower recidivism rates, rather than the value for the society of lower recidivism rates). This approach could make governments and delivery organizations to prefer more standard programs, which may generate short-term savings but limited long-term social impacts. The short-term perspective may be preferred also by investors, because results are easier to be quantified and the risk of default is lower (Disley & Rubin, 2014; Fox & Albertson, 2012).

4.3. Lessons learnt from Social Impact Investing

Based on the review of social impact investing approaches and tools, we draw the following lessons learnt.

Lesson 1. There are private investors that are willing to take the risk of social outcomes. However the extension of the SIB-model to infrastructure-based PPP contracts may have some limits.

The rise of social impact investing demonstrates that there are investors that are willing to take the risk to reach social outcomes. In particular, SIBs are an example of pay-for-performance contracts where the payment mechanism is linked to the achievement of pre-determined social outcomes. However, from the analysis of SIBs international experiences, it has emerged that the model has been generally applied to small scale projects, at local level, with limited risk transfer to financial investors and, despite that, innovation. Drawing of these evidences, we may deduce that the amount of money requested to develop hard infrastructure, the long-term perspective to generate social results, the risk-adverse profile of long-term investors generally involved in infrastructure projects (Vecchi et al., 2016), and their preference for standardized solutions could prevent the application of the SIB model to infrastructure-based PPP. Furthermore, to make the SIB model consistent to infrastructure projects – especially in the social field – and to reach superior social outcomes, the private operator should be involved in the delivery of core services, which, in general, have remained under the responsibility of the public sector in PPP/PFI-like approaches.

Lesson 2. Many impact evaluation methodologies exist, no standardized approach.

Along with the rise of social impact investing, many impact evaluation methodologies have been developed. They have their roots in the economic theory (e.g. SROI) and incorporate the broader socio-economic and environmental outcomes. Besides the efforts to create common approaches, investees and investors apply specific sets of metrics depending on the type of project and sector.

Lesson 3. A number of stakeholders are involved in impact measurement.

In social impact investing, PV creation bases its practice in the systems of dialogue, exchange and co-creation among relevant interest groups (Stoker, 2006). Therefore, impact evaluation involves stakeholders at every stage through assessing how much they value the intervention. All parties involved usually agree on the main outcomes measured as well as the timing of measurement. The evaluation is often performed by an independent evaluator.

Lesson 4. Impact evaluation is carried out at every stage, and for different purposes.

Impact evaluation is carried out for rating, assessment and management purposes, at different stages, i.e. pre, during and posts the investment. Results are usually compared and triangulated on an on-going basis.

5. Conclusion and recommendations

In this conference paper we have reviewed the existing methodologies applied by government authorities and MDBs around the world to assess infrastructure investments; we have also analysed and compared the approaches and tools applied by private investors to screen and monitor their social impact investments. On the basis of the lessons learnt from these reviews, we draw the following recommendations to the EIB and the HLTF.

Recommendation 1. CBA and other economic evaluation frameworks are the preferred tools to measure the public value of social infrastructure, but:

- They should include wider socio-economic and environmental outcomes;
- They should be used not only for *ex-ante* project prioritization and screening, but also for project monitoring and *ex-post* evaluation.

Recommendation 2. To avoid that project promoters adopt opportunistic behaviours and overestimate project benefits and/or underestimate costs:

- Forecasts and business cases should be made subject to independent peer review;
- Payment-for-social-performance mechanisms should be incorporated (e.g. if social outcomes are not achieved as foreseen, an increase in the loan interest rate is applied).

In addressing these recommendations the following points of attention may have to be considered:

- Given that the casual links between infrastructure expenditure and social outcome are elusive, it is vital to involve relevant stakeholders to identify the main expected results of a project.
- As demonstrated by SIBs, the incentive – base structure of the PPP approach can be seen as the preferred perimeter to experiment payment-for-social-performance mechanisms.
- The amount of money requested to develop hard infrastructure, the long-term perspective to generate social results, the risk-adverse profile of long-term investors generally involved in infrastructure projects (Vecchi et al., 2016), and their preference for standardized solutions could prevent the application of the SIB model to infrastructure-based PPP.

- Small-scale experimentations and well-designed guarantees may be important to attract private capital and test the application of this mechanism.

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